

**SOFAR**

60K ... 80KTLX-G3

60 / 80 kW

THREE-PHASE

- Max. efficiency up to 98.7%
- Compatible with 500 W+ PV modules
- Type II SPD for both DC and AC side, optional: Type I
- Supports Modbus Communication, external WiFi
- Low start-up voltage, wide MPPT voltage range

SIX MPPTS

- Remote firmware upgrade
- I-V curve scanning function
- 6 MPP trackers with 1.5 times DC overload
- Longtime 110% AC overload ability

Datasheet
**SOFAR
60KTLX-G3**
**SOFAR
80KTLX-G3**

Input (DC)		
Recommended max. input power (Wp)	90000	120000
Number of MPP trackers	6	
Number of DC inputs	2 per MPPT	
Max. input voltage (V)	1100	
Start-up voltage (V)	200	
Rated input voltage (V)	620	
MPPT operating voltage range (V)	180-1000	
Full power MPPT voltage range (V)	550-800	
Max. input MPPT current (A)	6*32	6*40
Max. input short circuit current (A)	6*50	6*60
Output (AC)		
Rated power (W)	60000	80000
Max. AC power (VA)	66000	88000
Max. output current (A)	100	133.3
Rated grid voltage	3 / N / PE, 230 / 400 Vac	
Grid voltage range	310 - 480 Vac (according to local standard)	
Rated grid frequency	50 / 60 Hz	
Grid frequency range	45 Hz-55 Hz / 55 Hz-65 Hz (according to local standard)	
Active power adjustable range	0~100%	
THDi	< 3%	
Power factor	1 default (adjustable +/-0.8)	
Performance		
Max. efficiency	98.70%	
European efficiency	98.20%	
Protection		
DC reverse polarity protection	Yes	
Anti-islanding protection	Yes	
Leakage current protection	Yes	
Ground fault monitoring	Yes	
PV-array string fault monitoring	Yes	
Anti reverse power function	Yes	
DC switch	Optional	
Input / output SPD	PV: type II standard, optional: type I. AC: type II standard	
Communication		
Communication	RS485/Bluetooth Optional: WiFi/Ethernet	
General Data		
Ambient temperature range	-30°C~+60°C	
Self-consumption at night (W)	< 2	
Topology	Transformerless	
Degree of protection	IP66	
Allowable relative humidity range	0~100%	
Max. operating altitude	4000 m	
Weight (kg)	50	
Cooling	Fan	
Dimension (mm)	687*561*275	
Display	LCD, App via Bluetooth	
Standard		
EMC	EN 61000-6-2, EN 61000-6-3, EN 61000-3-11, EN 61000-3-12	
Safety standards	IEC 62109-1/2, IEC 62116, IEC 61727, IEC 61683, IEC 60068 (1,2,14,30), IEC 60255	
Grid standards	VDE V 0124-100, V 0126-1-1, VDE-AR-N 4105, CEI 0-21 / CEI 0-16, UNE 206 007-1, EN 50549, G99, EN 50530	

* All specifications are subject to change without notice.

SOFAR 60KTLX-G3 / 80KTLX-G3_EN_202209

Certificado de Conformidad

Por medio del certificado de producto número / By the product certificate number

N° 2622/0135-CER

Emitido a: / Issued to:

Propietario de la licencia /
License holder:

Shenzhen SOFARSOLAR Co., Ltd.
11/F., Gaoxingqi Technology Building, No.67 Area, Xingdong Community,
Xin'an Sub-district, Bao'an District, Shenzhen City, Guangdong Province, P.R. China



Marca / Trademark:



Dirección de Fábrica /
Factory location:

Dongguan SOFAR SOLAR Co., Ltd.
1F - 6F, Building E, No. 1 JinQi Road, Bihu Industrial Park, Wulian Village,
Fenggang Town, Dongguan City, Guangdong Province, P.R. China

Se certifica que el producto: / It is certified that the product:

Tipo de aparato: / Type of product: **Solar Grid-tied Inverter**

Modelos / Models:

**SOFAR
60KTLX-G3**

**SOFAR
70KTLX-G3**

**SOFAR
80KTLX-G3**

Datos técnicos: /
Rated characteristics:

Potencia nominal / Rated Power

60 kW

70 kW

80 kW

Tensión nominal / Rated Voltage

230/400 V_{ac}

Frecuencia nominal / Rated Frequency

50 Hz

Versión Firmware / Firmware version

V000001

Número de fases / Number of phases

3/N/PE

Transformador de aislamiento / Isolation transformer

NO / NO

Está en cumplimiento con las normas: / Is in compliance with of the standards:

- Norma Técnica de Supervisión de la Conformidad de los Módulos de Generación de electricidad según el Reglamento UE 2016/631. Revisión 2.1 del 9 de julio de 2021 (*)
- Corrección de errores de la versión 2.1 (del 9/7/2021) de la Norma Técnica de Supervisión de la Conformidad de los Módulos de Generación de electricidad según el Reglamento UE 2016/631. Revisión 1.0 del 8 de octubre de 2021.

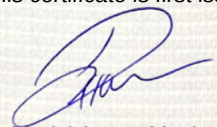
(*) Ver en la página 2 más detalles sobre los requisitos de esta norma que están evaluados y en cumplimiento bajo el alcance de este certificado. / (*) See page 2 for more details regarding the standard's requirements that are evaluated and in compliance under the scope of this certificate.

Se certifica que las Unidades de Generación Eléctrica (UGE) indicadas en este certificado cumplen con los requisitos estipulados en la norma certificada para solicitudes de conexión según **TIPO A**. / It is certified that Electrical Generating Units (UGE) above indicated are in compliance with requirements detailed in the above referenced standard for grid connections of **TYPE A**.

El equipo antes mencionado está certificado conforme con el procedimiento interno de SGS PE.T-ECPE-65 de acuerdo con los requisitos de la norma UNE-EN ISO/IEC 17065. / The above-mentioned generating unit is certified according to the SGS internal procedure PE.T-ECPE-65 based on the requirements of the UNE-EN ISO / IEC 17065.

Este certificado se emite por vez primera: 30 de mayo de 2022. / This certificate is first issued on 30th May 2022.

Madrid, 30 de mayo de 2022


Daniel Arranz Muñiz
Certification Manager



Requisito / Requirement	NTS	Tipo / Type	Cumplimiento / Compliant	Nombre Entidad Emisora / Name of Issuing Entity	Ev. (*)
Modo regulación potencia-frecuencia limitado sobrefrecuencia (MRPFL-O) / Power-frequency regulation mode limited to overfrequency (MRPFL-O)	5.1	≥A	SÍ / YES (TRF No. 2222/0135)	SGS	P
Modo regulación potencia-frecuencia limitado-subfrecuencia (MRPFL-U) / Power-frequency regulation mode limited to underfrequency (MRPFL-U)	5.2	≥C	NO APLICABLE / NOT APPLICABLE	--	--
Modo regulación potencia-frecuencia (MRPF) / Power-frequency regulation mode (MRPF)	5.3	≥C	NO APLICABLE / NOT APPLICABLE	--	--
Control de potencia-frecuencia / Power-Frequency Control	5.4	≥C	NO APLICABLE / NOT APPLICABLE	--	--
Capacidad de control y el rango de control de la potencia activa en remoto / Active Power Requirements	5.5	≥C	NO APLICABLE / NOT APPLICABLE	--	--
Emulación de inercia durante variaciones de frecuencia muy rápidas / Inertia Emulations	5.6	≥C	NO APLICABLE / NOT APPLICABLE	--	--
Capacidad de potencia reactiva a la capacidad máxima y por debajo / Reactive power capabilities at the EUT rated power and below	5.7	≥B	NO APLICABLE / NOT APPLICABLE	--	--
Modos de control de la potencia reactiva / Reactive power control modes	5.8	≥B	NO APLICABLE / NOT APPLICABLE	--	--
Control de amortiguamiento de oscilaciones / Control of oscillation damping	5.10	≥C	NO APLICABLE / NOT APPLICABLE	--	--
Capacidad para soportar huecos de tensión de los MPE conectados por debajo de 110 kV / Capability to withstand voltage grid faults for POC below 110 kV	5.11	≥B	NO APLICABLE / NOT APPLICABLE	--	--
Capacidad para soportar huecos de tensión de los MPE conectados por encima de 110 kV / Capability to withstand voltage grid faults for POC above 110 kV	5.11	D	NO APLICABLE / NOT APPLICABLE	--	--
Recuperación de la potencia activa después de una falta / Active power recovery after a grid fault	5.11	≥B	NO APLICABLE / NOT APPLICABLE	--	--
Inyección rápida de corriente de falta en el punto de conexión en caso de faltas (trifásicas) simétricas / Rapid current injection control	5.11	≥B	NO APLICABLE / NOT APPLICABLE	--	--
Capacidad de participar en el funcionamiento en isla / Islanding requirements	5.13	≥C	NO APLICABLE / NOT APPLICABLE	--	--

(*) Evaluado por: / Evaluated by:

P: Prueba de conformidad / Test of compliance

S: Simulación de conformidad / Simulation of compliance



Certificado de Conformidad

Por medio del certificado de producto número / By the product certificate number

Nº 2622/0135-1-B-CER

Emitido a / Issued to:

Titular del certificado / License holder:

Shenzhen SOFARSOLAR Co., Ltd.

