

Vorläufige Prototypenbestätigung / *Preliminary prototype confirmation*

Nr. / No.:

968/GI 2375.00/26

Netzintegration von Erzeugungseinheiten und -anlagen

Grid integration of power generating units and systems

Antragsteller /
Applicant

Foxxess Co., LTD.
No.939, Jinhai Third Road, New Airport Industry Area,
Longwan District, Wenzhou, Zhejiang China

Zertifizierstelle /
Certification Body

TÜV Rheinland Industrie Service GmbH
Am Grauen Stein, 51105 Köln,
Deutschland / *Germany*

Produkttyp /
Product type

Hybrid Wechselrichter / Energieerzeugungseinheit (EZE) Typ 2
Hybrid Inverter / Power Generating Unit (PGU) Type 2

Modell /
Model

**H3-50-Plus, H3-60-Plus, H3-75-Plus,
H3-80-Plus, H3-100-Plus, H3-125-Plus.**

Beschreibung /
Description

Die EZE kann innerhalb ihrer Betriebsbereiche Leistung und Blindleistung bereitstellen / beziehen. Darüber hinaus bietet sie eine dynamische Blindstromeinspeisung bei Netzfehlern mit eingebauter Schutzfunktion. / *The PGU can supply/receive power and reactive power within its operating ranges. It also provides dynamic reactive current feed-in during grid fault with equipped protective function.*

Normen /
Standards

VDE-AR-N 4110:2023-09,
FGW TR 8 / TG8, Rev.10

Erklärung /
Declaration

Die TÜV Rheinland Industrie Service GmbH bestätigt, dass es sich bei der genannten Energieerzeugungseinheit (EZE) Typ-2 nach VDE-AR-N 4110, sowie gemäß FGW TR 8, um einen Prototypen handelt, der in der Lage ist die technischen Anforderungen der Normen zu erfüllen. Es wird davon ausgegangen, dass die Anforderungen der FGW TR8 im Rahmen einer Zertifizierung erfüllt werden. / *TÜV Rheinland Industrie Service GmbH confirms that the mentioned Power Generating Unit (PGU Type-2) is a prototype according to VDE-AR-N 4110, as well as according to FGW TG 8, which is able to meet the technical requirements of the standards. It is assumed that the requirements of FGW TG8 are fulfilled within the scope of a certification.*

Inbetriebnahme der ersten EZE /
Commissioning of the first PGU

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Datum / *Date*

2026-08-12

Gültig bis / *Valid until*

2028-08-12

Die Details zur Gültigkeit im Kapitel 1.3 sind entsprechend zu beachten. /
The details on validity in chapter 1.3 must be observed accordingly.

Diese Prototypenbestätigung darf nicht auszugsweise verwendet werden.

This prototype confirmation may not be used in extracts.

Köln, 2026-08-12
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein, D-51105 Köln


Dr. Javad Allahdadian
Specialist Certifier


M.Sc. Sandip Kumar Prajapati
Assessor

1. Aufgabenstellung / Task

Im Rahmen dieser Prototypenbestätigung wird auf Grundlage herstellerspezifischer Dokumente überprüft, ob die genannte Energieerzeugungseinheit (EZE) die Anforderungen gemäß [N1] bis [N2] erfüllen kann.

As part of this prototype confirmation, it is checked on the basis of manufacturer-specific documents whether the named power generating unit (EZE Type-2) can meet the requirements according to [N1] to [N2].

1.1. Normen und Technische Richtlinien / Standards and technical guidelines

[N1] Technical Guideline for the connection of customer systems to the medium-voltage network and their operation (TAR medium voltage / VDE-AR-N 4110: 2023-09)

[N2] Technical guideline for generating units and systems part 8 revision 10 of the Fördergesellschaft Windenergie und andere Erneuerbare Energien e.V. (FGW TG8 Rev. 9)

1.2. Für die Bestätigung verwendete Dokumente / Documents supplied for confirmation

Für die Bewertung der EZE wurden u. a. Informationen aus den folgenden herstellerspezifischen Dokumenten entnommen.

For the evaluation of the PGU, e.g. Information taken from the following manufacturer-specific documents.

[D1] Foxess Co., LTD.,
Declaration of VDE-AR-N 4110
Datum / Date: 2026-07-17

[D2] Foxess Co., LTD.,
Quality Management System Certificate ISO 9001:2015
Datum / Date: 2024-11-08

[D3] Foxess Co., LTD.,
Application for Certification
Datum / Date: 2026-05-20

[D4] Foxess Co., LTD.,
User manual for Hybrid Inverter Series H3.50-125 Plus
Datum / Date: N/A

1.3. Gültigkeit der Prototypenbestätigung / Validity of prototype confirmation

Die Gültigkeit der ausgestellten Prototypenbestätigung beschränkt sich gemäß VDE-AR-N 4110 [N1] auf zwei Jahre nach Inbetriebsetzung des ersten Prototyps. Da zurzeit noch keine EZE von diesem Typ in Betrieb genommen worden ist, handelt es sich um eine vorläufige Prototypenbestätigung. Diese Prototypenbestätigung ist nach Inbetriebnahme des ersten Prototyps entsprechend zu revidieren und die Gültigkeit ist auf zwei Jahre nach Inbetriebsetzung der ersten EZE diese Prototypen zu beschränken.

The validity of the prototype confirmation issued is limited to two years after commissioning of the first prototype in accordance with VDE-AR-N 4110 [N1]. Since no PGU of this type has currently been commissioned, this is a provisional prototype confirmation. This prototype confirmation must be revised accordingly after commissioning of the first prototype, and the validity must be limited to two years after commissioning of the first PGU of this prototype.

2. Prototypenregelung nach FGW TR 8 / Prototype regulation according to FGW TG 8

In diesem Abschnitt wird überprüft, ob es sich bei der EZE gemäß FGW TR 8 [N2] um einen Prototyp handelt. Nach [N2] ist ein Prototyp das erste Betriebsmittel eines Typs, welches wesentliche technische Weiterentwicklungen oder Neuerungen aufweist, sowie alle weiteren Betriebsmittel dieses Typs, die innerhalb von zwei Jahren nach Inbetriebsetzung des ersten Betriebsmittels dieses Typs in Betrieb gesetzt wurden. Die Regelung und Fristen von Betriebsmittelprototypen in einer EZE können den Netzanschlussregeln (NAR) entnommen werden.

In this section, it is checked whether the mentioned PGU is a prototype according to FGW TG 8 [N2]. According to [N2], the definition of the prototype is the first item of equipment of this type that has significant technical developments or innovations, as well as all other items of equipment of this type that were put into operation within two years after the first item of equipment of this type was in service. The rules and deadlines for equipment prototypes of PGU can be found in the grid connection guideline (NAR).

Gemäß [N1] gilt: Für Erzeugungsanlagen (EZA) mit EZE gleichen Prototyps müssen das Anlagenzertifikat und die Konformitätserklärung binnen eines Jahres, nachdem für den ersten Prototyp ein Einheitenzertifikat vorliegt, nachgereicht werden. Für Komponenten innerhalb der Erzeugungsanlage, für die ein Komponentenzertifikat erforderlich ist, kann die Prototypenregelung entsprechend angewendet werden.

According to [N1], the following applies: for power generating systems (PGS) with PGU of the same prototype, the plant certificate and the declaration of conformity must be submitted within one year after a unit certificate is available for the first prototype. The prototype regulation can be applied accordingly for components within the generating plant for which a component certificate is required.

Bewertung / Assessment:

FGW TR8 / TG8 (Revision 9)	Bewertung/Assessment
2.11 Betriebsmittel Prototypen / Prototype	
Herstellereklärung zur teilweisen oder vollständigen Konformität zu einer oder mehreren NAR. / <i>Manufacturer's declaration of partial or full conformity to one or more NAR.</i>	☒ Berücksichtigt / Included (Anhang 1 / Annex 1)
Herstellereklärung, dass es sich um eine wesentliche technische Weiterentwicklung bzw. Neuerung handelt. / <i>Manufacturer's declaration that it is a major technical development or innovation.</i>	☒ Berücksichtigt / Included (Anhang 1 / Annex 1)
Aufzeigen von Unterschieden zu ggf. vorhandenen und bereits zertifizierten Betriebsmitteln. / <i>Identification of differences to any existing and already certified equipment.</i>	☒ Berücksichtigt / Included (Anhang 1 / Annex 1)
Herstellereklärung, dass weitere technische Daten den Anforderungen der jeweiligen NAR entsprechen. / <i>Manufacturer's declaration that further technical data meet the requirements of the respective NAR.</i>	☒ Berücksichtigt / Included (Anhang 1 / Annex 1)

3. Prototypenregelung gemäß VDE-AR-N 4110/ Prototype regulation according to VDE-AR-N 4110

Nach [N2] muss die Zertifizierungsstelle in der Prototypenbestätigung nachvollziehbar ausweisen, dass der Prototyp grundsätzlich in der Lage ist, die Anforderungen der jeweiligen NAR an die elektrischen Eigenschaften und Funktionen der Betriebsmittel zu erfüllen.

According to [N2], the certification body must clearly state in the prototype confirmation that the prototype is basically able to meet the requirements of the respective NAR for the electrical properties and functions of the equipment.

Die Vorgaben der NAR an den Prüfumfang für die Prototypenbestätigung sind zu berücksichtigen (sofern vorhanden). Im Folgenden wird dazu die Übereinstimmung der elektrischen Eigenschaften des EZE- mit den Anforderungen nach [N1] überprüft.

The specifications of the NAR for the scope of testing for the prototype confirmation must be taken into account (if available). In the following, the compliance of the electrical properties of the PGU with the requirements of [N1] is checked.

Bewertung / Assessment:

Art der Betriebsmittel Type	EZE / PGU		Komponenten / Components		
	PV	Speicher / Storage System	EZA-Regler / PGU Controller	Kompensations- einrichtung / Compensation equipment	Schutzein- richtungen / Protective devices
	☐	☒	☐	☐	☐
Anmerkung Annotation	Die folgenden Punkte 1), 2) und 4) sind anzuwenden. <i>The following items 1), 2) and 4) are applied.</i>		Die folgenden Punkte 1), 2), 3) und 4) sind anzuwenden. <i>The following items 1), 2), 3) and 4) are applied.</i>		
Anforderungen an Prototypen gemäß VDE-AR-N 4110 Requirements for Prototypes according to VDE-AR-N 4110					
Nr.	Anforderungen / Requirements				Bewertung / Evaluation
1)	Der Prototyp weist wesentliche technische Weiterentwicklungen oder Neuerungen auf. / <i>The prototype shows significant technical developments or innovations.</i>				☒ Zutreffend/ Applied
2)	Der Prototyp ist grundsätzlich in der Lage die Anforderungen dieser VDE-Richtlinie an die elektrischen Eigenschaften zu erfüllen. / <i>The prototype is basically able to meet the requirements of this VDE guideline for the electrical properties.</i>				☒ Zutreffend/ Applied
3)	Für Komponenten innerhalb der Erzeugungsanlage, für die ein Komponentenzertifikat erforderlich ist, kann die Prototypenregelung entsprechend angewandt werden. <i>For components within the power generating plant, for which a component certificate is required, the prototype regulation can be applied in analogy.</i>				☐ Zutreffend/ Not applicable
4)	Anforderungen an die Angaben der Datenblätter und darauf basierende Plausibilitätsprüfung (PP) / <i>Requirements for the information in the data sheets and the plausibility check (PP) based on them</i>				
	a) Herstellererklärung, dass die Erzeugungseinheit so konstruiert wurde, dass die Anforderungen der VDE erfüllt werden können. / <i>Manufacturer's declaration that the generating unit was constructed in such a way that the requirements of the VDE can be met.</i>				☒ Enthalten/ Included
	PP: ☒ Erfüllt (Anhang 1) / <i>Fulfilled (Annex 1)</i> ☐ Entfällt / <i>Not applicable</i>				
	b) Schematisches Übersichtsbild der Erzeugungseinheit mit allen wesentlichen Komponenten / <i>Schematic overview of the generating unit with all essential components</i>				☒ Enthalten/ Included
	PP: ☒ Erfüllt (Anhang 1) / <i>Fulfilled (Annex 1)</i>				

☐ Entfällt / <i>Not applicable</i>	
c) Elektrische Daten (Nenn- und Bemessungsgrößen) / <i>Electrical data (nominal and rated values)</i>	☒ Enthalten/ <i>Included</i>
PP: ☒ Erfüllt (Anhang 1) / <i>Fulfilled (Annex 1)</i> ☐ Entfällt (keine Anforderungen an EZA-Regler) / <i>Not applicable for PGU controllers</i>	
d) Schutzfunktionen mit Einstellbereichen / <i>Protection functions with setting ranges</i> Entkupplungsschutz / <i>Decoupling protection</i> Eigenschutz / <i>Self-protection</i>	☒ Enthalten/ <i>Included</i>
PP: ☒ Erfüllt (Anhang 1) / <i>Fulfilled (Annex 1)</i> ☐ Entfällt (keine Anforderungen an EZA-Regler) / <i>Not applicable for PGU controllers</i>	
e) Betriebsbereich der Erzeugungseinheit: / <i>Operating range of the generating unit</i> Grenzen im quasistationären Betrieb / <i>Limits in quasi-steady state operation</i> Blindleistungsstellbereich / <i>Reactive power adjustment range</i> FRT-Grenzkurve (U/t-Diagramm) / <i>FRT limit curve (U/t diagram)</i>	☒ Enthalten/ <i>Included</i>
PP: ☒ Erfüllt (Anhang 1) / <i>Fulfilled (Annex 1)</i> ☐ Entfällt (keine Anforderungen an EZA-Regler) / <i>Not applicable for PGU controllers</i>	
f) Wirkleistungsregelung: / <i>Active power control</i> Leistungs-Frequenz-Verhalten; / <i>Power frequency regulation</i> Wirkleistungsgradient / <i>Active power ramping</i>	☒ Enthalten <i>Included</i>
PP: ☒ fulfilled: the active power can be regulated by following methods (Annex-1): - Power/frequency behavior $P = f(f, P_{ref})$ - Power/Voltage behavior $P = f(v)$ - Active power ramping ☒ Entfällt / <i>Not applicable</i>	
g) Blindleistungsregelung / <i>Reactive power control regulated by</i> - Fixed Q - Fixed $\cos \varphi$ - Voltage-dependent reactive power $Q(U)$ - Active power Dependent reactive power $Q(P)$	☒ Enthalten <i>Included</i> ☐ Entfällt für EZA-Regler / <i>Not applicable</i>
PP: ☒ Erfüllt (Anhang 1) / <i>Fulfilled (Annex 1)</i> : ☐ Entfällt (keine Anforderung an EZA-Regler) / <i>Not applicable</i>	
h) Spannungsstützung bei Netzfehlern durch Blindstromspeisung bei dynamischer Netzstützung / <i>Dynamic reactive current feed-in functionality</i>	☒ Enthalten <i>Included</i>
PP: ☒ Erfüllt (Anhang 1) / <i>Fulfilled (Annex 1)</i> ☐ Entfällt / <i>Not applicable</i>	

Votum des Fachauditors / Conclusion

Die TÜV Rheinland Industrie Service GmbH bestätigt, dass es sich bei der genannten EZE nach [N1], sowie gemäß [N2], um einen Prototypen handelt, der in der Lage ist die technischen Anforderungen der Normen zu erfüllen. Es wird davon ausgegangen, dass die Anforderungen von [N2] im Rahmen einer Zertifizierung erfüllt werden.

TÜV Rheinland Industrie Service GmbH confirms that the mentioned PGU according to [N1], as well as according to [N2], is a prototype that is able to meet the technical requirements of the standards. It is assumed that the requirements of [N2] are met within the framework of a certification.

Die Bewertung ergab keine Beanstandungen.
The evaluation did not result in any objections.

Anhang / Annex
Anhang 1 / Annex 1:
Manufacturer's Declaration



Declaration of VDE-AR-N 4110

FOXESS CO., LTD.

H3-50-Plus, H3-60-Plus, H3-75-Plus, H3-80-Plus, H3-100-Plus, H3-125-Plus

Version: V1.0

Note: All parameters information in the parameter list corresponds to the actual parameters in the control system and can be adjusted on the generating units.

Signature: Max Feng

Date: 2026.07.17

Declaration of VDE-AR-N 4110

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1. Company Information

License Holder: FOXESS CO., LTD.

Address: No.939, Jinhai Third Road, New Airport Industry Area, Longwan District, Wenzhou, Zhejiang, China

Product Type: H3-50-Plus, H3-60-Plus, H3-75-Plus, H3-80-Plus, H3-100-Plus, H3-125-Plus

2. Product Datasheet: See following page.

MODEL	H3-50-Plus	H3-60-Plus	H3-75-Plus	H3-80-Plus	H3-100-Plus	H3-125-Plus
BATTERY SPECIFICATION						
Battery Type	LiFePO ₄					
Voltage Range [Vd.c.]	180-950					
Max. Charging Current [Ad.c.]	3*80					
Max. Discharging Current [Ad.c.]	3*80					
Battery Port	3					
Communication	CAN*3					
PV SPECIFICATION						
Max. PV Array Power [kW]	100	120	150	160	200	250
Max. PV Input Power [kW]	100	120	150	160	200	250
Max. PV array voltage [Vd.c.]	1000					
PV DC Input Voltage Range [Vd.c.]	180-950					
Start up Voltage [Vd.c.]	180					
MPPT Voltage Range [Vd.c.]	180-850					
MPPT No. / String per MPPT	4/2	4/2	8/2	8/2	8/2	8/2
Maximum Current per MPPT [Ad.c.]	40					
Maximum Short Circuit Current per MPPT [Ad.c.]	50					

Declaration of VDE-AR-N 4110

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Grid SPECIFICATION						
Rated AC Output Power [kW]	50	60	75	80	100	125
Rated AC Output apparent power [kVA]	50	60	75	80	100	125
Max. AC Output apparent Power [kVA]	55	66	82.5	88	110	137.5
Rated AC Output Current [Aa.c.]	76.0	91.2	113.9	121.6	152.0	190.0
Max. AC Output Current [Aa.c.]	83.6	100.3	125.4	133.7	167.2	198.5
Max AC current for battery charged [Aa.c.]	83.6	100.3	125.4	133.7	167.2	198.5
Max AC Power for battery charged [kW]	50	60	75	80	100	100*
Max Apparent power for battery charged [kVA]	55	66	82.5	88	110	129.6
Max. AC input Power [kW]	207					
Max. AC input current [Aa.c.]	300					
Nominal AC Voltage [Va.c.]	220/380Va.c., 230/400Va.c., 3L/N/PE					
Nominal AC Frequency [Hz]	50/60Hz					
Power Factor	0.8 Leading, 0.8 Lagging					
EPS load SPECIFICATION						
Rated Power [kW]	50	60	75	80	100	125
Rated AC Output apparent power [kVA]	50	60	75	80	100	125
Max. AC Output apparent Power [kVA]	55	66	82.5	88	110	137.5
Rated AC Output Current [Aa.c.]	76.0	91.2	113.9	121.6	152.0	190.0
Max. AC Output Current [Aa.c.]	83.6	100.3	125.4	133.7	167.2	198.5
Max. by pass current [Aa.c.]	300	300	300	300	300	300

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Max. bypass power [kW]	207	207	207	207	207	207
Nominal AC Voltage [Va.c.]	220/380Va, 230/400Vac, 3L/N/PE					
Nominal AC Frequency [Hz]	50/60Hz					
Power Factor	0.8 Leading, 0.8 Lagging					
Diesel generators SPECIFICATION						
Max. AC Input apparent Power [kW]	207					
Max. AC Input Current [Aa.c.]	300					
Nominal AC Voltage [Va.c.]	220/380Va, 230/400Vac, 3L/N/PE					
Nominal AC Frequency [Hz]	50/60Hz					
Power Factor	0.8 Leading, 0.8 Lagging					
GENERAL SEPECIFICATION						
Operating Temperature	-30 °C ~60 °C(>40 °C derating)					
Ingress Protection (IP) Rating	IP65					
Topology	Non-Isolation					
Protective class	I					
Dimensions W*D*H [mm]	730*1060*305					
Over Voltage Category	III (AC) , II (DC)					
Max. Operating Altitude [m]	3000					
Weight(kg)	110kg	110kg	120kg	120kg	120kg	120kg
Firmware	H3-Plus_Master_V1.09					

<*>:The charging mode applies only to active power; reactive power is unaffected.

Declaration of VDE-AR-N 4110

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3. Rating Label:

FOX ESS		H3-50-Plus GRID SUPPORT UTILITY INTERACTIVE INVERTER (NON-ISOLATED INVERTER) www.fox-ess.com	
PV INPUT	Max. PV array power	10000 W	
	Max. input voltage	1000 V d.c.	
	Nominal voltage	750 V d.c.	
	DC input voltage range	80-950 V d.c.	
	MPPT voltage range	80-950 V d.c.	
BATTERY DATA	Max. input current	4750 A d.c.	
	Isolated PV	No	
	Battery voltage range	180-950 V d.c.	
	Max. charge/discharge current	3700 A d.c.	
	Battery type	Lithium-ion	
AC INPUT	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
	Nominal frequency	50/60 Hz	
	Max. input current	320 A a.c.	
	Max. apparent power	23700 VA	
	Max. power for battery charged	50000 W	
AC OUTPUT	Power factor	0.8 leading to 0.8 lagging	
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
	Nominal frequency	50/60 Hz	
	Rated output current	76.0 A a.c.	
	Max. output current	83.8 A a.c.	
GRID DATA	Rated power	50000 W	
	Rated apparent power	50000 VA	
	Max. apparent power	55000 VA	
	Power factor	0.8 leading to 0.8 lagging	
	Nominal AC voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
LOAD OUTPUT	Nominal AC frequency	50/60 Hz	
	Max. AC input current	320 A a.c.	
	Max. AC input apparent power	23700 VA	
	Power factor	0.8 leading to 0.8 lagging	
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
OVER PROTECTION	Nominal frequency	50/60 Hz	
	Rated AC output current	76.0 A a.c.	
	Max. AC output current	83.8 A a.c.	
	Rated power	50000 W	
	Rated AC output apparent power	50000 VA	
ENVIRONMENTAL PROTECTION	Max. output apparent power	55000 VA	
	Max. output current and power	300 A a.c./207000W	
	Power factor	0.8 leading to 0.8 lagging	
	Ingress protection	IP65	
	Operation temperature range	-30...+60 °C	
CERTIFICATION	Protective class	II	
	Inverter topology	Non-isolated	
	Over voltage category	II (DC), III (AC)	
	Over current category	II (DC), III (AC)	
	Over temperature category	II (DC), III (AC)	
DRMG DRM1 DRM2 DRM3 DRM4 DRM5 DRM6 DRM7 DRM8 ☒ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
			
EN 50549-1 IEC 62109-1 IEC 62109-2 IEC 62109-3 IEC 62109-4 FOXESS CO., LTD. No. 333, Jinsha Third Road, New Airport Industry Area, Longmen District, Shenzhen, Guangdong, China 			
MADE IN CHINA 10-200-0000-01-X			

FOX ESS		H3-60-Plus GRID SUPPORT UTILITY INTERACTIVE INVERTER (NON-ISOLATED INVERTER) www.fox-ess.com	
PV INPUT	Max. PV array power	12000 W	
	Max. input voltage	1000 V d.c.	
	Nominal voltage	750 V d.c.	
	DC input voltage range	80-950 V d.c.	
	MPPT voltage range	80-950 V d.c.	
BATTERY DATA	Max. input current	4750 A d.c.	
	Isolated PV	No	
	Battery voltage range	180-950 V d.c.	
	Max. charge/discharge current	3700 A d.c.	
	Battery type	Lithium-ion	
AC INPUT	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
	Nominal frequency	50/60 Hz	
	Max. input current	320 A a.c.	
	Max. apparent power	23700 VA	
	Max. power for battery charged	50000 W	
AC OUTPUT	Power factor	0.8 leading to 0.8 lagging	
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
	Nominal frequency	50/60 Hz	
	Rated output current	81.2 A a.c.	
	Max. output current	100.3 A a.c.	
GRID DATA	Rated power	60000 W	
	Rated apparent power	60000 VA	
	Max. apparent power	65000 VA	
	Power factor	0.8 leading to 0.8 lagging	
	Nominal AC voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
LOAD OUTPUT	Nominal AC frequency	50/60 Hz	
	Max. AC input current	320 A a.c.	
	Max. AC input apparent power	23700 VA	
	Power factor	0.8 leading to 0.8 lagging	
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3~/N/PE	
OVER PROTECTION	Nominal frequency	50/60 Hz	
	Rated AC output current	81.2 A a.c.	
	Max. AC output current	100.3 A a.c.	
	Rated power	60000 W	
	Rated AC output apparent power	60000 VA	
ENVIRONMENTAL PROTECTION	Max. output apparent power	65000 VA	
	Max. output current and power	300 A a.c./207000W	
	Power factor	0.8 leading to 0.8 lagging	
	Ingress protection	IP65	
	Operation temperature range	-30...+60 °C	
CERTIFICATION	Protective class	II	
	Inverter topology	Non-isolated	
	Over voltage category	II (DC), III (AC)	
	Over current category	II (DC), III (AC)	
	Over temperature category	II (DC), III (AC)	
DRMG DRM1 DRM2 DRM3 DRM4 DRM5 DRM6 DRM7 DRM8 ☒ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
			
EN 50549-1 IEC 62109-1 IEC 62109-2 IEC 62109-3 IEC 62109-4 FOXESS CO., LTD. No. 333, Jinsha Third Road, New Airport Industry Area, Longmen District, Shenzhen, Guangdong, China 			
MADE IN CHINA 10-200-0000-01-X			

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FOX ESS		H3-75-Plus GRID SUPPORT UTILITY INTERACTIVE INVERTER (NON-ISOLATED INVERTER) www.fox-ess.com
PV INPUT	Max. PV array power	10000 W
	Max. input voltage	1000 V d.c.
	Nominal voltage	750 V d.c.
	DC input voltage range	180-950 V d.c.
	MPP voltage range	180-950 V d.c.
BATTERY DATA	Max. input current	8740 A d.c.
	Max. input current to PV	8740 A d.c.
BATTERY DATA	Battery voltage range	180-950 V d.c.
	Max. charge/discharge current	2780 A d.c.
AC INPUT	Battery type	Lithium-ion
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
AC INPUT	Nominal frequency	50/60 Hz
	Max. input current	300 A a.c.
AC INPUT	Max. apparent power	207000 VA
	Max. power for battery charged	75000*/82500 W
AC OUTPUT	Power factor	0.8 leading to 0.8 lagging
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
AC OUTPUT	Nominal frequency	50/60 Hz
	Rated output current	183.9 A a.c.
AC OUTPUT	Max. output current	184*/125.4 A a.c.
	Rated power	75000 W
AC OUTPUT	Rated apparent power	75000 VA
	Max. apparent power	75000*/82500 VA
AC OUTPUT	Power factor	0.8 leading to 0.8 lagging
DIESEL GEN DATA	Nominal AC voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
	Nominal AC frequency	50/60 Hz
DIESEL GEN DATA	Max. AC input current	300 A a.c.
	Max. AC input apparent power	207000 VA
DIESEL GEN DATA	Power factor	0.8 leading to 0.8 lagging
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
DIESEL GEN DATA	Nominal frequency	50/60 Hz
	Rated AC output current	183.9 A a.c.
DIESEL GEN DATA	Max. AC output current	184*/125.4 A a.c.
	Rated power	75000 W
DIESEL GEN DATA	Rated AC output apparent power	75000 VA
	Max. output apparent power	75000*/82500 VA
DIESEL GEN DATA	Max. bypass current and power	300 A a.c./207000 W
	Power factor	0.8 leading to 0.8 lagging
Ingress protection		IP65
Operation temperature range		-30...+40 °C
Protective class		I
Inverter topology		Non-isolated
Over voltage category		II (DC), III (AC)
D1/D2 D1/D3 D1/D4 D1/D5 D1/D6 D1/D7 D1/D8 D1/D9 ☒ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
		
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MADE IN CHINA		

FOX ESS		H3-80-Plus GRID SUPPORT UTILITY INTERACTIVE INVERTER (NON-ISOLATED INVERTER) www.fox-ess.com
PV INPUT	Max. PV array power	10000 W
	Max. input voltage	1000 V d.c.
	Nominal voltage	750 V d.c.
	DC input voltage range	180-950 V d.c.
	MPP voltage range	180-950 V d.c.
BATTERY DATA	Max. input current	8740 A d.c.
	Max. input current to PV	8740 A d.c.
BATTERY DATA	Battery voltage range	180-950 V d.c.
	Max. charge/discharge current	2780 A d.c.
AC INPUT	Battery type	Lithium-ion
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
AC INPUT	Nominal frequency	50/60 Hz
	Max. input current	300 A a.c.
AC INPUT	Max. apparent power	207000 VA
	Max. power for battery charged	80000 W
AC OUTPUT	Power factor	0.8 leading to 0.8 lagging
	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
AC OUTPUT	Nominal frequency	50/60 Hz
	Rated output current	125.4 A a.c.
AC OUTPUT	Max. output current	133.7 A a.c.
	Rated power	80000 W
AC OUTPUT	Rated apparent power	80000 VA
	Max. apparent power	80000 VA
AC OUTPUT	Power factor	0.8 leading to 0.8 lagging
	Nominal AC voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
DIESEL GEN DATA	Nominal AC frequency	50/60 Hz
	Max. AC input current	300 A a.c.
DIESEL GEN DATA	Max. AC input apparent power	207000 VA
	Power factor	0.8 leading to 0.8 lagging
DIESEL GEN DATA	Nominal voltage	220/230 V a.c., 230/400 V a.c., 3/N/PE
	Nominal frequency	50/60 Hz
DIESEL GEN DATA	Rated AC output current	125.4 A a.c.
	Max. AC output current	133.7 A a.c.
DIESEL GEN DATA	Rated power	80000 W
	Rated AC output apparent power	80000 VA
DIESEL GEN DATA	Max. output apparent power	80000 VA
	Max. bypass current and power	300 A a.c./207000 W
DIESEL GEN DATA	Power factor	0.8 leading to 0.8 lagging
	Ingress protection	IP65
DIESEL GEN DATA	Operation temperature range	-30...+40 °C
	Protective class	I
DIESEL GEN DATA	Inverter topology	Non-isolated
	Over voltage category	II (DC), III (AC)
D1/D2 D1/D3 D1/D4 D1/D5 D1/D6 D1/D7 D1/D8 D1/D9 ☒ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
		
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MADE IN CHINA		

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FOX ESS		H3-100-Plus GRID SUPPORT UTILITY INTERACTIVE INVERTER (NON-ISOLATED INVERTER) www.fox-ess.com	
PV INPUT	Max. PV array power	20000 W	
	Max. input voltage	1000 V d.c.	
	Nominal voltage	750 V d.c.	
	DC input voltage range	180-950 V d.c.	
	MPP voltage range	180-950 V d.c.	
BATTERY DATA	Max. input current	8740 A d.c.	
	Isd PV	8750 A d.c.	
BATTERY DATA	Battery voltage range	180-550 V d.c.	
	Max. charge/discharge current	3780 A d.c.	
AC INPUT	Battery type	Lithium-ion	
	Nominal voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
AC INPUT	Nominal frequency	50/60 Hz	
	Max. input current	300 A a.c.	
AC INPUT	Max. apparent power	207000 VA	
	Max. power for battery charged	100000 W	
AC INPUT	Power factor	0.8 leading to 0.8 lagging	
AC OUTPUT	Nominal voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
	Nominal frequency	50/60 Hz	
AC OUTPUT	Rated output current	193.0 A a.c.	
	Max. output current	167.2 A a.c.	
AC OUTPUT	Rated power	100000 W	
	Rated apparent power	100000 VA	
AC OUTPUT	Max. apparent power	100000 VA	
	Power factor	0.8 leading to 0.8 lagging	
DIESEL GEN DATA	Nominal AC voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
	Nominal AC frequency	50/60 Hz	
DIESEL GEN DATA	Max. AC input current	300 A a.c.	
	Max. AC input apparent power	207000 VA	
DIESEL GEN DATA	Power factor	0.8 leading to 0.8 lagging	
LOAD OUTPUT	Nominal voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
	Nominal frequency	50/60 Hz	
LOAD OUTPUT	Rated AC output current	193.0 A a.c.	
	Max. AC output current	167.2 A a.c.	
LOAD OUTPUT	Rated power	100000 W	
	Rated AC output apparent power	100000 VA	
LOAD OUTPUT	Max. output apparent power	100000 VA	
	Max. bypass current and power	300 A a.c./207000 W	
LOAD OUTPUT	Power factor	0.8 leading to 0.8 lagging	
	Ingress protection	IP65	
LOAD OUTPUT	Operation temperature range	-30...+60 °C	
	Protective class	I	
LOAD OUTPUT	Inverter topology	Non-isolated	
	Over voltage category	III (DC), III (AC)	
DRM0 DRM1 DRM2 DRM3 DRM4 DRM5 DRM6 DRM7 DRM8 ☒ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
			