11/F., Gaoxingqi Technology Building, No.67 Area, Xingdong Community,
Xin'an Sub-district, Bao'an District, Shenzhen City, Guangdong Province, P.R. China

Marca / Trademark:



Fábrica / Manufacturer:

Dongguan SOFAR SOLAR Co., Ltd.

1F - 6F, Building E, No. 1 JinQi Road, Bihu Industrial Park, Wulian Village,
Fenggang Town, Dongguan City, Guangdong Province, P.R. China

Se certifica que el product / It is certified that the product:

Tipo de aparato / Type of product: **Solar Grid-tied Inverter**

Modelos / Models:

Datos técnicos / Rated characteristics:

Potencia nominal / Rated Power

**SOFAR
60KTLX-G3**

60 kW

**SOFAR
70KTLX-G3**

70 kW

**SOFAR
80KTLX-G3**

80 kW

Tensión nominal / Rated Voltage

230/400 V_{ac}

Frecuencia nominal / Rated Frequency

50 Hz

Versión Firmware / Firmware version

V000001

Número de fases / Number of phases

3/N/PE

Transformador de aislamiento / Isolation transformer

No / No

Está en cumplimiento con los requisitos de la norma y regulación / Is in compliance with the requirements of standard and regulation:

- **RD 647/2020**, de 7 de julio, por el que se regulan aspectos necesarios para la implementación de los códigos de red de conexión de determinadas instalaciones eléctricas. ⁽¹⁾

(1) Observación: Siendo **SOLO** certificado los requisitos para funciones de protección ante variaciones anormales de tensión y frecuencia, auto reconexión y factor de potencia en la red según viene definido en el Real Decreto 647/2020 / **(1) Remark:** Being **ONLY** certified the protective functions requirements for voltage and frequency abnormal variations, Self-reconnection and Power Factor in the grid stated in the Real Decreto 647/2020.

El equipo antes mencionado está certificado conforme con el procedimiento interno 4 de SGS de acuerdo con los requisitos de la norma UNE-EN ISO / IEC 17065. / The above-mentioned generating unit is certified according to the SGS internal procedure 4 based on the requirements of the UNE-EN ISO / IEC 17065.

Este certificado se emite por vez primera: 21 de junio de 2022. / This certificate is first issued on 21st of June 2022.

Este certificado es válido hasta: 21 de junio de 2027. / This certificate is valid until the 21st of June 2027.

Madrid, 21 de junio de 2022.



Daniel Arranz Muñiz
Certification Manager



Certificado de Conformidad

Por medio del certificado de producto número / By the product certificate number

Nº 2622/0135-1-A-CER

Emitido a / Issued to:

Titular del certificado / License holder:

Shenzhen SOFARSOLAR Co., Ltd.

11/F., Gaoxingqi Technology Building, No.67 Area, Xingdong Community,
Xin'an Sub-district, Bao'an District, Shenzhen City, Guangdong Province, P.R. China

Marca / Trademark:



Fábrica / Manufacturer:

Dongguan SOFAR SOLAR Co., Ltd.

1F - 6F, Building E, No. 1 JinQi Road, Bihu Industrial Park, Wulian Village,
Fenggang Town, Dongguan City, Guangdong Province, P.R. China

Se certifica que el product / It is certified that the product:

Tipo de aparato / Type of product: **Solar Grid-tied Inverter**

Modelos / Models:

**SOFAR
60KTLX-G3**

**SOFAR
70KTLX-G3**

**SOFAR
80KTLX-G3**

Datos técnicos / Rated
characteristics:

Potencia nominal / Rated Power

60 kW

70 kW

80 kW

Tensión nominal / Rated Voltage

230/400 V_{ac}

Frecuencia nominal / Rated Frequency

50 Hz

Versión Firmware / Firmware version

V000001

Número de fases / Number of phases

3/N/PE

Transformador de aislamiento / Isolation transformer

No / No

Está en cumplimiento con la norma / Is in compliance with the standard:

- **UNE 217002: 2020** Inversores para conexión a la red de distribución. Ensayos de los requisitos de inyección de corriente continua a la red, generación de sobretensiones y sistema de detección de funcionamiento en isla

Está en cumplimiento con los requisitos de la norma y regulación / Is in compliance with the requirements of standard and regulation:

- **IEC 62116** "Utility-interconnected photovoltaic inverters-Test procedure of islanding prevention measures"
- **Anexo I, apartado 2.3.6 y 5.3 de la Orden Ministerial TED/749/2020**, de 16 de julio, por la que se establecen los requisitos técnicos para la conexión a la red necesarios para la implementación de los códigos de red de conexión.

El equipo antes mencionado está certificado conforme con el procedimiento interno de SGS PE.T-ECPE-23 de acuerdo con los requisitos de la norma UNE-EN ISO/IEC 17065. / The above-mentioned generating unit is certified according to the SGS internal procedure PE.T-ECPE-23 based on the requirements of the UNE-EN ISO / IEC 17065.

Este certificado se emite por vez primera: 21 de junio de 2022. / This certificate is first issued on 21st of June 2022.

Este certificado es válido hasta: 21 de junio de 2027. / This certificate is valid until the 21st of June 2027.

Madrid, 21 de junio de 2022.

Daniel Arranz Muñoz
Certification Manager





PROTOTYPE DECLARATION / Prototypenbescheinigung

Product prototype certificate number

No. 2622/0342-PTCER

For the company: / Für das Unternehmen

Shenzhen SOFARSOLAR Co., Ltd.

11/F., Gaoxingqi Technology Building, No.67 Area, Xingdong Community, Xin'an
Sub-district, Bao'an District, Shenzhen City, Guangdong Province, P.R. China



Has provided to E&E Product Certification Body of SGS the technical documentation indicated in both articles no. 12 of standards /

Hat der E&E-Produktzertifizierungsstelle von SGS die technischen Dokumente für beide Artikel-Nr. 12 des Standards überliefert:

- **VDE-AR-N 4110: 2018.** Technical requirements for the connection and operation of customer installations to the medium voltage network (TAR medium voltage) /
VDE-AR-N 4110: 2018. Technische Voraussetzungen für den Anschluss und Betrieb von Kundenanlagen an das Mittelspannungsnetz (TAR-Mittelspannung).

For the product / Für das Produkt: **Type 2 PV inverter / PV-Wechselrichter Typ 2**

Models / Modelle:		SOFAR (60 / 70 / 75 / 80) KTLX-G3
Technical Data / Technische Daten:		
DC	Max. Input voltage / <i>Max.-Eingangsspannung:</i>	See Annex 3 / siehe Anhang 3
	MPPT Voltage Range / <i>MPPT-Spannungsbereich:</i>	See Annex 3 / siehe Anhang 3
	No. of MPP inputs per tracker / <i>Anzahl der MPP-Eingänge pro Tracker</i>	See Annex 3 / siehe Anhang 3
	Max. input current / <i>Max.-Eingangsstrom:</i>	See Annex 3 / siehe Anhang 3
AC	AC output power/ <i>AC-Ausgangsleistung:</i>	See Annex 3 / siehe Anhang 3
	Max. AC output current / <i>Max. AC-Ausgangsstrom:</i>	See Annex 3 / siehe Anhang 3
	Nominal Grid Voltage / <i>Nominale Netzspannung:</i>	See Annex 3 / siehe Anhang 3
	Nominal Grid Frequency / <i>Nominale Netzfrequenz:</i>	See Annex 3 / siehe Anhang 3

We confirm that the above mentioned PV inverters are considered as Prototypes in accordance with the VDE-AR-N 4110 and the standard FGW TR 8 / Hiermit bestätigen wir, dass es sich bei der genannten EZE nach VDE-AR-N 4110 und FGW TR 8 um einen Prototyp handelt

- **FGW TR8. Certification of the Electrical Characteristics of Power Generating Units, Systems and Storage Systems as well as for their Components to the Grid. Revision 9.**
FGW TR8. Zertifizierung der elektrischen Eigenschaften von Erzeugungseinheiten und -anlagen, Speicher sowie für deren Komponenten am Stromnetz. Revision 9.

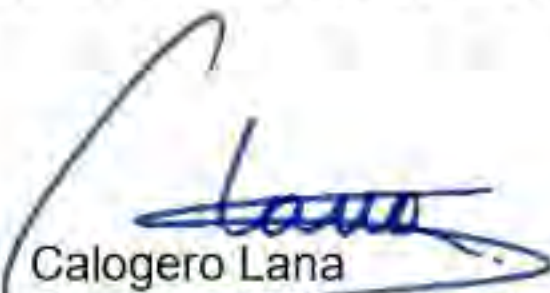
Test reports and certificates will be issued when the testing process is finished and evaluated with positive result.