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FOX ESS		H3-125-Plus GRID SUPPORT UTILITY INTERACTIVE INVERTER (NON-ISOLATED INVERTER) www.fox-ess.com	
PV INPUT	Max. PV array power	25000 W	
	Max. input voltage	1000 V d.c.	
	Nominal voltage	750 V d.c.	
	DC input voltage range	180-950 V d.c.	
	MPP voltage range	180-950 V d.c.	
BATTERY DATA	Max. input current	8740 A d.c.	
	Isd PV	8750 A d.c.	
BATTERY DATA	Battery voltage range	180-550 V d.c.	
	Max. charge/discharge current	3780 A d.c.	
AC INPUT	Battery type	Lithium-ion	
	Nominal voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
AC INPUT	Nominal frequency	50/60 Hz	
	Max. input current	300 A a.c.	
AC INPUT	Max. apparent power	207000 VA	
	Max. power for battery charged	100000 W	
AC INPUT	Power factor	0.8 leading to 0.8 lagging	
AC OUTPUT	Nominal voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
	Nominal frequency	50/60 Hz	
AC OUTPUT	Rated output current	193.0 A a.c.	
	Max. output current	167.2 A a.c.	
AC OUTPUT	Rated power	125000 W	
	Rated apparent power	125000 VA	
AC OUTPUT	Max. apparent power	125000 VA	
	Power factor	0.8 leading to 0.8 lagging	
DIESEL GEN DATA	Nominal AC voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
	Nominal AC frequency	50/60 Hz	
DIESEL GEN DATA	Max. AC input current	300 A a.c.	
	Max. AC input apparent power	207000 VA	
DIESEL GEN DATA	Power factor	0.8 leading to 0.8 lagging	
LOAD OUTPUT	Nominal voltage	220/380 V a.c., 230/400 V a.c., 311/191 PE	
	Nominal frequency	50/60 Hz	
LOAD OUTPUT	Rated AC output current	193.0 A a.c.	
	Max. AC output current	167.2 A a.c.	
LOAD OUTPUT	Rated power	125000 W	
	Rated AC output apparent power	125000 VA	
LOAD OUTPUT	Max. output apparent power	125000 VA	
	Max. bypass current and power	300 A a.c./207000 W	
LOAD OUTPUT	Power factor	0.8 leading to 0.8 lagging	
	Ingress protection	IP65	
LOAD OUTPUT	Operation temperature range	-30...+60 °C	
	Protective class	I	
LOAD OUTPUT	Inverter topology	Non-isolated	
	Over voltage category	III (DC), III (AC)	
DRM0 DRM1 DRM2 DRM3 DRM4 DRM5 DRM6 DRM7 DRM8 ☒ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐			
			
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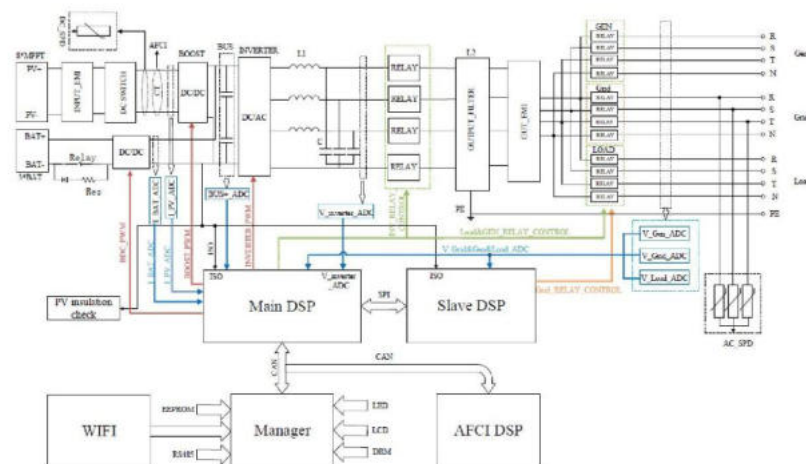
Declaration of VDE-AR-N 4110

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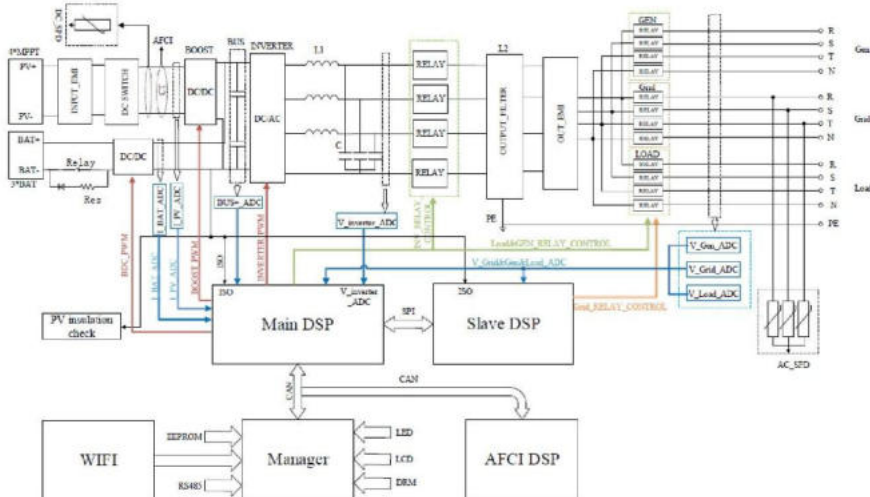
4. Product description:

The PCE under test (EUT) is Grid-connected hybrid Inverter which utilizes the advanced power electronics conversion components such as MOSFET, IGBT to convert the variable DC power generated from the photovoltaic (PV) arrays to the stable utility AC power which can be fed into the commercial electrical grid, battery and load. The unit would switch to off grid mode if grid power is unavailable.

The PGU have been designed so that the requirements of VDE-AR-N 4110 for the power generating unit can be complied with.



8 MPPT for model H3-75-Plus, H3-80-Plus, H3-100-Plus, H3-125-Plus



4 MPPT for model H3-50-Plus, H3-60-Plus

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Primary energy supply: PV/battery source

Type of modulation in Hybrid inverter: SVPWM (Space Vector Pulse Width Modulation)

Pulse frequency: 18kHz

Phase to neutral voltage is used for protection detection.

P.u. value is related to rated current

=190.0 A	(for model H3-125-Plus)
=152.0 A	(for model H3-100-Plus)
=121.6 A	(for model H3-80-Plus)
=113.9 A	(for model H3-75-Plus)
=91.2 A	(for model H3-60-Plus)
=76.0 A	(for model H3-50-Plus)

The protection device makes up of two in series, communicative coupled AC relays so that the equipment could be effectively separated from utility even any one of relays short circuited or works abnormally.

The controlling section is also redundant built, one master DSP, and one slave DSP. The master DSP carries out the main calculation and driving instructions. Slave DSP is responsible for the redundant relay independently. In case any one of two chips breaks down or runs a wrong program, which result to the loss of protection function, the another chip could indicate the fault and disconnect the equipment immediately.

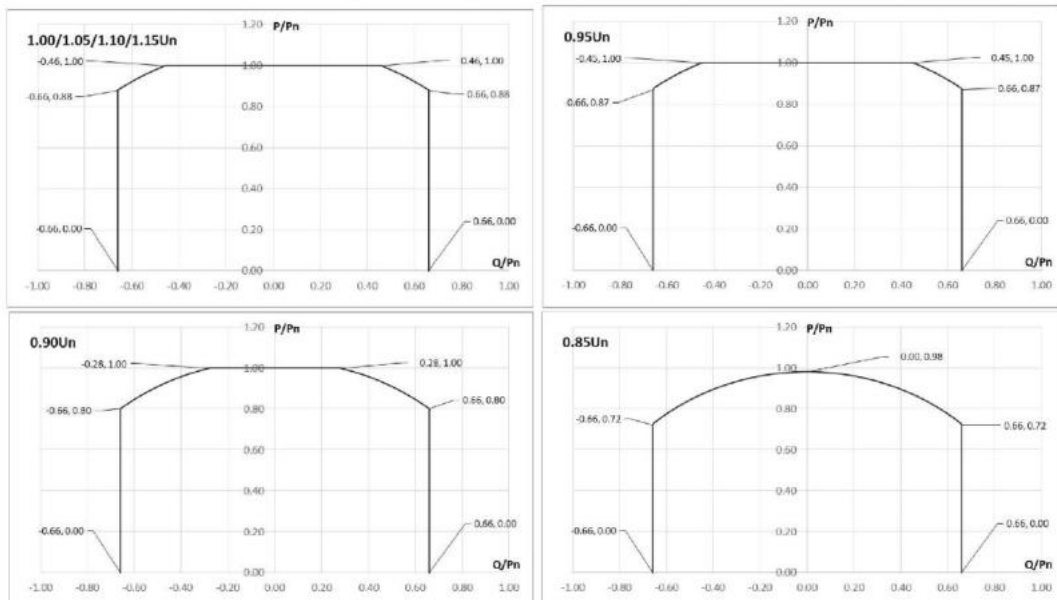
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5. PQ diagram:

Discharge mode:

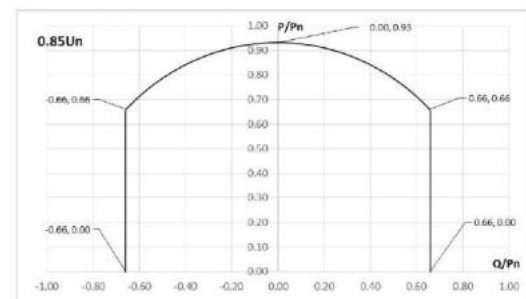
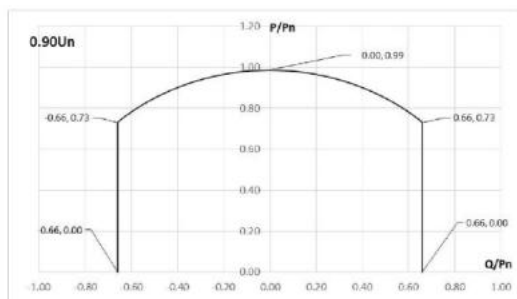
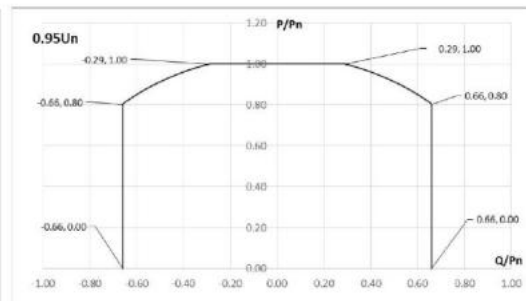
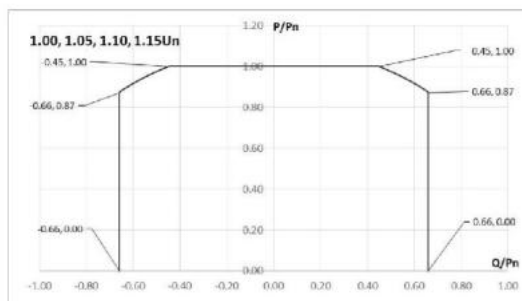
H3-50-Plus, H3-60-Plus, H3-75-Plus, H3-80-Plus, H3-100-Plus								
P [p.u.]	Direction	Qmax [p.u.]						
		85 % U _N	90 % U _N	95 % U _N	100 % U _N	105 % U _N	110 % U _N	115 % U _N
0	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.1	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.2	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.3	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.4	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.5	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.6	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.7	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.8	Underexcited	-0.57	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.57	0.66	0.66	0.66	0.66	0.66	0.66
0.9	Underexcited	-0.39	-0.52	-0.63	-0.63	-0.63	-0.63	-0.63
	Overexcited	0.39	0.52	0.63	0.63	0.63	0.63	0.63
1.0	Underexcited	--	-0.28	-0.45	-0.46	-0.46	-0.46	-0.46
	Overexcited	--	0.28	0.45	0.46	0.46	0.46	0.46
1.1	Underexcited	--	--	--	--	--	--	--
	Overexcited	--	--	--	--	--	--	--



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H3-125-Plus								
P [p.u.]	Direction	Qmax [p.u.]						
		85 % U _N	90 % U _N	95 % U _N	100 % U _N	105 % U _N	110 % U _N	115 % U _N
0	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.1	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.2	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.3	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.4	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.5	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.6	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
0.7	Underexcited	-0.61	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.61	0.66	0.66	0.66	0.66	0.66	0.66
0.8	Underexcited	-0.48	-0.58	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.48	0.58	0.66	0.66	0.66	0.66	0.66
0.9	Underexcited	-0.24	-0.40	-0.52	-0.62	-0.62	-0.62	-0.62
	Overexcited	0.24	0.40	0.52	0.62	0.62	0.62	0.62
1.0	Underexcited	--	--	-0.29	-0.45	-0.45	-0.45	-0.45
	Overexcited	--	--	0.29	0.45	0.45	0.45	0.45
1.1	Underexcited	--	--	--	--	--	--	--
	Overexcited	--	--	--	--	--	--	--

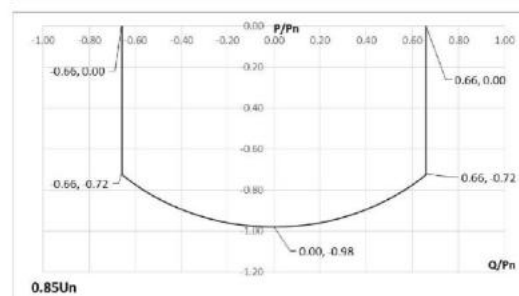
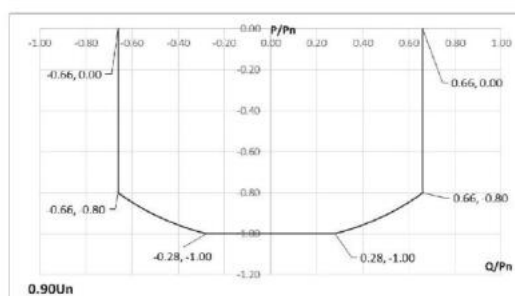
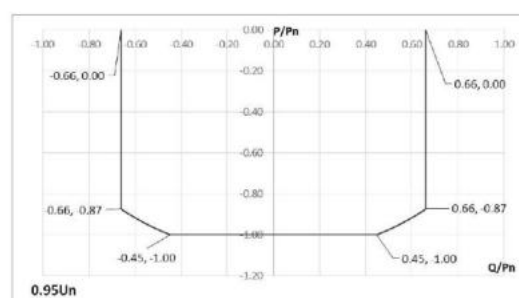
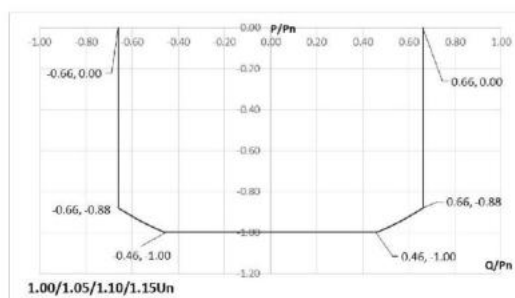


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Charge mode:

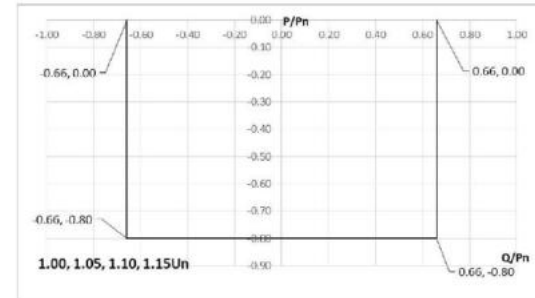
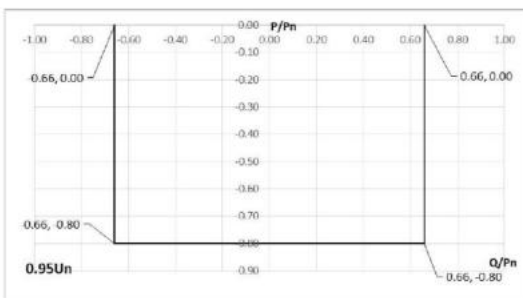
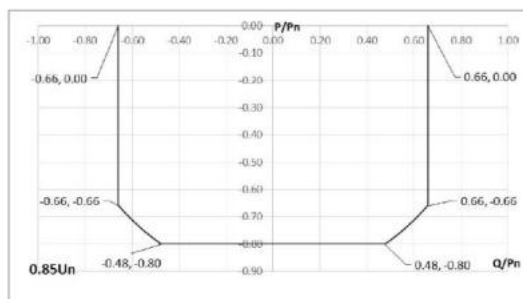
H3-50-Plus, H3-60-Plus, H3-75-Plus, H3-80-Plus, H3-100-Plus								
P [p.u.]	Direction	Qmax [p.u.]						
		85 % U _N	90 % U _N	95 % U _N	100 % U _N	105 % U _N	110 % U _N	115 % U _N
0	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.1	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.2	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.3	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.4	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.5	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.6	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.7	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.8	Underexcited	-0.57	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.57	0.66	0.66	0.66	0.66	0.66	0.66
-0.9	Underexcited	-0.39	-0.52	-0.63	-0.63	-0.63	-0.63	-0.63
	Overexcited	0.39	0.52	0.63	0.63	0.63	0.63	0.63
-1.0	Underexcited	--	-0.28	-0.45	-0.46	-0.46	-0.46	-0.46
	Overexcited	--	0.28	0.45	0.46	0.46	0.46	0.46
-1.1	Underexcited	--	--	--	0	0	0	0
	Overexcited	--	--	--	0	0	0	0



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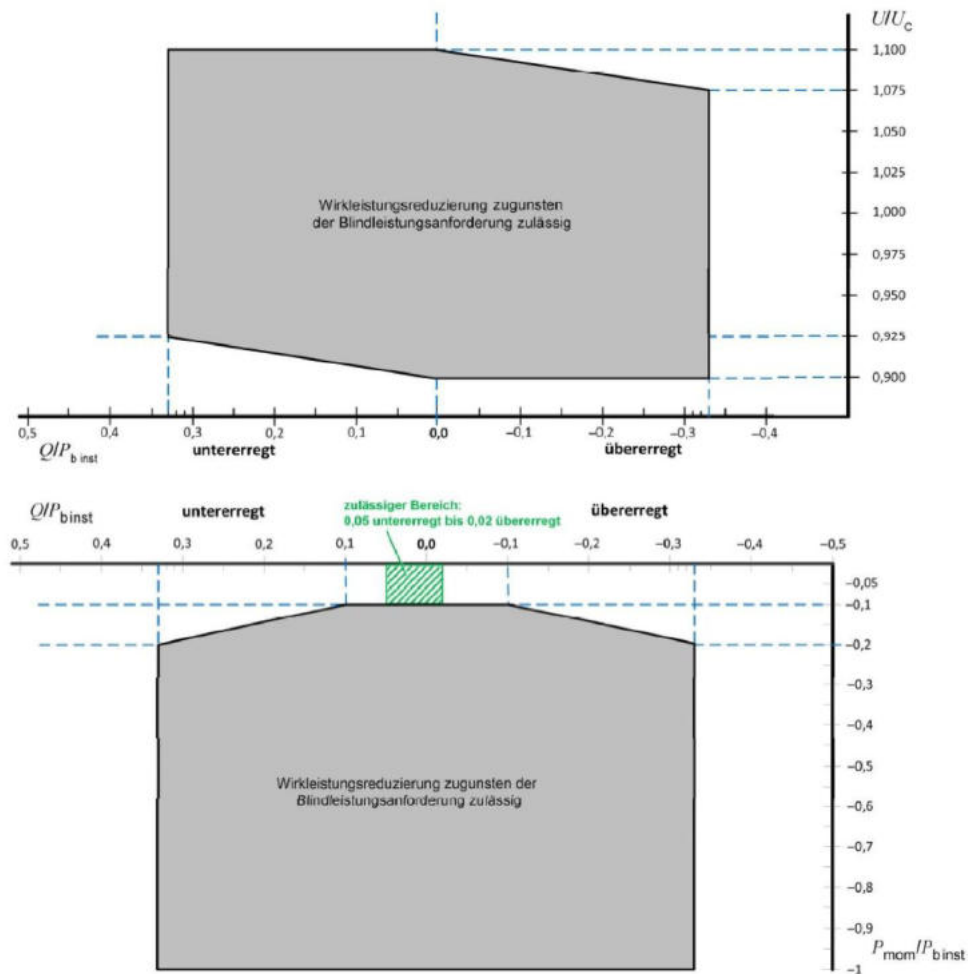
H3-125-Plus								
P [p.u.]	Direction	Qmax [p.u.]						
		85 % U _N	90 % U _N	95 % U _N	100 % U _N	105 % U _N	110 % U _N	115 % U _N
0	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.1	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.2	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.3	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.4	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.5	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.6	Underexcited	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.66	0.66	0.66	0.66	0.66	0.66	0.66
-0.7	Underexcited	-0.61	-0.66	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.61	0.66	0.66	0.66	0.66	0.66	0.66
-0.8	Underexcited	-0.48	-0.58	-0.66	-0.66	-0.66	-0.66	-0.66
	Overexcited	0.48	0.58	0.66	0.66	0.66	0.66	0.66
-0.9	Underexcited	--	--	--	--	--	--	--
	Overexcited	--	--	--	--	--	--	--
-1.0	Underexcited	--	--	--	--	--	--	--
	Overexcited	--	--	--	--	--	--	--
-1.1	Underexcited	--	--	--	--	--	--	--
	Overexcited	--	--	--	--	--	--	--



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Every set point value specified by the grid operator can be achieved within the required reactive power range from VDE-AR-N 4110.



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6. Methods for reactive power control

The reactive power is always prioritised over active power.

The P-Q relation in normal operation always follow the equation:

$$S = \min(U \cdot I, \min(S_{\max}, U \cdot I_{\max}))$$

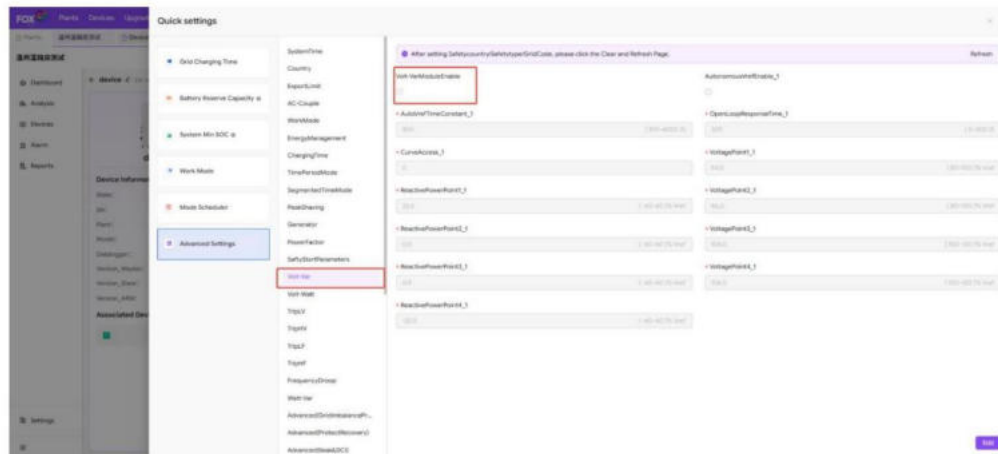
$$P = \sqrt{S^2 - Q^2}$$

a. Reactive power-voltage character curve Q(U)

Reactive power-voltage character curve Q(U):			
Parameter	Setting range	Setting step	Default value
Volt-VarModuleEnable	Disable/Enable	---	Disable
OpenLoopResponseTime_1	0...300s	1s	300s
VoltagePoint1_1	80% p.u. ... 100% p.u	1% p.u.	94% p.u
ReactivePowerPoint1_1	-60.000 % ... 60.000 % Pn	0.1 %	33.000 % Pn
VoltagePoint2_1	80% p.u. ... 100% p.u	1% p.u.	96% p.u
ReactivePowerPoint2_1	-60.000 % ... 60.000 %	0.1 %	0 % Pn
VoltagePoint3_1	100% p.u. ... 120% p.u	1% p.u.	104% p.u
ReactivePowerPoint3_1	-60.000 % ... 60.000 % Pn	0.1 %	0 % Pn
VoltagePoint4_1	100% p.u. ... 120% p.u	1% p.u.	106% p.u
ReactivePowerPoint4_1	-60.000 % ... 60.000 % Pn	0.1 %	-33.000 % Pn

Remark: For this function, the PT1 curve can be turned off directly under external control.

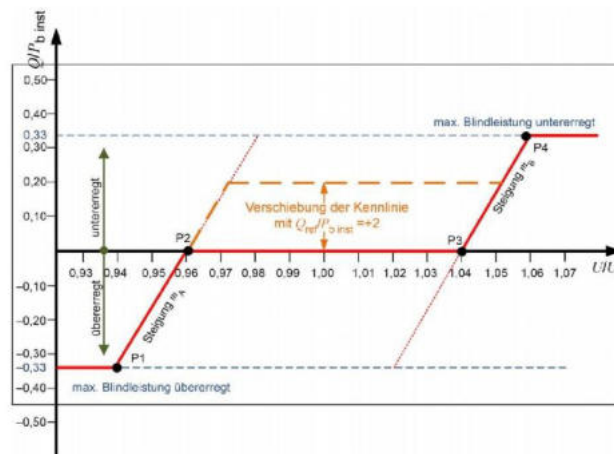
FoxESSCloud setting screenoot:



Curve setting in test:

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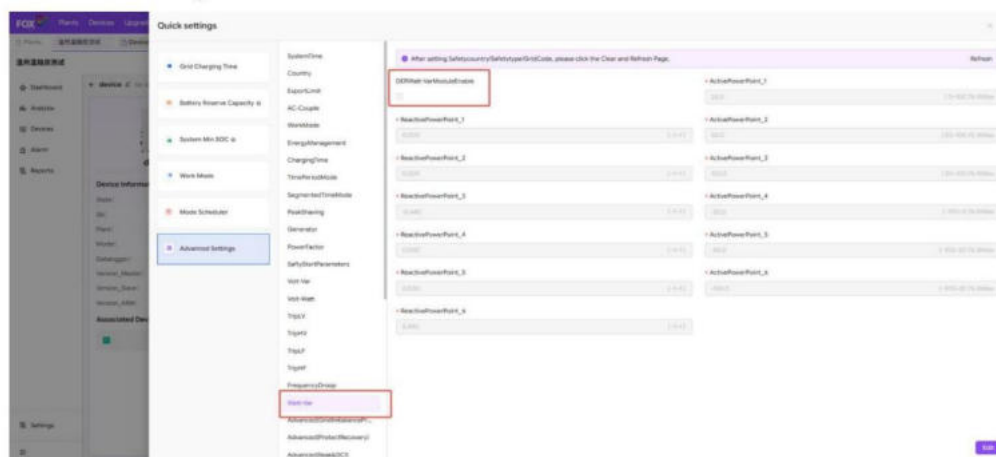


b. Character curve Q(P)

Character curve Q(P)			
Parameter	Setting range	Setting step	Default value
DERWatt-VarModuleEnable	Disable/Enable	--	Disable
ActivePowerPoint_1	0 ... 100% Pn	0.1% Pn	20% Pn
ReactivePowerPoint_1	-1 ... 1 Pn	0.001 Pn	0 Pn
ActivePowerPoint_2	20%...100% Pn	0.1% Pn	50% Pn
ReactivePowerPoint_2	-1 ... 1 Pn	0.001 Pn	0 Pn
ActivePowerPoint_3	20%...100% Pn	0.1% Pn	100% Pn
ReactivePowerPoint_3	-1 ... 1 Pn	0.001 Pn	-0.44 Pn
ActivePowerPoint_4	-100%...0% Pn	0.1% Pn	-20% Pn
ReactivePowerPoint_4	-1 ... 1 Pn	0.001 Pn	0 Pn
ActivePowerPoint_5	-100%...20% Pn	0.1% Pn	-50% Pn
ReactivePowerPoint_5	-1 ... 1 Pn	0.001 Pn	0.00 Pn
ActivePowerPoint_6	-100%...20% Pn	0.1% Pn	-100% Pn
ReactivePowerPoint_6	-1 ... 1 Pn	0.001 Pn	0.44 Pn
Reactive response time (PT1 behavior)	2 ... 20 s	0.1s	3.33s

Note(s): The cos(P)-Control can be achieved through Q(P) settings.

FoxESSCloud setting screenshot:



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Curve setting in test:

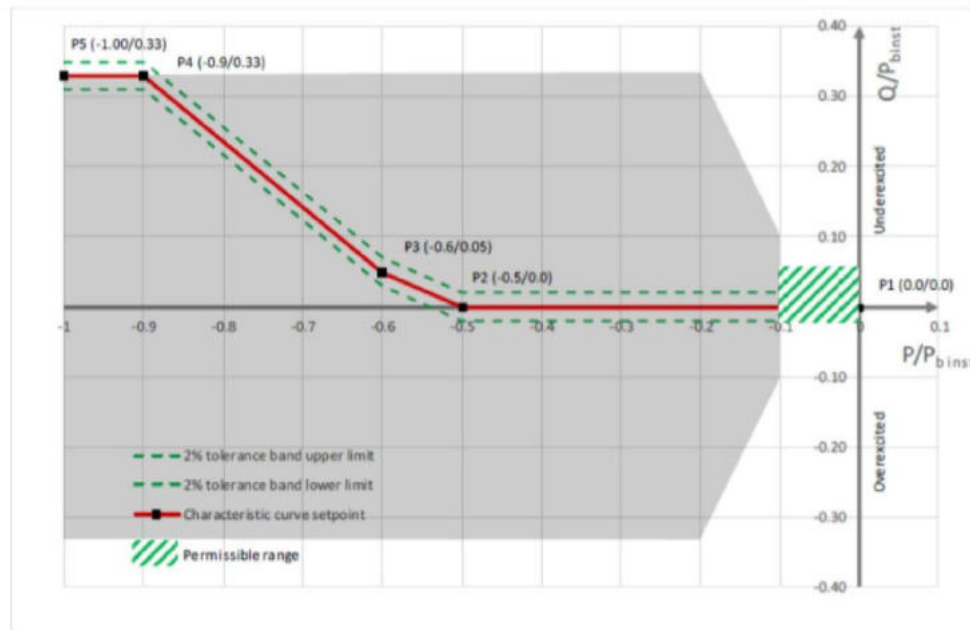


Figure 6–9: Reactive power characteristic curve as a function of the active power $Q(P)$ (source: VDE-AR-N 4110 [4] Picture 9: Load sign convention)

c. Fixed Q

Fixed Q			
Parameter	Setting range	Setting step	Default value
SetReactivePowerEnable	Disable/Enable	--	disable
ReactivePowerValue(Var)	-125...125kVar	0.1kVar	0 kVar
ReactiveResponseTime (s)	1-6000s	1 s	5 s
ReactivePowerRetentionSettingofSVG	Disable/Enable	--	Enable

FoxESSCloud setting screenoot:

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The screenshot displays the 'Network Setting' page in the FastSSCloud interface. The left sidebar contains navigation options such as 'Home', 'Device', 'Network Setting', 'Inverter', 'Device', 'Inverter', 'Data Report', 'Error List', 'Setting', 'Platform Log', 'Site Maintenance', 'Log Audit', and 'New Version Available'. The main content area is titled 'Network Setting' and features a 'Power Factor' section. This section includes a table of settings with columns for the parameter name, its value, and a unit. The 'Power Factor' section is highlighted with a red box. Below it, the 'Recovery' section is also highlighted with a red box. The 'Recovery' section includes settings for 'PDRRecoveryFunctionEnable', 'PDRRecoveryImpedanceSetting', 'PDRRecoveryVoltageSetting', 'PDRKernClearing', 'SDGDelayTimeSetting', 'SDGFunctionEnable', 'ReactivePowerBasedSettingPDRG', and 'ReactivePowerBasedSettingPDRG'. The 'Recovery' section is also highlighted with a red box. The bottom of the page features a 'New Version Available' banner and a 'Log Audit' button.