Testberichte und Zertifikate werden nach Abschluss des Testprozesses ausgestellt und mit positivem Ergebnis bewertet.

Restrictions or deviations / Einschränkungen und Abweichungen:

A connecting terminal plate has to be installed separately if necessary / Eine Prüfklemmleiste ist bei Bedarf separat nachzurüsten.

Brussels, 1st of August 2022


Calogero Lana
Certification Manager /
Zertifizierungsmanage

Annex 1 / Anhang 1

This certificate confirms that the mentioned generation unit is a prototype according to FGW TR 8. For this purpose, the PGU is described below and the main technical developments or innovations are presented: /

Diese Bescheinigung bestätigt, dass es sich bei der genannten Erzeugungseinheit nach FGW TR 8 um einen Prototypen handelt. Dazu wird im Folgenden die EZE beschrieben und die wesentlichen technischen Weiterentwicklungen oder Neuerungen dargestellt:

Description of the generating unit / Beschreibung der Erzeugungseinheit:

modules from solar radiation into the public alternating current grid using power electronics. /
Die Photovoltaikerzeugungseinheit (PV-EZE) ermöglicht die Einspeisung von Gleichstrom erzeugt mittels Photovoltaikmodulen aus solarer Einstrahlung in das öffentliche Wechselstromnetz unter Verwendung von Leistungselektronik.

Treatment according to FGW TR 8, 2.3.2.2 / Behandlung nach FGW TR 8, 2.3.2.2:

The mentioned PGU is a non-wind generation unit. The plant certificate must be issued two years after the commissioning of the first PGU at the latest. /

Bei der genannten EZE handelt es sich um eine Nicht-Wind-Erzeugungseinheit. Spätestens zwei Jahre nach der Inbetriebnahme der ersten EZE muss das Anlagenzertifikat erstellt werden.

The PGU is operated in an PGS (generation plant), which consists of an PGU with PGU certificate and prototypes (case 2). Manufacturer's data must be compiled and provided for certification of the plant. The final plant certificate is issued when the PGU certificate is available for the generation unit in question. /

Die EZE wird in einer EZA (Erzeugungsanlage) betrieben, welche aus EZE mit EZE-Zertifikat und Prototypen besteht (Fall 2). Herstellerangaben müssen erstellt und für die Zertifizierung der Anlage zur Verfügung gestellt werden. Das endgültige Anlagenzertifikat wird erstellt, wenn das EZE-Zertifikat für die genannte Erzeugungseinheit vorliegt.

CEBEC

Annex 2 / Anhang 2

This certificate confirms that the mentioned generation unit is a prototype according to FGW TR 8. For this purpose, the PGU is described below and the main technical developments or innovations are presented: /

Diese Bescheinigung bestätigt, dass die genannte Erzeugungseinheit (EZE) in der Lage ist, die Anforderungen an die elektrischen Eigenschaften der Erzeugungseinheit nach VDE-AR-N 4110 zu erfüllen. Dazu wird im Folgenden die Übereinstimmung der elektrischen Eigenschaften der EZE mit den Anforderungen nach VDE-ARN 4110 nachgewiesen:

VDE-AR-N 4110	Comment and reference / Kommentar und Bewertung
12 Regulation for prototypes / Prototypen-Regelung A prototype is the first power generating unit of a type presenting substantial technological developments or innovations and all other power generating units of this type put into operation within two years after the commissioning of the first power generating unit of this type. / <i>Ein Prototyp ist die erste Erzeugungseinheit eines Typs, der wesentliche technische Weiterentwicklungen oder Neuerungen aufweist, und alle weiteren Erzeugungseinheiten dieses Typs, die innerhalb von zwei Jahren nach der Inbetriebsetzung der ersten Erzeugungseinheit dieses Typs in Betrieb gesetzt werden.</i> NOTE 1 This definition corresponds to the term's definition given in SDLWindV. There is no relation to the term "pilot wind turbine" (de: Pilotwindenergieanlage) used in the EEG. / <i>ANMERKUNG 1 Diese Definition entspricht der Begriffsdefinition nach SDLWindV. Es besteht kein Zusammenhang zum Begriff „Pilotwindenergieanlage“ im EEG [6].</i> Technological developments and innovations are generally considered to be substantial where components or software versions are changed so that the electrical behaviour of the power generating unit at the network changes significantly and a unit certification of this new type is required. / <i>Wesentliche technische Weiterentwicklungen und Neuerungen liegen in der Regel vor, wenn Komponenten oder Softwareversionen so geändert werden, dass sich das elektrische Verhalten der Erzeugungseinheit am Netz signifikant ändert und eine Einheitenzertifizierung dieses neuen Typs erforderlich wird.</i>	Checked / Berücksichtigt: - See annex 1 / siehe Anhang 1
For the prototype of a power generating unit the requirements of this VDE application guide apply. For these prototypes, a prototype confirmation, in which the certification body confirms a substantial technological development or innovation based on a manufacturer declaration, is sufficient, instead of the unit certificate, for a period of two years after commissioning of the first power generating unit prototype in Germany. The certification body shall also check and set out reproducibly in the prototype confirmation, whether the prototype is generally capable of meeting the requirements of this VDE application guide for the electrical properties of the power generating unit. This is based on an electrical properties data sheet prepared by the manufacturer of the power generating unit. / <i>Für einen Prototypen einer Erzeugungseinheit gelten die Anforderungen dieser VDE-Anwendungsregel. Innerhalb von zwei Jahren nach der Inbetriebsetzung der ersten Prototypen-Erzeugungseinheit in Deutschland ist für diese Prototypen anstelle des Einheitenzertifikats eine Prototypenbestätigung ausreichend, in der die Zertifizierungsstelle das Vorhandensein einer wesentlichen technischen Weiterentwicklung oder Neuerung auf Basis einer Herstellererklärung bestätigt. Weiterhin ist durch die Zertifizierungsstelle zu prüfen und in der Prototypenbestätigung nachvollziehbar auszuweisen, ob der Prototyp grundsätzlich in der Lage ist, die Anforderungen dieser VDE-Anwendungsregel an die elektrischen Eigenschaften der Erzeugungseinheit zu erfüllen. Dies erfolgt auf Basis eines vom Hersteller der Erzeugungseinheit erstellten Datenblattes der elektrischen Eigenschaften.</i> For prototypes commissioned before 2019-04-27, the above-mentioned period starts 2019-04-27. / <i>Für Prototypen die vor dem 27.04.2019 in Betrieb gesetzt werden, beginnt die oben genannte Frist am 27.04.2019.</i>	Checked / Berücksichtigt

VDE-AR-N 4110	Comment and reference / Kommentar und Bewertung
In order to allow the certification body to carry out the required plausibility test, the data sheet of the power generating unit shall contain at least the following information: / <i>Damit die geforderte Plausibilitätsprüfung durch die Zertifizierungsstelle erfolgen kann, muss das Datenblatt der Erzeugungseinheit mindestens folgende Angaben enthalten:</i>	Checked / <i>Berücksichtigt</i> After documentation provided by the manufacturer (see annex 3 and Annex 4). / <i>Daten vom Hersteller stehen zur Verfügung (siehe Anhang 3 und Anhang 4).</i>
1. Electrical data (nominal and rated quantities) / <i>Elektrische Daten (Nenn- und Bemessungsgrößen);</i>	Compliant / <i>Erfüllt:</i> - See annex 3 / <i>siehe Anhang 3</i>
2. Schematic overview circuit diagram of the power generating unit with all relevant componentsschematisches / <i>Übersichtsbilcl der Erzeugungseinheit mit allen wesentlichen Komponenten.</i>	Compliant / <i>Erfüllt:</i> - See annex 4 / <i>siehe Anhang 4</i>
3. Operating ranges of the power generating unit / <i>Betriebsbereiche der Erzeugungseinheit:</i> - Limits in quasi-static operation / <i>Grenzen im quasistationären Betrieb.</i> - Reactive power adjustment range / <i>Blindleistungsstellbereich.</i> - FRT limit curve (U/t diagram) / <i>FRT-Grenzkurve(U/t-Diagramm).</i>	Compliant / <i>Erfüllt:</i> - See annex 4 / <i>siehe Anhang 4</i>
4. Protection functions with setting ranges / <i>Schutzfunktionen mit Einstellberemhen:</i> - Decoupling protection / <i>Entkuppplungsschutz.</i> - Self-protection / <i>Eigenschutz.</i>	Compliant / <i>Erfüllt:</i> - See annex 4 / <i>siehe Anhang 4</i> Restriction / <i>Einschränkung:</i> A connecting terminal plate has to be installed separately if necessary / <i>Eine Prüfklemmleiste ist bei Bedarf separat nachzurüsten.</i>
5. Active power control / <i>Wirkleistungsregelung:</i> - Power/frequency behaviour / <i>Leistungs-Freqbenz-Verhalten.</i> - Active power gradient / <i>Wirkleistungsgradient.</i>	Compliant / <i>Erfüllt:</i> - See annex 4 / <i>siehe Anhang 4</i>
6. Reactive power control / <i>Blindleistungsregelung.</i>	Compliant / <i>Erfüllt:</i> - See annex 4 / <i>siehe Anhang 4</i>
7. Dynamic reactive current feed-in / <i>Dynamische Blindstrom einspeisung:</i> Basic functionality / <i>Grundsätzliche Funktionsweise.</i>	Compliant / <i>Erfüllt:</i> - See annex 4 / <i>siehe Anhang 4</i>
8. Declaration of the manufacturer stating that the power generating unit has been designed so that the requirements of this application guide for the power generating unit can be complied with / <i>Erklärung des Herstellers, dass die Erzeugungseinheit so konstruiert wurde, dass die Anforderungen dieser Anwendungsregel an die Erzeugungseinheit erfüllt werden können.</i>	Compliant / <i>Erfüllt:</i> - See annex 4 / <i>siehe Anhang 4</i>
At the latest after expiry of the above-mentioned period, a unit certificate is required. / <i>Spätestens nach Ablauf der oben genannten Frist ist ein Einheitenzertifikat erforderlich.</i> NOTE 2 If the unit certificate is available prior to expiry of the two-year term after commissioning the first power generating unit of this type, it can still be a prototype. / <i>ANMERKUNG 2 Sofern das Einheitenzertifikat vor Ablauf der Frist von zwei Jahren nach der Inbetriebsetzung der ersten Erzeugungseinheit.</i>	Compliant / <i>Erfüllt</i>

Annex 3 / Anhang 3

Datasheet of the generating unit / *Datenblatt der Erzeugungseinheit:*

Models	SOFAR 60KTLX-G3	SOFAR 70KTLX-G3	SOFAR 75KTLX-G3	SOFAR 80KTLX-G3
PV Input (DC)				
Recommended Max. PV input power	90000Wp	105000Wp	105000Wp	120000Wp
Number of MPP trackers	6			
Number of DC inputs	2 for each MPPT			
Max. PV input voltage (Vdc)	1100			
Min. PV input voltage / Startup input voltage (Vdc)	200			
Rated input voltage (Vdc)	620V	620V	620V	620V
MPPT operating voltage range	180~1000			
Full power MPPT voltage range	550~800V	550~800V	550~800V	550~800V
Max. input MPPT current	6*32A	6*40A	6*40A	6*40A
Max. DC short-circuit current (A)	6*50A	6*60A	6*60A	6*60A
Output (AC)				
Rated power	60000W	70000W	75000W	80000W

Max. AC power	66000VA	77000VA	75000VA	88000VA
Rated output current	86.9A	101.4A	108.7A	115.9A
Max. output current	100A	116.7A	113A	133.3A
Rated AC voltage (V)	3/N/PE 230/400Vac			
AC voltage range	310Vac-480Vac (According to local standard)			
Rated frequency	50/60Hz			
Grid frequency range	45Hz-55Hz/55Hz-65Hz (According to local standard)			
Active power adjustable range	0~100%			
THDi	< 3%			
DC current injection	< 0.5% In			
Power factor	1 (adjustable+/-0.8)			
Efficiency				
Max. efficiency / European efficiency	98.7%/ 98.2%			
Protection				
DC reverse polarity protection	Yes			
Anti-islanding protection	Yes			
Leakage current protection	Yes			
Anti reverse power function	Yes			
Ground fault monitoring	Yes			
PV-array string fault monitoring	Yes			
DC switch	Optional			
Anti-PID function	Optional			
DC arc detection	Optional			
Input/ output SPD	PV:Type II standard,Type I optional; AC:Type II standard,Type I optional			
General Data				
Dimensions (W*H*D, mm)	687*561*275			
Weight (kg)	50			
Isolation method	Transformerless			
Night power consumption	< 2W			

Operating ambient	-30~60°C (up 45°C derating)
Allowable relative humidity range (non-condensing)	0~100%
Cooling method	Fan
Max. operating altitude (m)	4000
Display	LCD, App via BluetoothAPP
Communication	RS485/Bluetooth, Optional:WiFi/Ethernet
EMC	EN 61000-6-2, EN 61000-6-3, EN 61000-3-11, EN 61000-3-12
Safety standards	IEC 62109-1/2, IEC 62116, IEC 61727, IEC 61683, IEC 60068(1,2,14,30), IEC 60255
Grid standards	AS/NZS 4777, VDE V 0124-100, V 0126-1-1, VDE-AR-N 4105, CEI 0-21/CEI 0-16, UNE 206 007-1, EN50549, G99, EN50530, NB/T32004

CEBEC

Annex 4 / Anhang 4

Technical data of the generating unit / Technische Daten der Erzeugungseinheit:

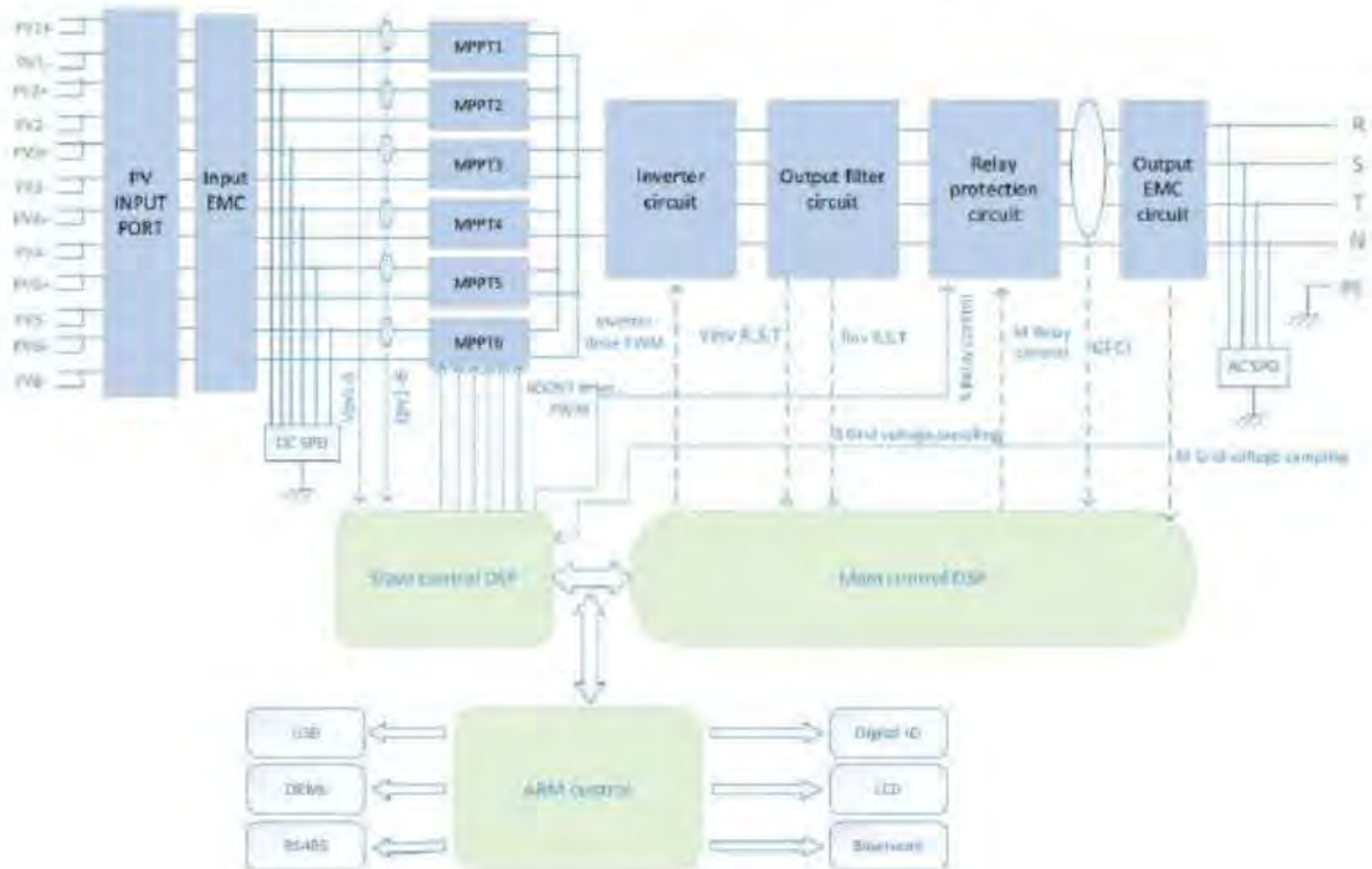


Figure 1

Selection for VDE-AR-N 4110

First start by downloading the safety parameters file (named after the corresponding safety country) on the website and copy the file to a USB flash drive.

Then insert the USB flash drive into PV inverter SOFAR 80KTLX-G3. Enter menu "Safety Param." according to Figure 2 below.