Fixed cosφ			
Parameter	Setting range	Setting step	Default value
PowerFactorEnable(WInj)Enable	Disable/Enable	--	disable
PowerFactor(WInj)	0.80...1.0	0.001	1
PowerFactorExcitation(WInj)	-underexcitation -overexcitation	-	underexcitation
ReactiveResponseTime(s)	1-6000s	1s	2s
ReactiveResponse	On/Off	--	On

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FoxESSCloud setting screensoot:

Figure 10 shows the 'Network Setting' page in the FoxtESSCloud interface for Inverter ID: B0PFD0R5TQR017. The interface includes a sidebar with navigation options and a main content area with a list of parameters and their values. Red boxes highlight specific parameters that are part of the safety settings configuration.

Parameter	Value
SystemTime	PowerFactorOutActivePowerEnable
Country	LineVoltageActivePowerValue
ExportLimit	* LineMaximumActivePowerValue 100.0
DOActiveService	SetActivePowerValue
DOActiveControl	* ReactivePowerSettingValue 0.0
DOActiveVar	* PowerFactorOutActivePowerValue 1.00
DOActiveWait	ReactiveResponse
DOActiveV	* ReactiveResponseTime 0
DOActiveF	GridFSet
DOActiveP	* GridFSet 1000
DOActiveImp	* LoadLimitPower 200.0
DOActiveVar	* PActivePowerSetting 200.0
AdvancedGridBalanceProtection	* EPActivePower 100.0
AdvancedRecoveryFunctionSetting	RecoveryFunctionSetting
AdvancedRecoveryImpedanceSetting	* RecoveryImpedanceSetting 40
AdvancedRecoveryVoltageSetting	* RecoveryVoltageSetting 80.0
AdvancedRecoveryClearing	* RecoveryClearing Enable
AdvancedRecoveryDelayTimeSetting	* RecoveryDelayTimeSetting 0
AdvancedRecoveryFunctionSetting	* RecoveryFunctionSetting Enable
AdvancedRecoveryPowerRetentionSetting	* RecoveryPowerRetentionSetting 0.0

Note:

The function below applies for all the control modes.

If ReactivePowerRetentionSettingofSVG is enabled, the reactive power remains the same after the machine is completely powered off and restarted. If Reactive Power Retention Setting of SVG is not enabled, the reactive power returns to its default value after the machine is completely powered off and restarted.

If communication with plant controller or network operator interrupted over 1min, the reactive power maintain the last set-point received or reduction to xx% Pn Var(xx is a preset value).

Users can enable the Fall Safe function through the host computer. When the Fall Safe function is enabled, within 60 seconds after a communication interruption, the system will operate according to the reactive power state before the interruption. After 60 seconds, it will operate according to the preset reactive power. Once communication is restored, a new reactive power dispatch needs to be issued, and the system will operate according to the new reactive power dispatch. Symbol (??) in first row is an ASCII symbol.

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Fall Safe Enable(0xAA-Enable)	(??) 0x00AA
Fall Safe Commtimeout(s)	60
Fall safe ActivePower Pct(0.1%)	1000
Fall safe ReactivePower Pct(0.1%)	600

Reactive power strategy:

The reactive power is prioritized over active power. Active power can be reduced in favor of reactive power provision. In favor of reactive power provision, the active power can be reduced when limitation of apparent power(Smax) or current(I_{max}) reached. The reduction of power is automatically, and can not be parameterized manually.

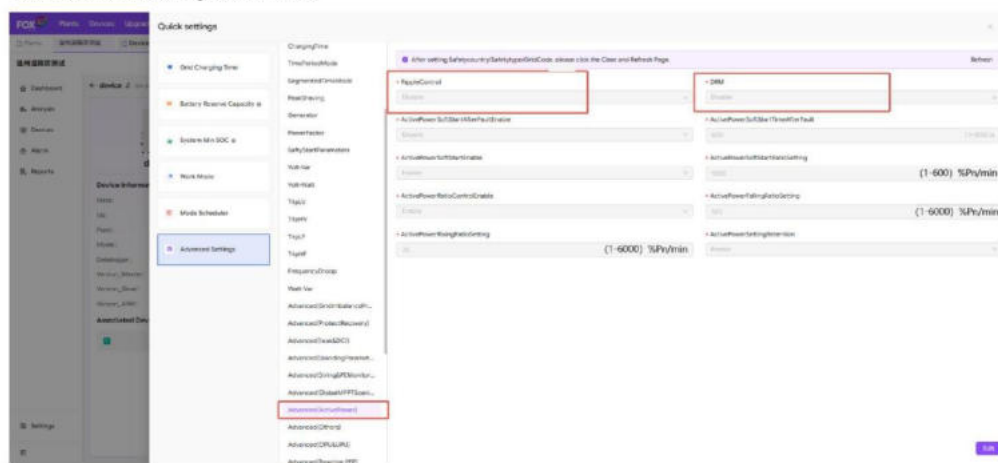
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7. Network security management

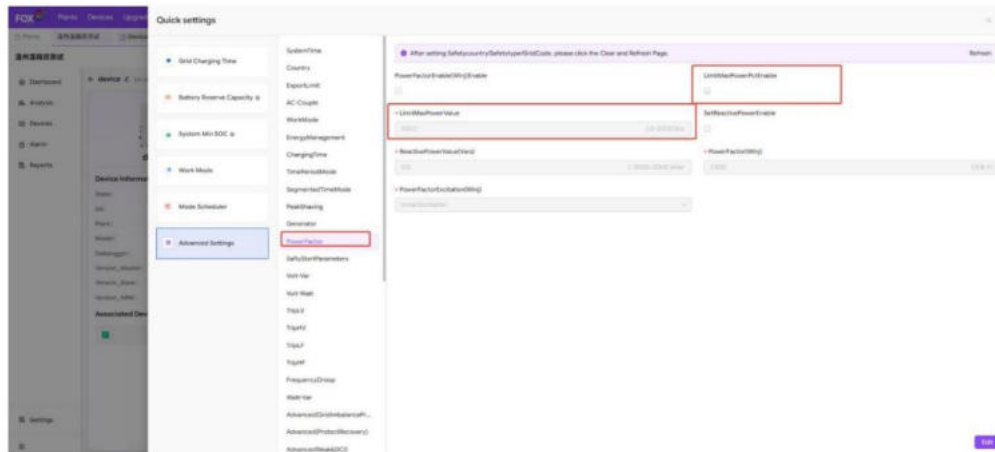
Network security management			
Parameter	Setting range	Setting step	Default value
LimitMaxPowerPctEnable	- Disable/Enable	--	Enable
LimitMaxPowerValue	0-2000kW	0.1kW	125kW(H3-125-Plus) 100kW(H3-100-Plus) 80kW(H3-80-Plus) 75kW(H3-75-Plus) 60kW(H3-60-Plus) 50kW(H3-50-Plus)
RippleControl	- Disable/Enable	--	Disable
DRM	- Disable/Enable	--	Disable
ActivePowerSoftStartingAfterFaultEnable	- Disable/Enable	--	Disable
ActivePowerSoftStartingTimeAfterFault	1-1200s	1	600s
ActivePowerSoftStartingEnable	- Disable/Enable	--	Enable
ActivePowerSoftStartingRatioSetting	1-6000%Pn/min	1%Pn/min	30%Pn/min
ActivePowerRatioControlEnable	- Disable/Enable	--	Enable
ActivePowerFallingRatioSetting	1-6000%Pn/min	1%Pn/min	25%Pn/min
ActivePowerRisingRatioSetting	1-6000%Pn/min	1%Pn/min	25%Pn/min
ActivePowerSettingRetention	- Disable/Enable	--	Enable

FoxESSCloud setting screenshoot:



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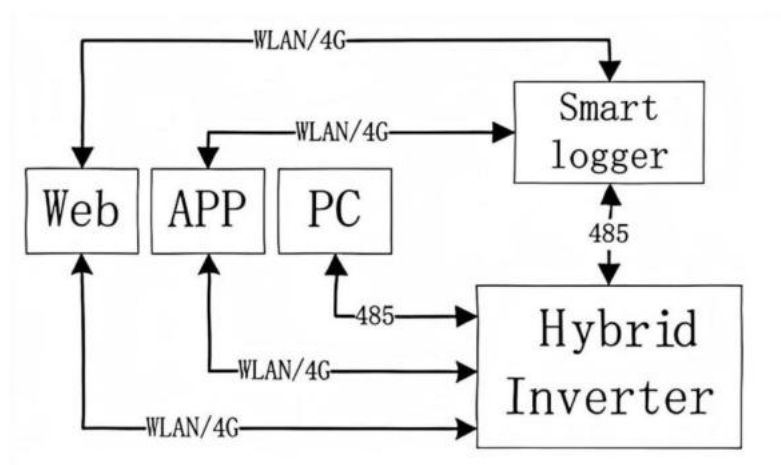
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Interface: RS485, INTER WLAN

The way of External controller is FoxESSCloud2.0

There is one kind of interface for network security management integrated in each unit and only one command from network or third party can be responded a time.



8. Active power output dependent on grid frequency

RoCoF complied with:

$\pm 2.0 \text{ Hz/s}$ for a moving average window 0.5s or

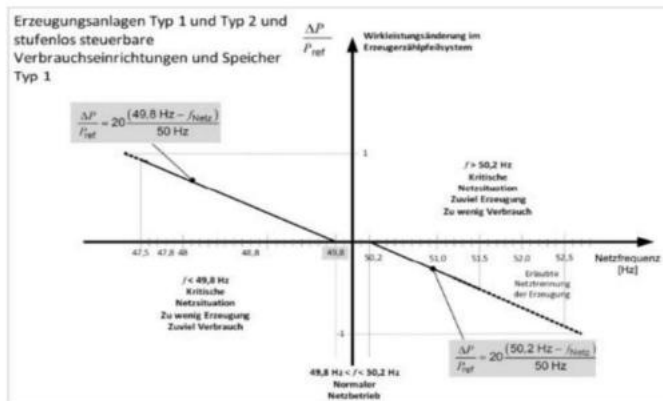
$\pm 1.5 \text{ Hz/s}$ for a moving average window 1s or

$\pm 1.25 \text{ Hz/s}$ for a moving average window 2s

P(f) curve:

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Over frequency curve start point: 50.2Hz – 50.5Hz adjustable Over frequency curve droop: 2% - 12% adjustable.

Under frequency curve start point: 49.5Hz – 49.8Hz adjustable Under frequency curve droop: 2% - 12% adjustable

While frequency step or shift exceeded the dead-band of P(f) curve, the unit output decrease or increase according to the droop of curve. There is no power change when frequency located within the dead-band (50±200mHz default). In the case of frequency above 51.5Hz the unit is able to remain connected to grid for another 5s without any power increase.

Even if the mains frequency has regained the tolerance band of 50,0 Hz ± 200 mHz after the frequency deviation, a critical network condition shall still be assumed. The transition from "critical network condition" to "normal operation" is time-limited by a maximum change of the set-point active power, starting from P_{nom}. This set-point active power change (except for the supply of control energy) shall be limited to a maximum gradient of 10 % P_b inst/min. Only when the mains frequency has been within the tolerance band of 50,0 Hz ± 200 mHz for an uninterrupted period of 10 min, the normal network operation is considered to be restored and this requirement is no longer valid.

The following requirements complied:

- 1) Initial time delay T_v < 2 s
- 2) Accuracy of frequency measurement < 10 mHz
- 3) Accuracy of fast frequency measurement < 50 mHz
- 4) Sample time < 200 ms

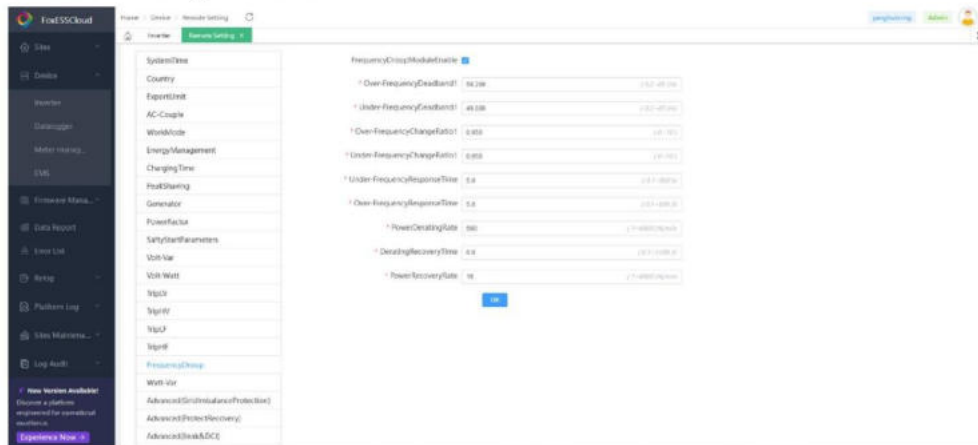
Active power output dependent on grid frequency			
Parameter	Setting range	Setting step	Default value
FrequencyDroopModuleEnable	- Disable/Enable	--	Enable
Over-FrequencyDeadband1	0.20 Hz ... 65.000 Hz	0.001 Hz	50.200 Hz
Under-FrequencyDeadband1	0.20 Hz ... 65.000 Hz	0.001 Hz	49.800 Hz
Over-FrequencyChangeRatio1 (droop setting)	0...10	0.001	0.050(5%)
Under-FrequencyChangeRatio1 (droop setting)	0...10	0.001	0.050(5%)
Under-FrequencyResponseTime	0.1s...6000s	0.1s	5.0s
Over-FrequencyResponseTime	0.1s...6000s	0.1s	5.0s

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PowerRecoveryRate	1%Pn/min ... 6000%Pn/min	1%Pn./min	10% Pn./min
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FoxESSCloud setting screenoot:



9. Quasi-steady-state operation

During quasi-steady-state operation, the power generating plants shall be able to operate linked to the distribution network in compliance with the minimum time requirements given in following figure over the full frequency range of 47,5 Hz to 51,5 Hz and for voltages in the range of 85 % U_c to 115 % U_c (r.m.s. values of the phase-to-phase voltage) at the network connection point.