Figure 2

Operational areas of MODEL SOFAR 80KTLX-G3

a) Limits during quasi-stationary operation

For VDE-AR-N 4110:2018-11, in the entire frequency range from 47.5 Hz to 51.5 Hz and voltages in the range of 85% U_n to 115% U_n at the MODEL SOFAR 80KTLX-G3 PV inverter AC connection terminal, while voltage gradient $<5\% U_c / \text{min}$ and a frequency gradient of $<0.5\% f_n / \text{min}$, for quasi-stationary operation, MODEL SOFAR 80KTLX-G3 PV inverter is able to in parallel operation with grid according to the minimum duration time Figure 3 below.

When voltage changes at the inverter AC terminal in the amount of $\Delta U \leq 10\% U_c$ with voltage gradients of $\geq 5\% U_c / \text{min}$ within the voltage band from 90% U_c to 110% U_c occur, inverter has no reduction for active and reactive power and keep connected to the grid.

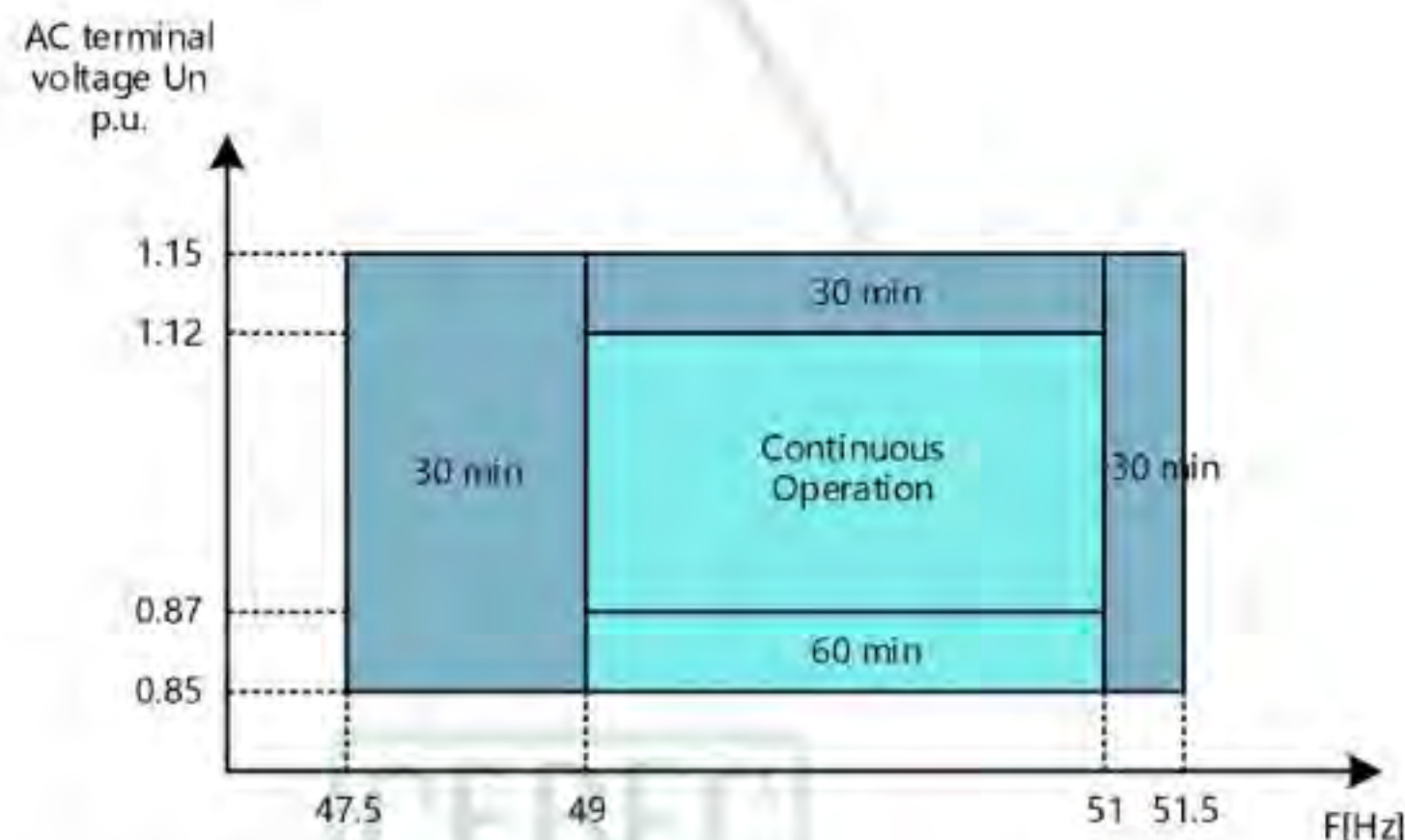


Figure 3 Quasi-stationary operation range for MODEL SOFAR 80KTLX-G3 PV

b) Reactive power capability

For VDE-AR-N 4110:2018-11, the reactive power capability of MODEL SOFAR 80KTLX-G3 PV inverter is according to Figure 4 below.

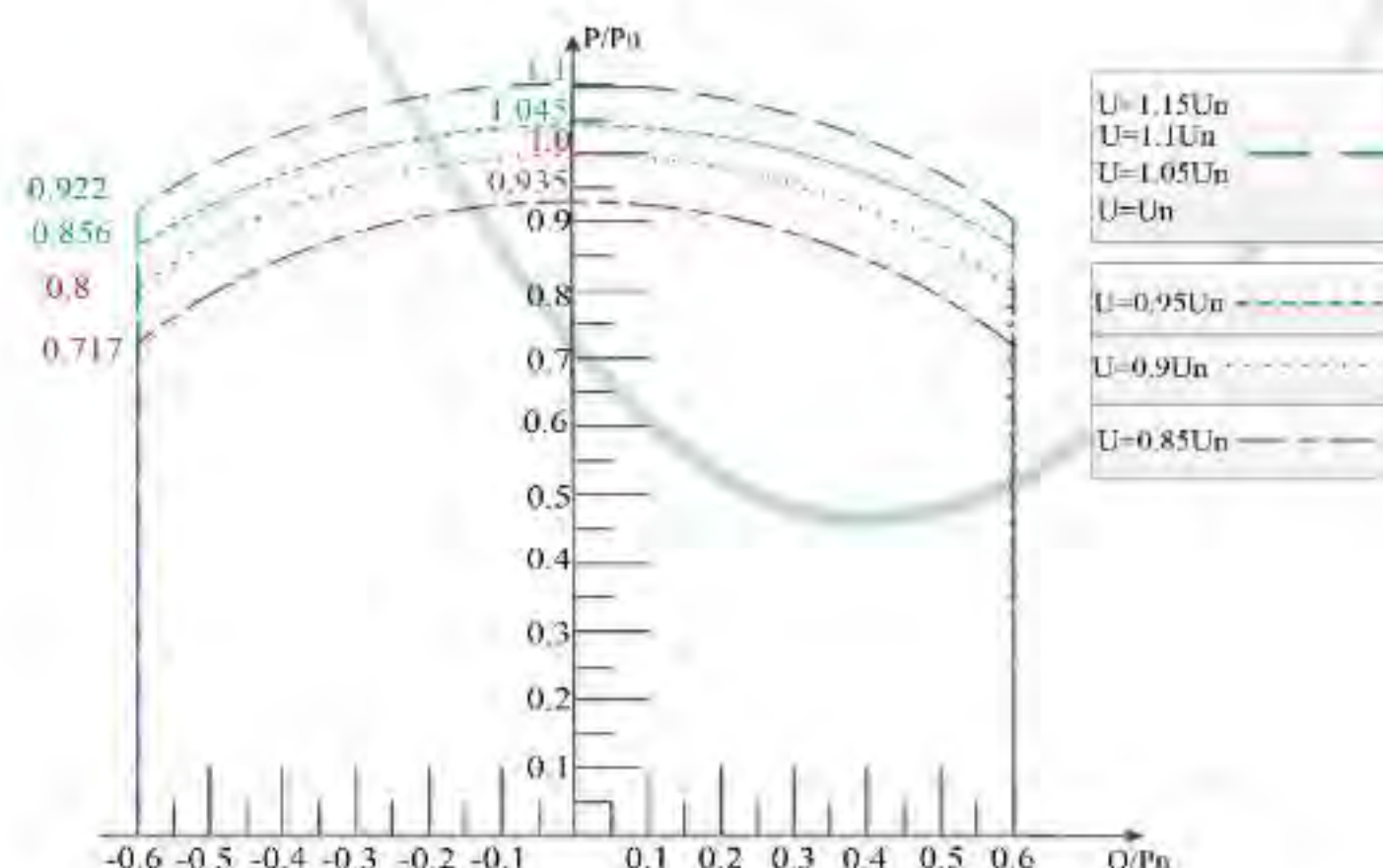


Figure 4 a. Voltage-dependent PQ diagram for MODEL SOFAR 60KTLX-G3/70KTLX-G3/80KTLX-G3

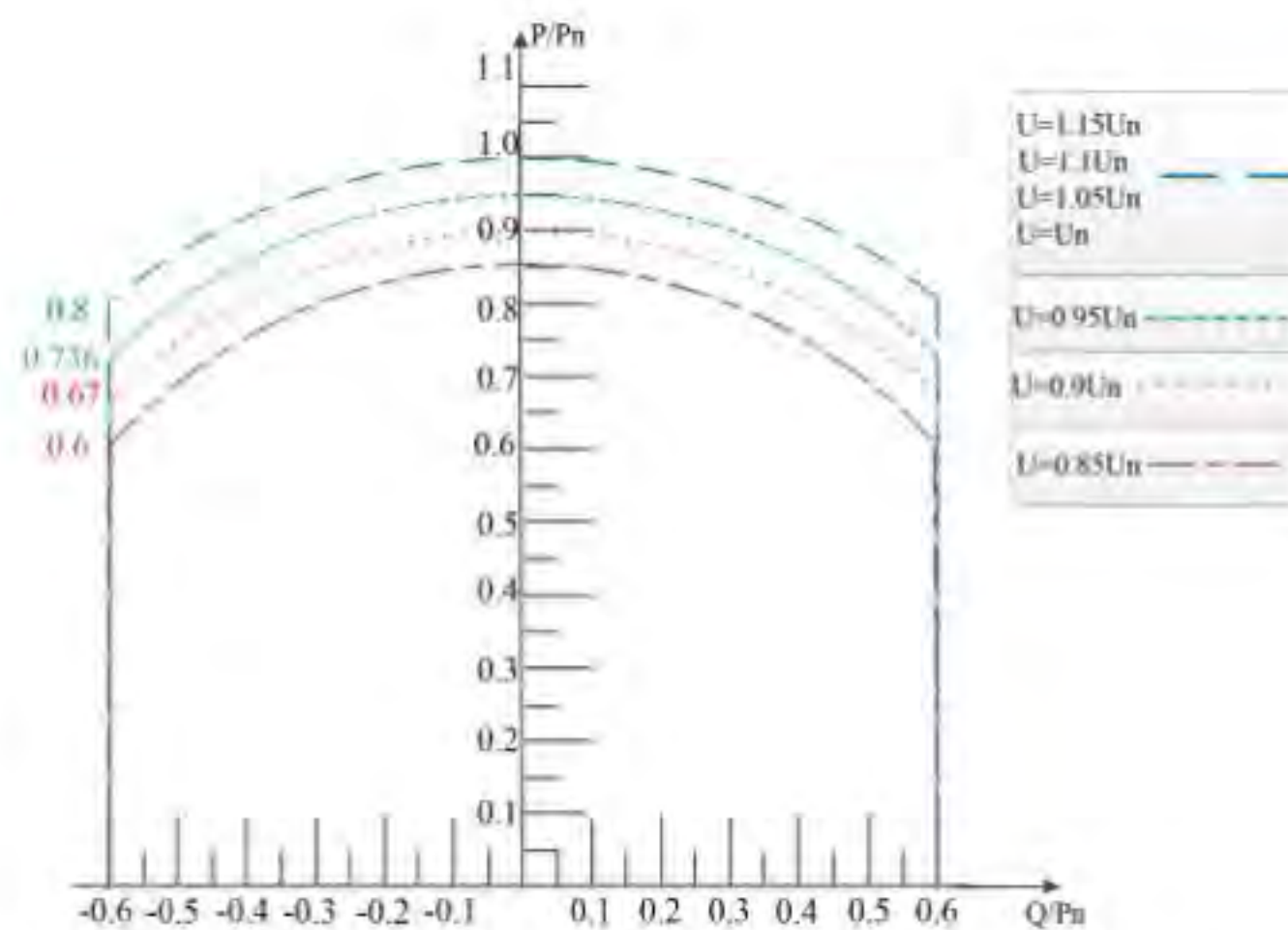


Figure 4. b. Voltage-dependent PQ diagram for
MODEL SOFAR 75KTLX-G3

c) FRT-limit curve (U(t)-diagram)

For VDE-AR-N 4110:2018-11, the FRT limit curve of MODEL SOFAR 80KTLX-G3 PV inverter is according to Figure 5 below.

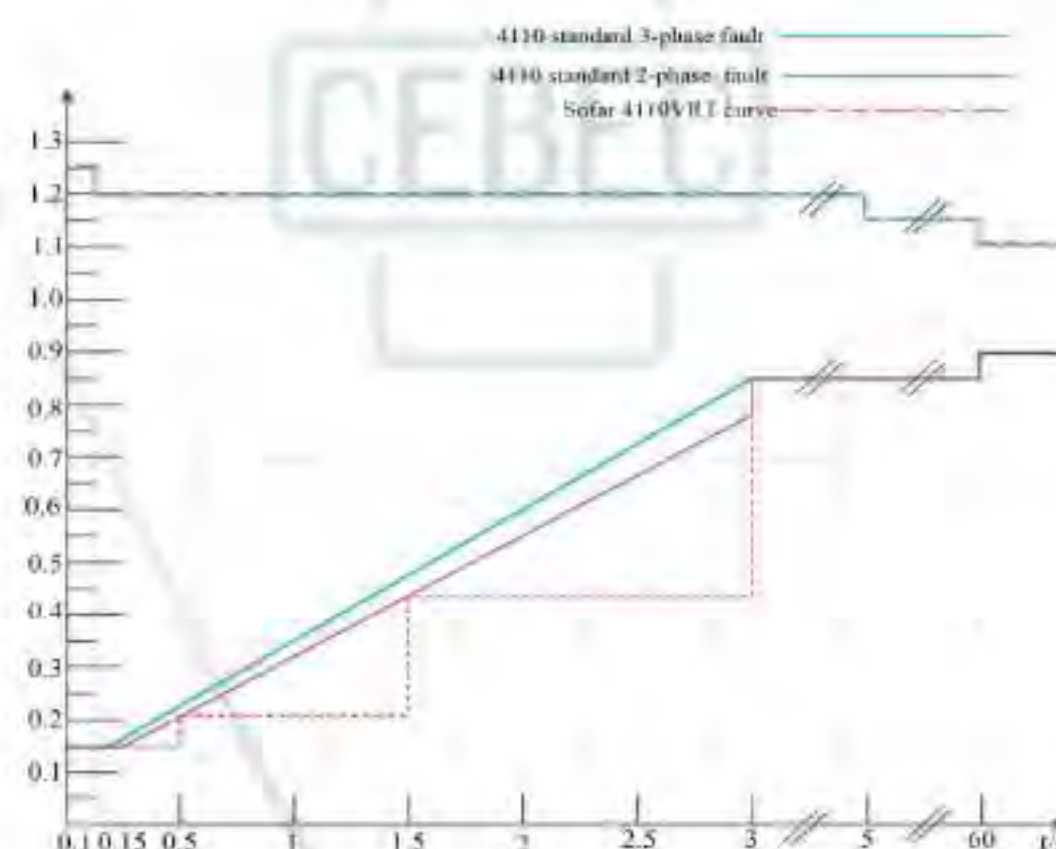


Figure 5 FRT limit curve for SOFAR 80KTLX-G3 PV

Note: For the reason of limited dynamic grid support requirement, MODEL SOFAR 80KTLX-G3 PV provide ZP(Zero Power) mode as well, when select this mode, MODEL SOFAR 80KTLX-G3 PV will supply no active and reactive power during LVRT for the voltage drop $\leq 70\%U_n$, but for voltage range from $70\% \sim 90\%U_n$, even choose ZP mode, inverter will enter into normal LVRT period with reactive power supplied by K factor.

Protection functions:

a) Grid protection

The default grid protection of MODEL SOFAR 80KTLX-G3 PV for VDE-AR-N 4110:2018-11:2018 is according to Table 1 below:

Function	Protection value	Trip time
U>	Default: 287.5V Range: 230.0-299.0V	Default: 0.10s Range: 0-600s
U>>	Default: 287.5V Range: 230.0-299.0V	Default: 0.10s Range: 0-600s
U<	Default: 184.0V Range: 23.0-230.0V	Default: 1.00 s Range: 0-600s
U<<	Default: 103.5V Range: 23.0-230.0V	Default: 0.30s Range: 0-600s
f>>	Default: 52.5 Hz Range: 50.1-55.0Hz	Default: 0.10s Range: 0-600s
f>	Default: 51.5 Hz Range: 50.1-55.0Hz	Default: 0.20s Range: 0-600s
f<	Default: 47.5 Hz Range: 45.0-49.9Hz	Default: 0.10s Range: 0-600s

Table 1 MODEL SOFAR 80KTLX-G3 PV default protection setting for VDE-AR-N 4110:2018-11:2018

Function	Protection value	Trip time
Step for Voltage protection	0.1V	0.01s
Step for Frequency protection	0.1Hz	0.01s

Table 2 MODEL SOFAR 80KTLX-G3 PV setting step for voltage/frequency protection

The protection functions is independence from other set point.