Minimum time requirements given in standard:

Following P-f diagram per VDE-AR-N 4110: 2023 complied:

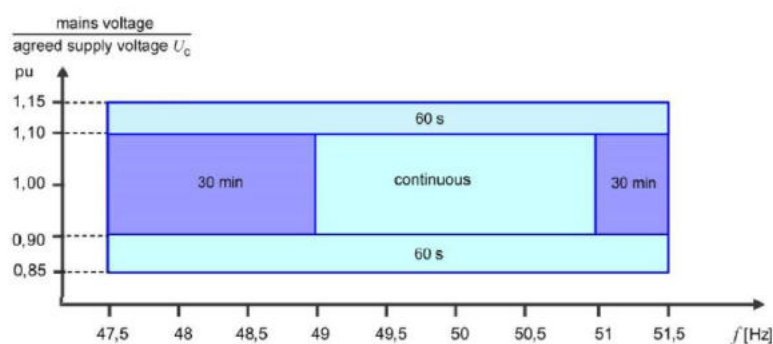
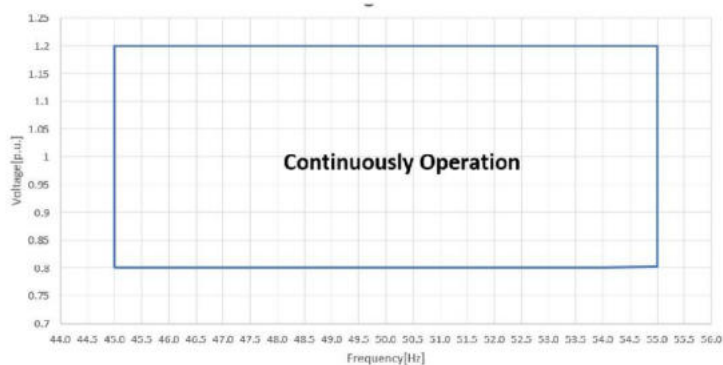


Figure 4 – Requirements for the quasi-steady-state operation of power generating plants

4110 Actual capability of inverter:

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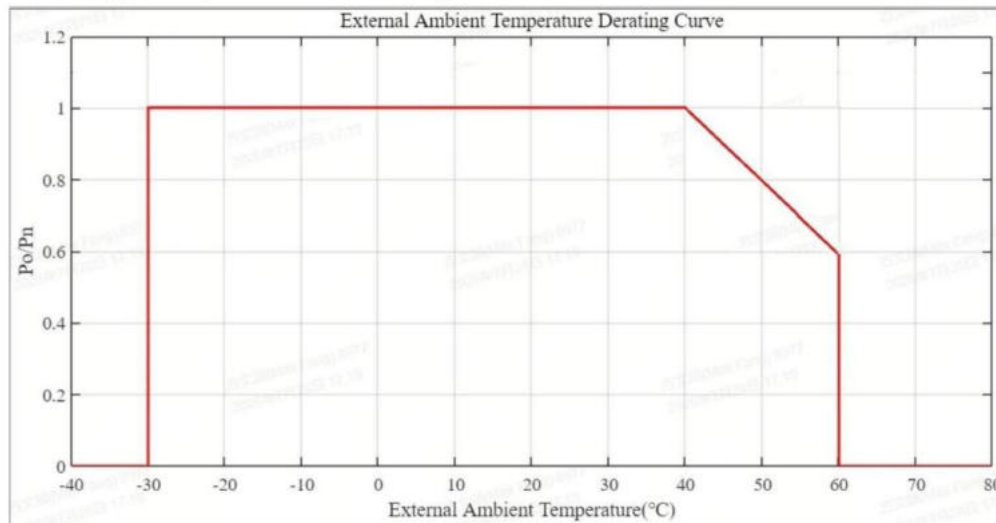


Continuously operation area: 0.80-1.20Un, 45.0-55.0Hz (When the protection and FVRT functions are disable)

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10. Active power dependent on ambient temperature



11. Interface protection function

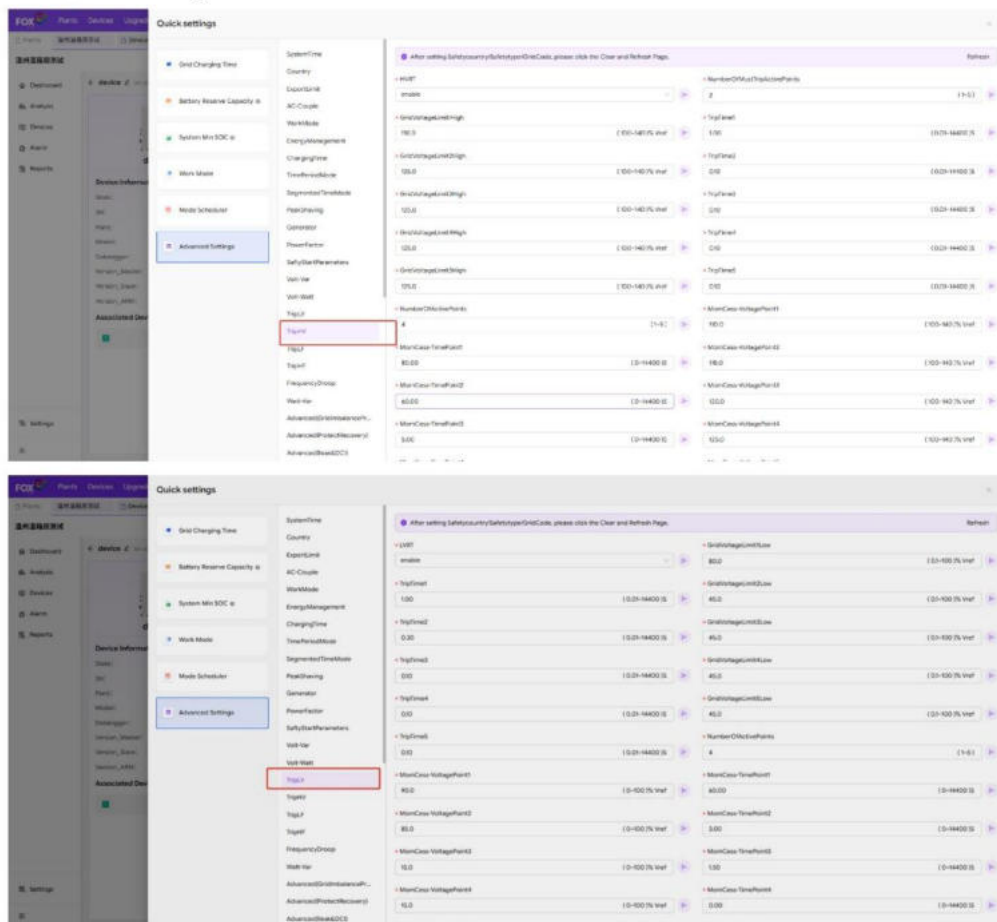
Interface protection settings:			
Parameter	Setting range	Setting step	Default value
HVRT	- Disable/Enable	--	Enable
NumberOfMustTripActivePoints	1-5	1	2
GridVoltageLimit1High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.10 p.u.
TripTime1	0.05 s ... 14400 s	0.01 s	1s
GridVoltageLimit2High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime2	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit3High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit4High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit5High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s
LVRT	- Disable/Enable	--	Enable
GridVoltageLimit1Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.800 p.u.
TripTime1	0.05 s ... 14400 s	0.01 s	1s
GridVoltageLimit2Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime2	0.05 s ... 14400 s	0.01 s	0.3s
GridVoltageLimit3Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit4Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit5Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s
TripHFModuleEnable	- Disable/Enable	--	Enable
NumberOfMustTripActivePoints	1-5	1	2
GridFrequencyLimit1High	50.04 Hz ... 65.00 Hz	0.01 Hz	51.50 Hz
TripTime1	0.05 s ... 14400 s	0.01 s	5s
GridFrequencyLimit2High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime2	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit3High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s

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GridFrequencyLimit4High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit5High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s
TripLFModuleEnable	- Disable/Enable	---	Enable
NumberOfMustTripActivePoints	1-5	1	2
GridFrequencyLimit1Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.50 Hz
TripTime1	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit2Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime2	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit3Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit4Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit5Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s
Self protection	---	---	1.4 Uc

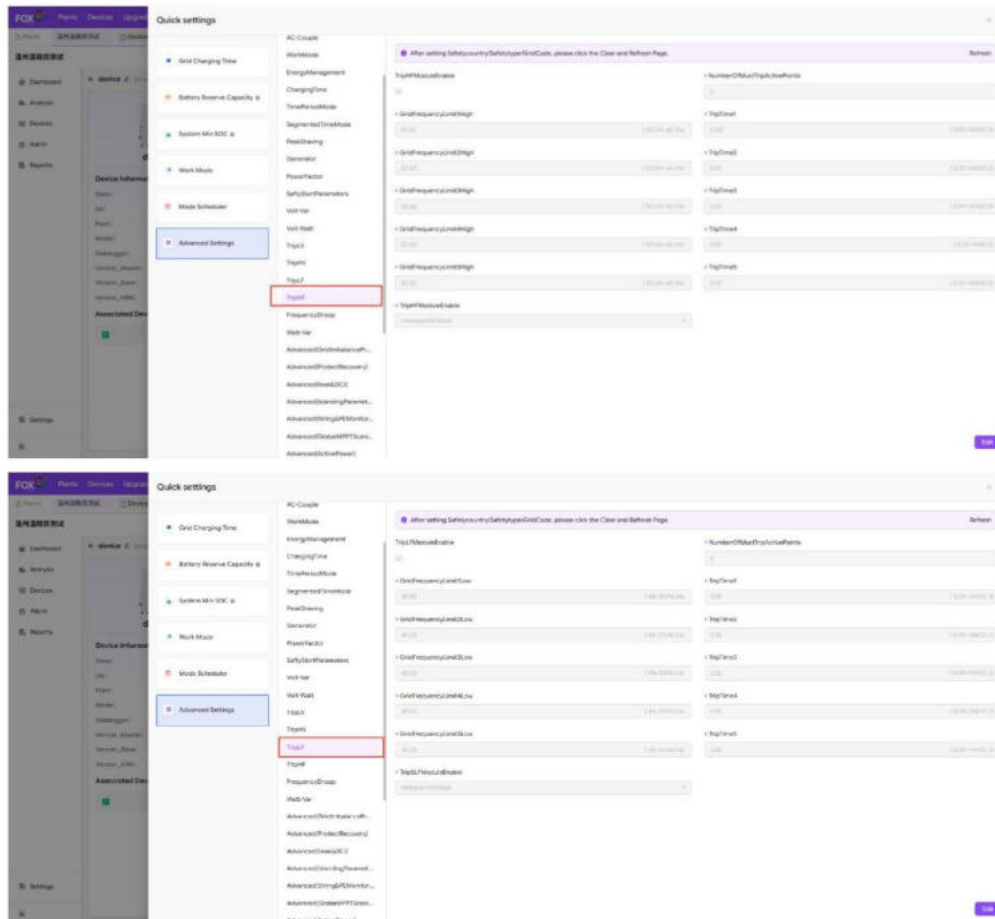
FoxESSCloud setting screenshot:



The screenshots show the FoxESSCloud settings interface. The top screenshot displays the 'Quick settings' tab, and the bottom screenshot displays the 'Advanced settings' tab. Both screenshots show the 'Trip' section with 'Trip1' highlighted. The 'Trip' section includes settings for 'Trip1', 'Trip2', 'Trip3', 'Trip4', and 'Trip5', each with a 'TripTime' and a 'GridFrequencyLimit'.

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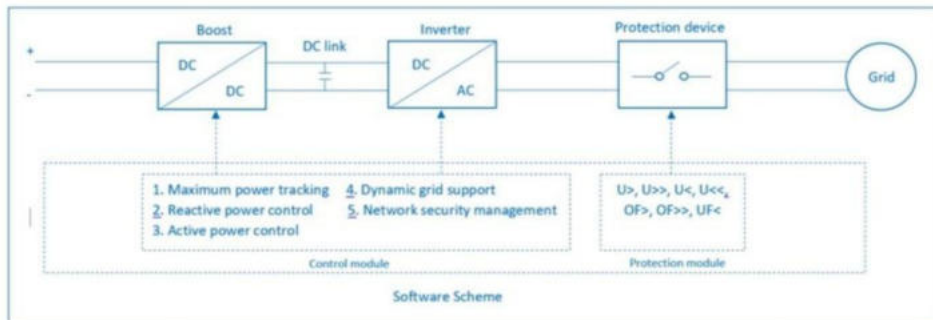
All the settings values are readable through FoxESS Cloud.

The self-check function of protection device is integrated in unit and could be started by PC without any wiring change. When self-check function started, the program would change the voltage sampling value to trip the protection settings. It's detected by unit if the protection relay works normally.

The integrated protection functions are implemented in separate software modules and they operate independent from control functions as the software block diagram below:

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The auxiliary power supply of protection device be supply from dc side, as a network independent auxiliary power can supply to the protection device over 5s. The protection device would be tripped immediately as long as the auxiliary power supply failed.

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12. Connection & Reconnection conditions

After both DC and AC are powered on, the first step is to detect the amplitude and frequency of the power grid. If the amplitude and frequency meet the grid connection requirements, relay detection will be carried out. The grid side relay and inverter side relay will be detected in sequence. During the relay detection process, the inverter bridge and DC-DC bridge will be checked for normal operation; If all the above tests are normal, the driving waveform will be officially generated. After the amplitude and phase of the inverter voltage and the grid voltage are consistent, the machine will be officially connected to the grid.

The inverter could be connected at the grid connection point for 47,5 Hz and 50,2Hz as well as at 90 % U_n and 110 % U_n , it must be technically possible to connect the generation system.

The conditions for product connection are shown in the table below for setting conditions.

After a power generating unit was disconnected from the network by opening the coupler circuit-breaker(galvanic isolation) at the power generating unit due to the tripping of decoupling protection equipment(overfrequency, underfrequency, voltage reduction, voltage rise), automatic connection or reconnection of the power generating units is permitted only if the voltage at the network connection point is at least 95 % U_c and if the frequency is between 49.9 Hz and 50.1 Hz.

The conditions for product connection are shown in the table below for setting conditions.

Simultaneous sampling accuracy:

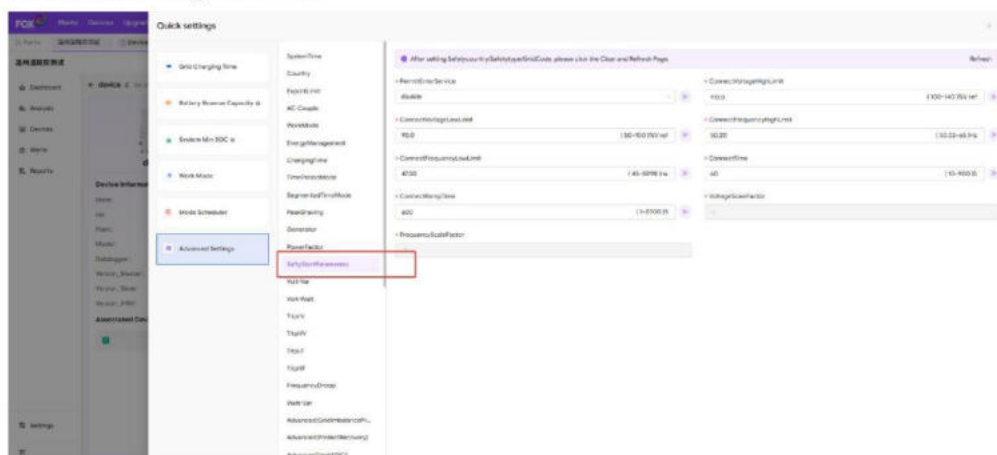
Voltage $\pm 1\%$

Frequency $\pm 0.01\text{Hz}$

Time $\pm 60\text{ms}$

Connection condition settings:			
Parameter	Setting range	Setting step	Default value
PermitEnterService	- Disable/Enable	--	Enable
ConnectVoltageHighLimit	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.10 p.u.
ConnectVoltageLowLimit	0.500 p.u. ... 1.000 p.u.	0.001 p.u.	0.90 p.u.
ConnectFrequencyHighLimit	50.02Hz...65Hz	0.01Hz	50.20Hz
ConnectFrequencyLowLimit	45.00Hz...59.98Hz	0.01Hz	47.50Hz
ConnectTime	10...900s	1s	60s
ConnectRampTime	1...2000s	1s	600s

FoxESSCloud setting screenoot:



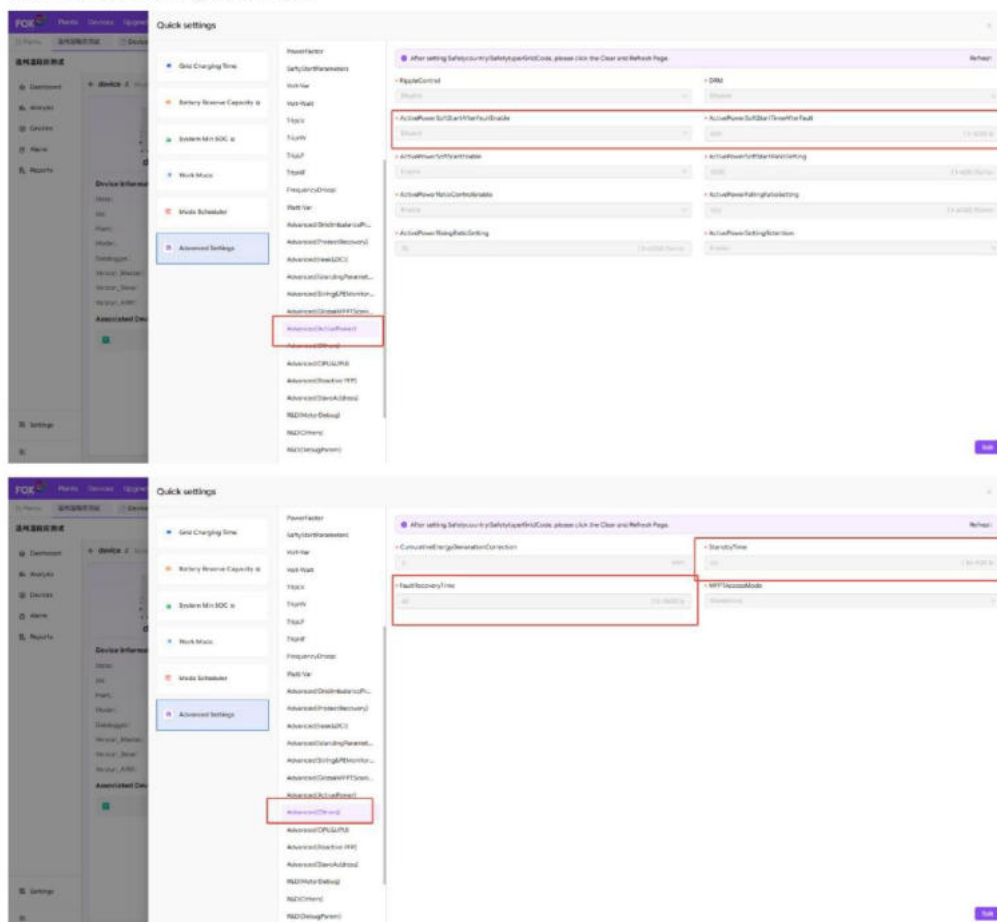
Reconnection condition settings:

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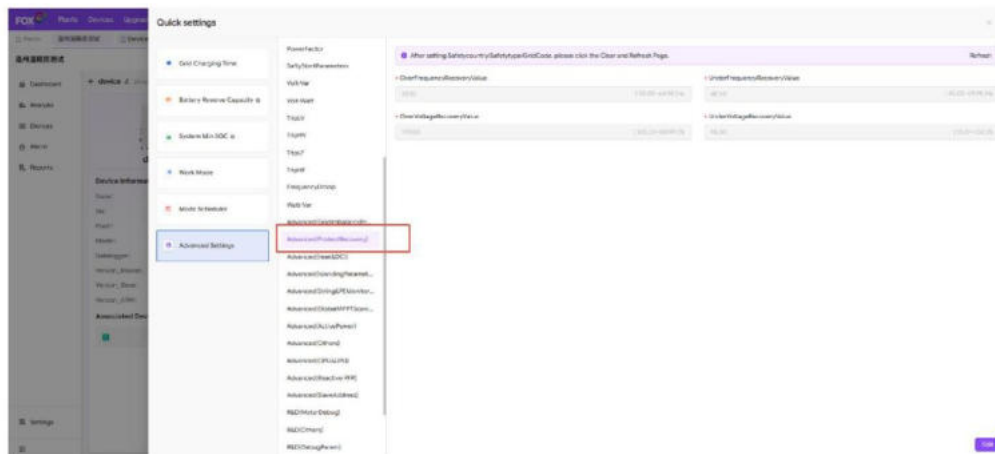
Parameter	Setting range	Setting step	Default value
OverFrequencyRecoveryValue	50.02Hz...64.98Hz	0.01Hz	50.10Hz
UnderFrequencyRecoveryValue	45.02Hz...59.98Hz	0.01Hz	49.90Hz
OverVoltageRecoveryValue	100.01%...139.99% p.u.	0.01% p.u.	109% p.u.
UnderVoltageRecoveryValue	10.01%...100% p.u.	0.01% p.u.	95% p.u.
StandbyTime	10...900s	1s	20s
FaultRecoveryTime	0...3600s	1s	60s
ActivePowerSoftStartAfterFaultEnable	- Disable/Enable	--	Disable
ActivePowerSoftStartAfterFaultEnable	1...1200s	1s	600s

FoxESSCloud setting screenoot:



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13. Interface Switch Information

Mfg.	Type	Parameter
SONG CHUAN PRECISION CO., LTD. (for grid side and generator side)	420HA-1AH-F-C M07	1000V/300A/1NO/-40-85°C
SONG CHUAN PRECISION CO., LTD. (for inverter side)	511ZP-1AD-F-C M06	800V/200A/1NO/-40-85°C

the interface switch complied with:

- Three-pole galvanic separation.
- The switch is designed as specified by the manufacturer. The switching capacity of the coupling switch may sustain the max. output current of inverter
- The coupling switch is designed to be triggered without delay.
- The sum of time elements of the protection and switching equipment does not exceed 100 ms.

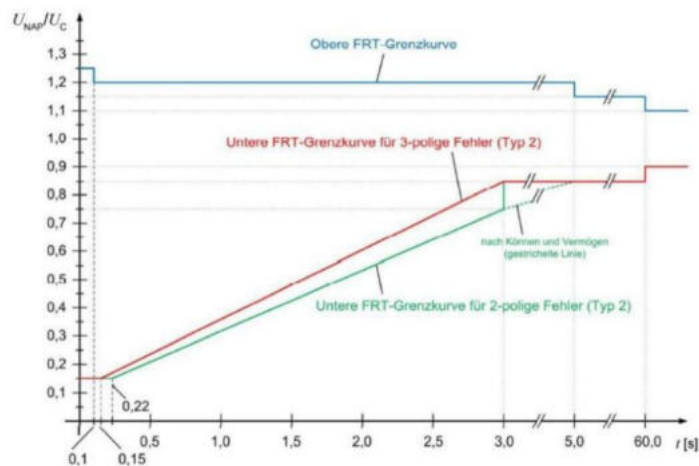
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14. Dynamic Grid Support

The inverter is able to keep connecting on the grid in case grid voltage change within the limit curve below, even the step change of voltage exceeded 15% U_N . The inverter is able to ride through several consecutive voltage dips.

Following FVRT curve per VDE-AR-N 4110:2023 complied:

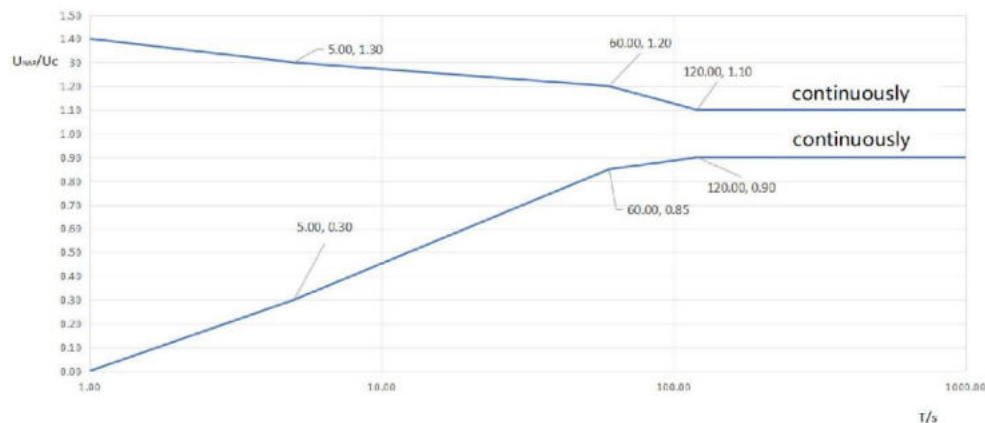


Legende

U_{NAP} Effektivwert der aktuellen Spannung am Netzanschlusspunkt

H3-Plus meeting all requirements mentioned above except the paragraph for PGU with double-fed asynchronous machine, FOXESS capability VRT curve is shown as below according to the FoxESSCloud:

Actual operational capability:



During the voltage fault, the inverter may:

- cease feeding any current to grid or
- feed the reactive current of both positive and negative sequence components according to the ΔU - ΔI relationship below:

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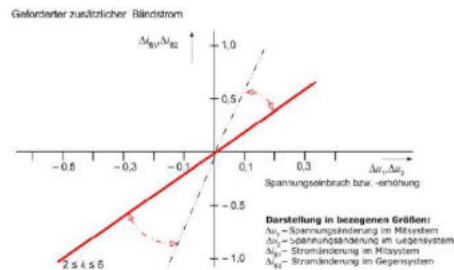


Bild 15 – Prinzip der Spannungsstützung bei Netzfehlern

Response the reactive current fulfill:

a) Rise time: $T_{an_90\%} \leq 30 \text{ ms}$;

b) Settling time: $T_{ein_dx} \leq 60 \text{ ms}$.

Dynamic network support			
Parameter	Setting range	Setting step	Default value
LVRT_ZeroPowerMode (Dynamic grid support, active current priority at apparent current limit)	- ZeroPowerMode; - ReactivePowerMode; - ActivePowerMode;	--	- ReactivePowerMode
LVRT_K-factor (Dynamic grid support, k-factor of react. current stat. for undervolt)	0...60	0.1	2
NumberOfActivePoints	1...5	1	4
MomCess-VoltagePoint1	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.900 p.u.
MomCess-TimePoint1	0.00 s ... 14400 s	0.01 s	60.00s
MomCess-VoltagePoint2	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.850 p.u.
MomCess-TimePoint2	0.00 s ... 14400 s	0.01 s	3.00s
MomCess-VoltagePoint3	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.150 p.u.
MomCess-TimePoint3	0.00 s ... 14400 s	0.01 s	1.5s
MomCess-VoltagePoint4	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.150 p.u.
MomCess-TimePoint4	0.00 s ... 14400 s	0.01 s	0s
MomCess-VoltagePoint5	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.150 p.u.
MomCess-TimePoint5	0.00 s ... 14400 s	0.01 s	0s
ZeroPowerMode	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.700 p.u.
VoltageFluctuationRideThroughEnable	- Disable/Enable	--	Enable
VoltageFluctuationRideThroughThreshold	0 - 10%	1%	5%

Note:

Although the adjustable range of MomEss-VoltagePoint1 is 0-1.0, the control software only enters low voltage ride through when it is less than 0.9. The grid voltage can operate continuously between 0.9-1.0, and the maximum time range set by the cloud platform can only reach 14400 seconds

MomCess-VoltagePoint1 default 0.9 p.u. is the FRT-trigger value. MomCess-VoltagePoint(n) vs MomCess-TimePoint(n), n various 1-5, that means the inverter maintains connection on grid at voltage MomCess-VoltagePoint(n) for time of MomCess-TimePoint(n) after entry of FRT mode. The execute time will be

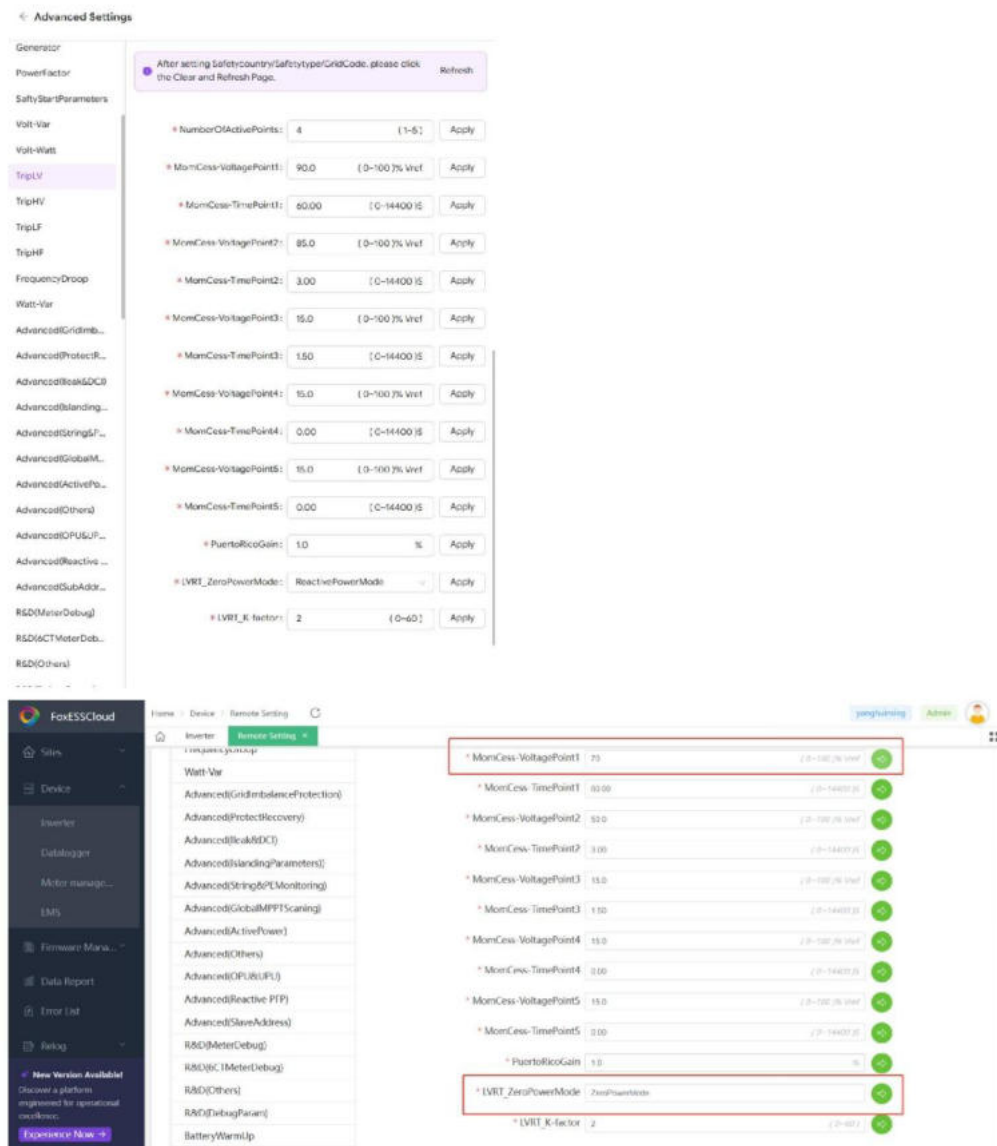
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MomCess-TimePoint(n-1) for FRT, when MomCess-VoltagePoint(n-1) = MomCess-VoltagePoint(n) and MomCess-TimePoint(n-1) > MomCess-TimePoint(n), note n various 2-5.

When the fault time is longer than MomCess-TimePointX, the product will execute protection function.

setting screenshot:



The screenshot displays the 'Advanced Settings' page for a FoxESS Cloud inverter. The left sidebar lists various settings categories, and the main area shows the configuration for MomCess-VoltagePoint and MomCess-TimePoint. The settings are organized into a table with columns for the parameter name, its value, and a range. The 'MomCess-VoltagePoint' settings are highlighted with a red box, and the 'LVRT_ZeroPowerMode' setting is also highlighted with a red box.