After the inverter trip for protection, when the voltage recovers to at least 82%Un and frequency is between 47.6~51.4Hz, MODEL SOFAR 80KTLX-G3 PV has the setting of the delay time of recovery for VDE-AR-N 4110:2018-11, the setting range is from 0 to 30 mins, default setting is 90s.

Notes: MODEL SOFAR 80KTLX-G3 PV didn't provide testing terminal for protection test without disconnect the wires, such test terminal would be supplied at the system level on the LV side of MV transformer.

b) Intrinsic ("self") protection

For VDE-AR-N 4110:2018-11, MODEL SOFAR 80KTLX-G3 PV is integrated with intrinsic hardware protection only for over voltage, the protection is for hardware protection and is not settable. The protection default setting is 1.44Un for 200us.

Active power control

a) Frequency control (P(f)-diagram)

For VDE-AR-N 4110:2018-11, P(f)-diagram is default according to Figure 6 below.

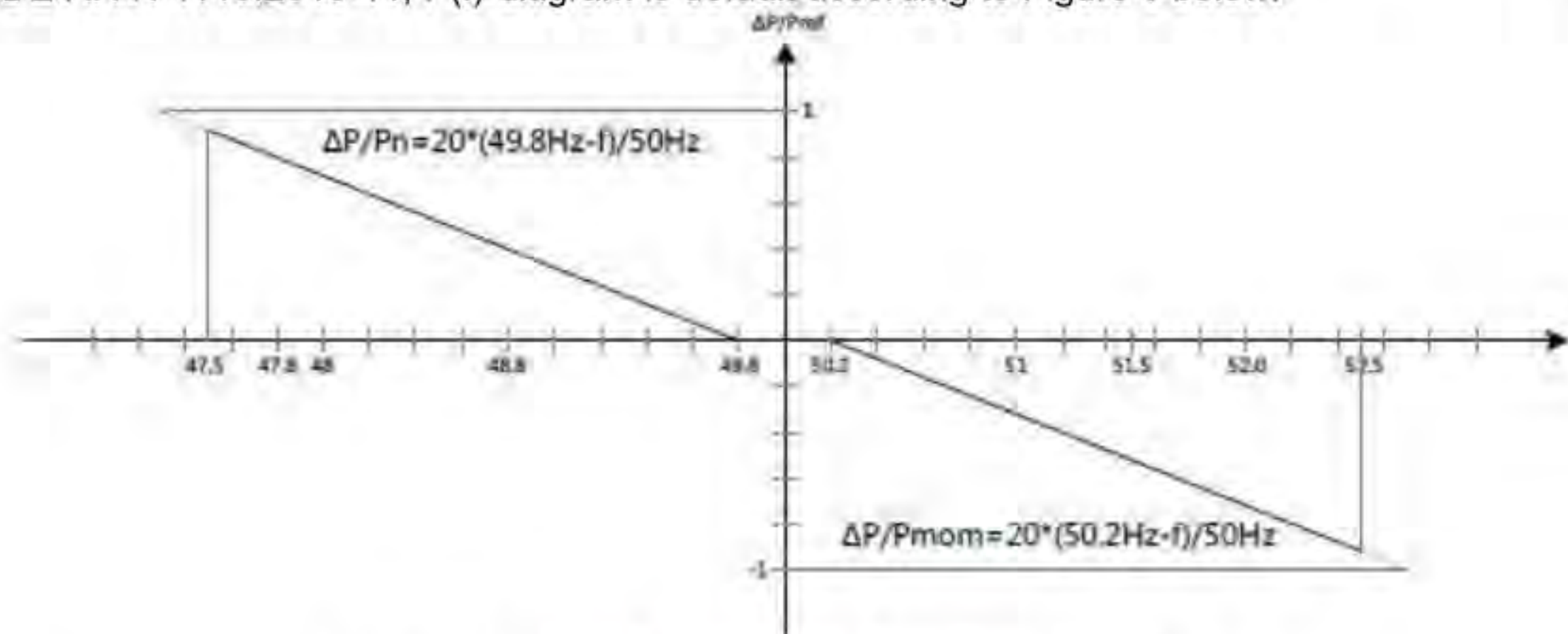


Figure 6 MODEL SOFAR 80KTLX-G3 PV P(f)-diagram

Note: Here Pmom is the active power freeze at that moment when the frequency to 50.2Hz. Pn is normal active power. The default gradient for over-frequency and under-frequency is 40%Pref/Hz (slope=5%), while it can be adjustable from 16.67%Pref/Hz(s=12%) to 100%Pref/Hz(s=2%).

When doing for TR3 test, due to the requirement by FGW TR3, inverter take higher priority for active power rising during frequency drop from 49.8Hz to 47.5Hz temporary than dispatching command by grid operator set point only for test purpose, but the final inverter will take higher priority for dispatching command set point.

b) Related gradients, dynamics and functions

For VDE-AR-N 4110:2018-11, the following active power control applied to MODEL SOFAR 80KTLX-G3. Normal active power gradients: 0.33%Pn/s~0.66%Pn/s (default is 0.66%Pn/s) for stationary connection and reconnection after grid fault trip.

P(f)-diagram: When frequency returned to rated value (50Hz±0.2Hz) , for the first 10mins, the active power gradients is less than 10%Pn/min, after 10mins quit from abnormal frequency, the active power gradients will back to normal active power gradients: 0.33%Pn/s~0.66%Pn/s.

Dynamic functions: When MODEL SOFAR 80KTLX-G3 PV enter into FTR, the active power reduced to zero to ensure reactive power, after the FTR end according to Figure 4 limit or 5s whichever is the earlier, the active power will recover by max ramp rate within 200ms.

c) Set point

For VDE-AR-N 4110:2018-11, the active power control set point applied to MODEL SOFAR 80KTLX-G3 PV is according to Table 4 Overfrequency derating and underfrequency increment.

Overfrequency derating		
Function	Default Set point	Set range
Frequency-power response(Overfrequency derating)	ON	ON/OFF
Overfrequency Reload Enable	OFF	ON/OFF
Overfrequency Start (0.01Hz step)	50.20Hz	50.10-55.00Hz
Overfrequency Slope	40%Pn/Hz	17-100%Pn/Hz
Overfrequency Reload Start	50.20Hz	50.00-55.00Hz
Overfrequency Reload Delay	0.00s	0-655s
Overfrequency Reload Speed	9%Pn/min	1-6000%Pn/min
underfrequency increment		
Function	Default Set point	Set range
Frequency-power response(Underfrequency derating)	ON	ON/OFF
Underfrequency Reload Enable	OFF	ON/OFF
Underfrequency Start (0.01Hz step)	49.80Hz	45.00-49.98 Hz
Underfrequency Slope	40%Pn/Hz	17-100%Pn/Hz
Underfrequency Reload Start	49.80Hz	45.00-49.98 Hz
Underfrequency Reload Delay	0.00s	0-655s
Underfrequency Reload Speed	9%/min	1-6000%/min

Table 4 Active power set point for MODEL SOFAR 80KTLX-G3 PV

Reactive power control

a) Related gradients, dynamics and functions

For VDE-AR-N 4110:2018-11, MODEL SOFAR 80KTLX-G3 PV reactive power control is following according to Figure 7 below.

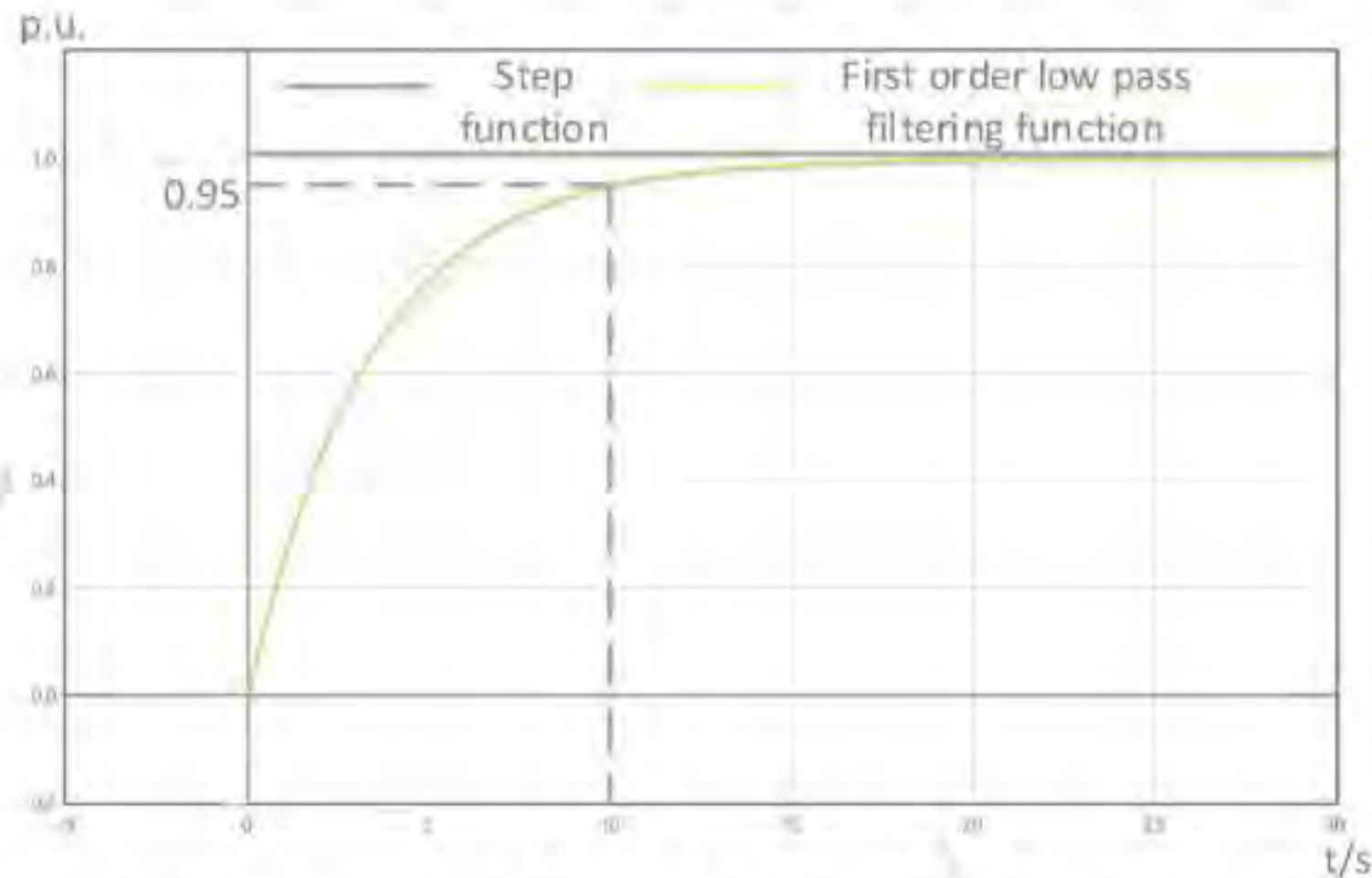


Figure 7 MODEL SOFAR 80KTLX-G3 PV reactive power control

feature

The reactive power is supplied by equation (1):

$$Q = Q_{set} * [1 - e^{-(3t/3\tau)}] \quad (1)$$

Here the time constant 3τ is settable as the time for 95% target value.

For VDE-AR-N 4110:2018-11, the 3τ setting range is from 1~60s, the default setting is 10s.

b) Set point

For VDE-AR-N 4110:2018-11, the reactive power control set point applied to MODEL SOFAR 80KTLX-G3 PV is according to Table 6.

Function	Default Set point	Set range
Reactive mode	OFF	Off/Mode1/2/3/4 ⁽¹⁾
Reactive response period	10	1~600s
Mode 1		
Power factor (0.0001)	1.00	-1 ~ -0.8, +0.8~ +1
Mode 2		
Fixed Reactive Percentage (0.01%)	0%	0~60%Pn
Mode 3		
Reactive Cos1 (0.0001)	1.00	-1 ~ -0.8, +0.8~ +1
Reactive dynamic value1	0	-100~100%Pn
Reactive Cos2 (0.0001)	1.00	-1 ~ -0.8, +0.8~ +1
Reactive dynamic value2	0	-100~100%Pn
Reactive Cos3 (0.0001)	1.00	-1 ~ -0.8, +0.8~ +1
Reactive dynamic value3	0	-100~100%Pn
Reactive Cos4 (0.0001)	1.00	-1 ~ -0.8, +0.8~ +1
Reactive dynamic value4	100	-100~100%Pn
Mode 4		
HighVoltStartValue	104	100~130%
HighVoltEndValue	106	100~130%
LowVoltStartValue	96	0~100%
LowVoltEndValue	94	0~100%
MaxLeadingReactivePower	33	0~60%
MaxLaggingReactivePower	33	0~60%
ReactiveResponseWaitTime	0	0~300s
ReactivePowerOffset	0	-100~100%Qmax

Table 6 Reactive power set point for MODEL SOFAR 80KTLX-G3

(1) Off The PF is limited to +1.000,s and the "Q-Var limits" is limited to 0.0%.
 Mode1: The reactive power can be regulated by the parameter PF (Power Factor).
 Mode2: The reactivepower can beregulated bythe parameterReactive power limit (in %).
 Mode3: Q(P)
 The PF changes with the output power of the inverter.
 Mode4: Q(U) The reactive power changes with the grid voltage.

Dynamic reactive current control

a) Basic functions

The reactive current supply during FRT is calculated by both positive sequence and negative sequence component. The additional reactive current Δi_B of MODEL SOFAR 80KTLX-G3 PV is proportional to the voltage deviation Δu ($\Delta i_B = k \cdot \Delta u$), where k is the amplification factor. It is defined by the straight line below in Figure 8.

The k factor is settable between 0 to 10 with the step of 0.1, the default MODEL SOFAR 80KTLX-G3 PV k factor for VDE-AR-N 4110:2018-11 is 2.

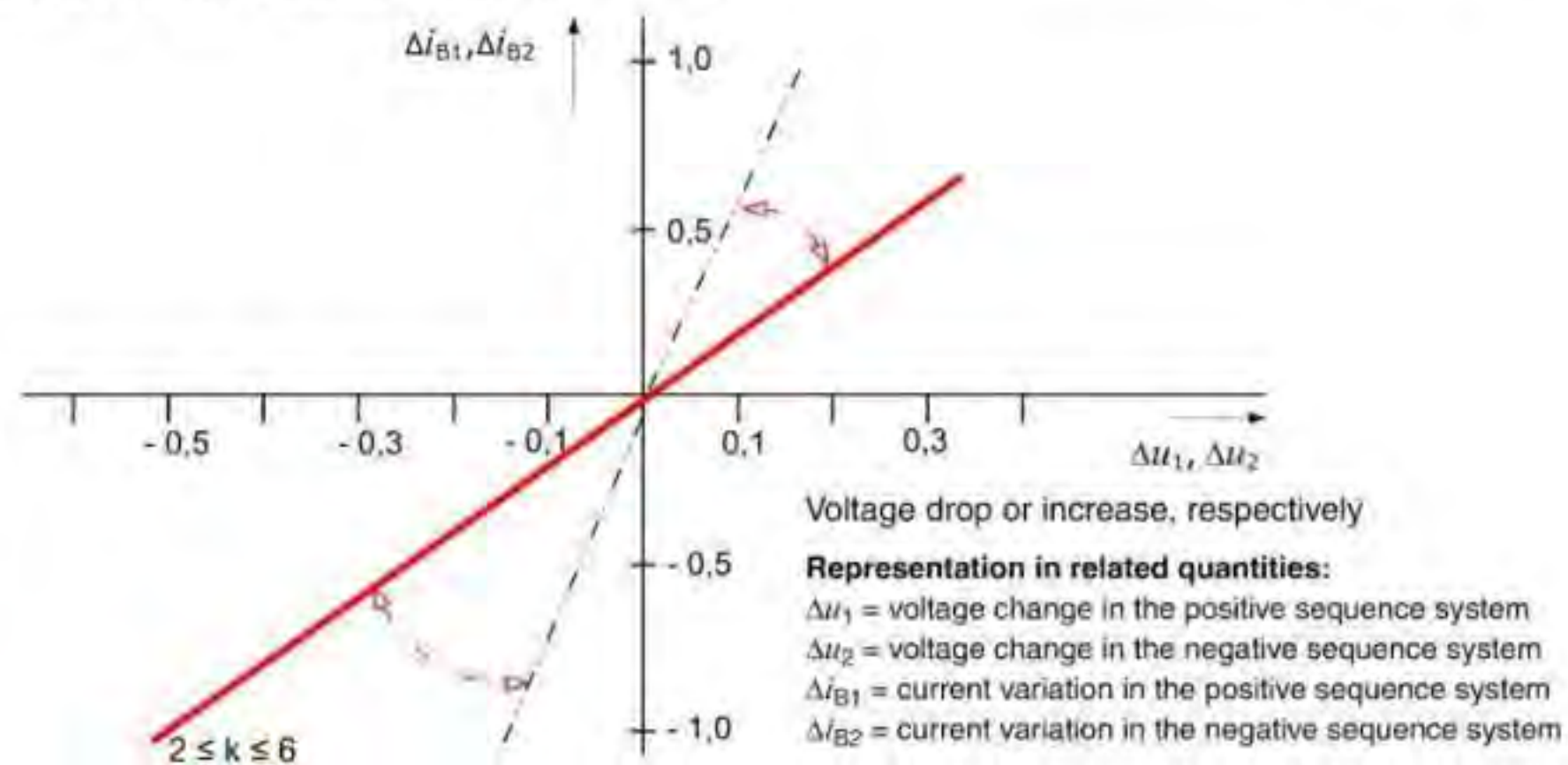


Figure 8 k factor of voltage support in the event of a network fault