Parameter	Value	Range
MomCess-VoltagePoint1	75.0	(0-100) % Vref
MomCess-TimePoint1	80.00	(0-14400) s
MomCess-VoltagePoint2	85.0	(0-100) % Vref
MomCess-TimePoint2	3.00	(0-14400) s
MomCess-VoltagePoint3	15.0	(0-100) % Vref
MomCess-TimePoint3	1.00	(0-14400) s
MomCess-VoltagePoint4	15.0	(0-100) % Vref
MomCess-TimePoint4	0.00	(0-14400) s
MomCess-VoltagePoint5	15.0	(0-100) % Vref
MomCess-TimePoint5	0.00	(0-14400) s
PuertoRicoGain	1.0	%
LVRT_ZeroPowerMode	ZeroPowerMode	
LVRT_K-factor	2	(0-60)

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id Settings

After setting Safetycountry/Safetytype/GridCode, please click the Clear and Refresh Page. [Refresh](#)

* MomCess-VoltagePoint3: 125.0 (100~140)% Vref [Apply](#)
 * MomCess-TimePoint3: 0.10 (0~14400) s [Apply](#)
 * MomCess-VoltagePoint4: 125.0 (100~140)% Vref [Apply](#)
 * MomCess-TimePoint4: 0.10 (0~14400) s [Apply](#)

* MomCess-VoltagePoint5: 125.0 (100~140)% Vref [Apply](#)
 * MomCess-TimePoint5: 0.10 (0~14400) s [Apply](#)
 * HVRT_ZeroPowerMode: ZeroPowerMode [Apply](#)
 * HVRT_K-factor: 0 (0~60) [Apply](#)
 * VoltageFluctuationRideThrough Enable: enable [Apply](#)
 * VoltageFluctuationRideThrough Threshold: 0 (0~10) [Apply](#)

Dynamic network support			
Parameter	Setting range	Setting step	Default value
HVRT_ZeroPowerMode	- ZeroPowerMode; - ReactivePowerMode; - ActivePowerMode;	--	- ReactivePowerMode
HVRTK-factor	0 ...60	0.1	2
NumberOfActivePoints	1...5	1	4
MomCess-VoltagePoint1	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.100 p.u.
MomCess-TimePoint1	0.00 s ... 14400 s	0.01 s	80.00s
MomCess-VoltagePoint2	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.150 p.u.
MomCess-TimePoint2	0.00 s ... 14400 s	0.01 s	60.00s
MomCess-VoltagePoint3	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.200 p.u.
MomCess-TimePoint3	0.00 s ... 14400 s	0.01 s	5s
MomCess-VoltagePoint4	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
MomCess-TimePoint4	0.00 s ... 14400 s	0.01 s	0.1s
MomCess-VoltagePoint5	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
MomCess-TimePoint5	0.00 s ... 14400 s	0.01 s	0s
VoltageFluctuationRideThroughEnable	- Disable/Enable	--	Enable
VoltageFluctuationRideThroughThreshold	0 - 10%	1%	5%

Note:

Although the adjustable range of MomEss-VoltagePoint1 is 1.0-1.4, the control software only enters high voltage ride through when it is greater than 1.1. The grid voltage can operate continuously between 1.0-1.1, and the maximum time range set by the cloud platform can only reach 14400 seconds

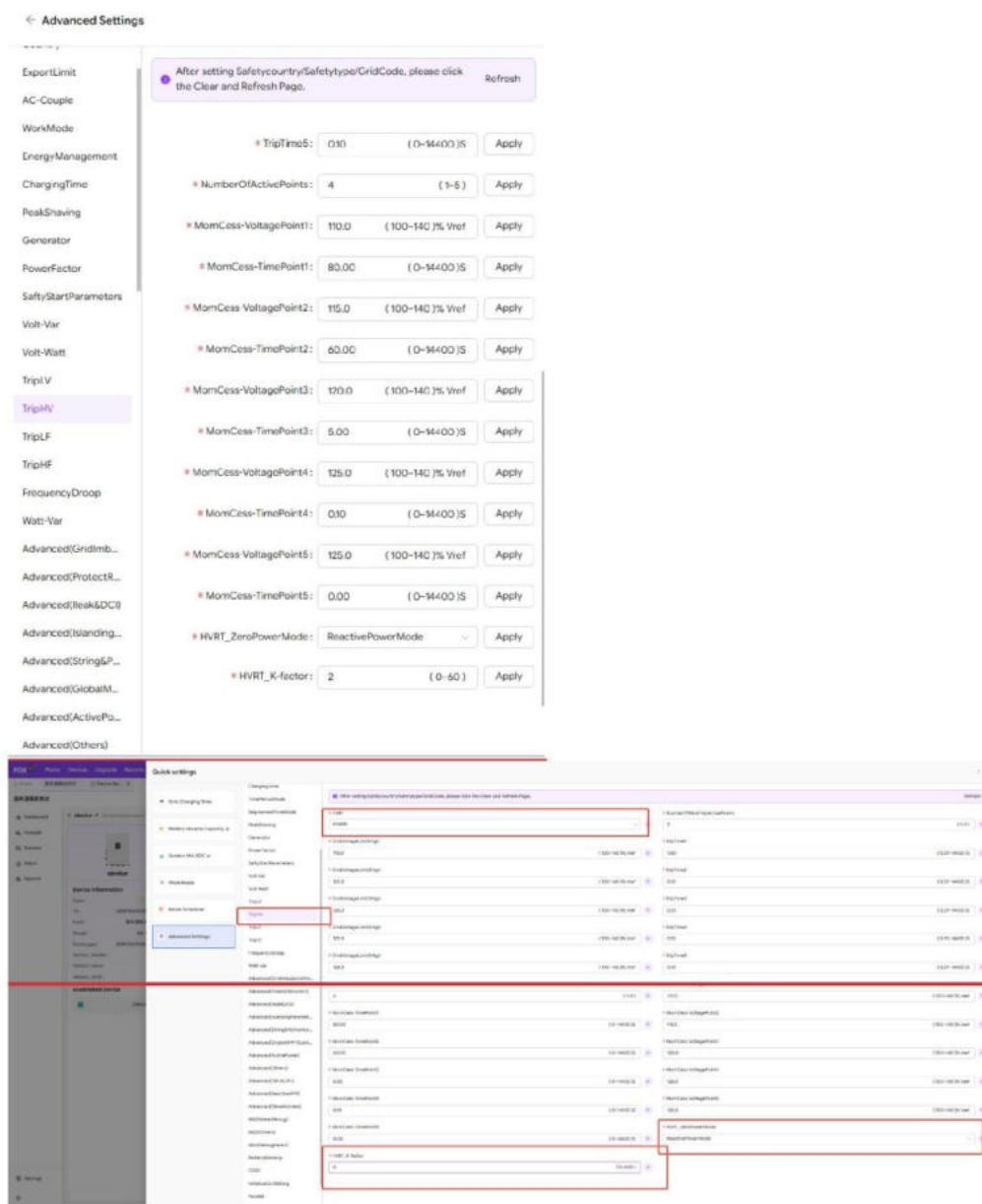
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MomCess-VoltagePoint1 default 1.10 p.u. is the HVRT-trigger value. MomCess-VoltagePoint(n) vs MomCess-TimePoint(n), n various 1-5, that means the inverter maintains connection on grid at voltage MomCess-VoltagePoint(n) for time of MomCess-TimePoint(n) after entry of HVRT mode. The execute time will be MomCess-TimePoint(n-1) for HVRT, when MomCess-VoltagePoint(n-1) = MomCess-VoltagePoint(n) and MomCess-TimePoint(n-1) > MomCess-TimePoint(n), note n various 2-5.

When the fault time is longer than MomCess-TimePointX, the product will execute protection function.

FoxESSCloud setting screenshoot:



Advanced Settings

After setting SafetyCountry/SafetyType/GridCode, please click the Clear and Refresh Page. Refresh

* TripTime5: 0.10 (0-54.00) S Apply

* NumberOfActivePoints: 4 (1-5) Apply

* MomCess-VoltagePoint1: 110.0 (100-140) % Vref Apply

* MomCess-TimePoint1: 80.00 (0-54.00) S Apply

* MomCess-VoltagePoint2: 115.0 (100-140) % Vref Apply

* MomCess-TimePoint2: 60.00 (0-54.00) S Apply

* MomCess-VoltagePoint3: 120.0 (100-140) % Vref Apply

* MomCess-TimePoint3: 5.00 (0-54.00) S Apply

* MomCess-VoltagePoint4: 125.0 (100-140) % Vref Apply

* MomCess-TimePoint4: 0.10 (0-54.00) S Apply

* MomCess-VoltagePoint5: 125.0 (100-140) % Vref Apply

* MomCess-TimePoint5: 0.00 (0-54.00) S Apply

* HVRT_ZeroPowerMode: ReactivePowerMode Apply

* HVRT_K-factor: 2 (0-50) Apply

Quick settings

After setting SafetyCountry/SafetyType/GridCode, please click the Clear and Refresh Page. Refresh

* TripTime5: 0.10 (0-54.00) S Apply

* NumberOfActivePoints: 4 (1-5) Apply

* MomCess-VoltagePoint1: 110.0 (100-140) % Vref Apply

* MomCess-TimePoint1: 80.00 (0-54.00) S Apply

* MomCess-VoltagePoint2: 115.0 (100-140) % Vref Apply

* MomCess-TimePoint2: 60.00 (0-54.00) S Apply

* MomCess-VoltagePoint3: 120.0 (100-140) % Vref Apply

* MomCess-TimePoint3: 5.00 (0-54.00) S Apply

* MomCess-VoltagePoint4: 125.0 (100-140) % Vref Apply

* MomCess-TimePoint4: 0.10 (0-54.00) S Apply

* MomCess-VoltagePoint5: 125.0 (100-140) % Vref Apply

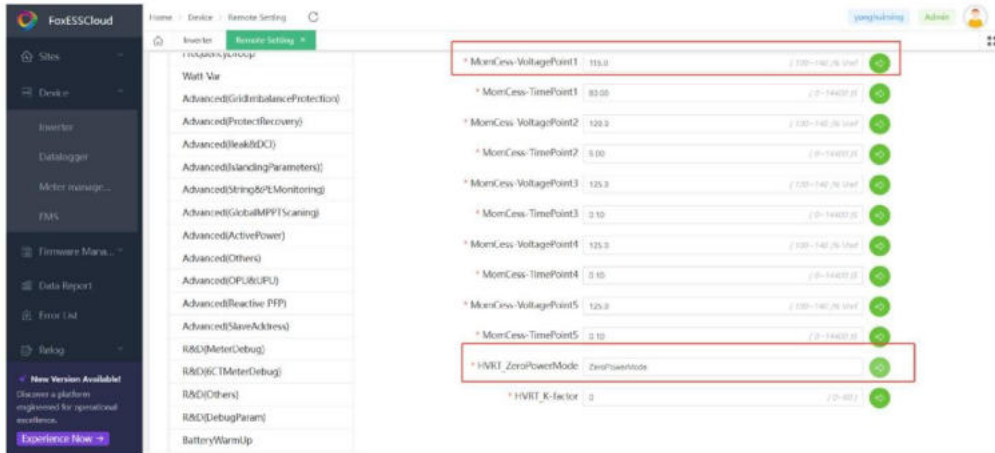
* MomCess-TimePoint5: 0.00 (0-54.00) S Apply

* HVRT_ZeroPowerMode: ReactivePowerMode Apply

* HVRT_K-factor: 2 (0-50) Apply

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Setting Name	Value	Range	Status
* MomCess-VoltagePoint1	115.0	(100-140) % Vref	OK
* MomCess-TimePoint1	80.00	(0-14400) s	OK
* MomCess-VoltagePoint2	120.0	(100-140) % Vref	OK
* MomCess-TimePoint2	8.00	(0-14400) s	OK
* MomCess-VoltagePoint3	125.0	(100-140) % Vref	OK
* MomCess-TimePoint3	0.10	(0-14400) s	OK
* MomCess-VoltagePoint4	125.0	(100-140) % Vref	OK
* MomCess-TimePoint4	0.10	(0-14400) s	OK
* MomCess-VoltagePoint5	125.0	(100-140) % Vref	OK
* MomCess-TimePoint5	0.10	(0-14400) s	OK
* HVRT_ZeroPowerMode	ZeroPowerMode		OK
* HVRT_K-factor	0	(0-60)	OK



After setting SafetyCountry/SafetyType/GridCode, please click the Refresh button.

Refresh

ment

- * MomCess-VoltagePoint3: 125.0 (100-140) % Vref Apply
- * MomCess-TimePoint3: 0.10 (0-14400) s Apply
- * MomCess-VoltagePoint4: 125.0 (100-140) % Vref Apply
- * MomCess-TimePoint4: 0.10 (0-14400) s Apply

meters

- * MomCess-VoltagePoint5: 125.0 (100-140) % Vref Apply
- * MomCess-TimePoint5: 0.10 (0-14400) s Apply
- * HVRT_ZeroPowerMode: ZeroPowerMode Apply
- * HVRT_K-factor: 0 (0-60) Apply
- * VoltageFluctuationRideThrough Enable: enable Apply
- * VoltageFluctuationRideThrough Threshold: 0 (0-10) Apply

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15. Multiple faults

Per control strategy of inverter, the PV input power reduced meanwhile in case the power output is blocked during voltage dips. Thus, the primary available energy is able to completely dissipate during the fault.

For instance, in multiple faults test procedure below under $P_{E_{max}}$ power condition, the dissipated energy can be estimated by $P_{E_{max}} \cdot (0.16s + 0.6s + 1.05s + 0.16s + 1.05s) = P_{E_{max}} \cdot 3.02s$

Event	Times according to VDE-AR-N 4110 [4]	Alternative sequence times in s
Drop	0.14 – 0.16	0.14 – 0.16
Break	0.30 – 2	0.30 – 2
Drop	0.55 – 0.6	0.95 – 1.05
Break	20 – 30	20 – 30
Drop	0.95 – 1.05	0.14 – 0.16
Break	20 – 30	0.30 – 2
Drop	0.14 – 0.16	0.95 – 1.05
Break	0.30 – 2	20 – 30
Drop	0.95 – 1.05	0.14 – 0.16
Break	-	0.30 – 2
Drop	-	0.95 – 1.05

Table 4-81: Multiple faults

After multiple faults, the product can continue to enter multiple faults even after 30 minutes.

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16. Configuration summary

Reactive power-voltage character curve Q(U):			
Parameter	Setting range	Setting step	Default value
Volt-VarModuleEnable	Disable/Enable	--	Disable
OpenLoopResponseTime_1	0...300s	1s	300s
VoltagePoint1_1	80% p.u. ... 100% p.u.	1% p.u.	94% p.u.
ReactivePowerPoint1_1	-60.000 % ... 60.000 %	0.1 %	33.000 %
VoltagePoint2_1	80% p.u. ... 100% p.u.	1% p.u.	96% p.u.
ReactivePowerPoint2_1	-60.000 % ... 60.000 %	0.1 %	0 %
VoltagePoint3_1	100% p.u. ... 120% p.u.	1% p.u.	104% p.u.
ReactivePowerPoint3_1	-60.000 % ... 60.000 %	0.1 %	0 %
VoltagePoint4_1	100% p.u. ... 120% p.u.	1% p.u.	106% p.u.
ReactivePowerPoint4_1	-60.000 % ... 60.000 %	0.1 %	-33.000 %
Remark: For this function, the PT1 curve can be turned off directly under external control.			
Character curve Q(P)			
Parameter	Setting range	Setting step	Default value
DERWatt-VarModuleEnable	Disable/Enable	--	Disable
ActivePowerPoint_1	0 ... 100%	0.1%	20%
ReactivePowerPoint_1	-1 ... 1	0.001	0
ActivePowerPoint_2	20%...100%	0.1%	50%
ReactivePowerPoint_2	-1 ... 1	0.001	0
ActivePowerPoint_3	20%...100%	0.1%	100%
ReactivePowerPoint_3	-1 ... 1	0.001	-0.44
ActivePowerPoint_4	-100%...0%	0.1%	-20%
ReactivePowerPoint_4	-1 ... 1	0.001	0
ActivePowerPoint_5	-100%...20%	0.1%	-50%
ReactivePowerPoint_5	-1 ... 1	0.001	0.00
ActivePowerPoint_6	-100%...20%	0.1%	-100%
ReactivePowerPoint_6	-1 ... 1	0.001	0.44
Note(s): The cos(P)-Control can be achieved through Q(P) settings.			
Fixed Q			
Parameter	Setting range	Setting step	Default value
SetReactivePowerEnable	Disable/Enable	--	disable
ReactivePowerValue(Var)	-125...125kVar	0.1kVar	0
ReactiveResponseTime(s)	1-6000s	1	2
ReactivePowerRetentionSettingofSVG	Disable/Enable	--	Enable
Fixed cosφ			
Parameter	Setting range	Setting step	Default value
PowerFactorEnable(WInj)Enable	Disable/Enable	--	disable
PowerFactor(WInj)	0.80...-0.80	0.001	1
PowerFactorExcitation(WInj)	-underexcitation -overexcitation	-	underexcitation
ReactiveResponseTime	1-6000	1	2
ReactiveResponse	On/Off	--	On
Network security management			
Parameter	Setting range	Setting step	Default value
LimitMaxPowerPctEnable	- Disable/Enable	--	Enable
LimitMaxPowerValue	0-2000kW	1W	The rated power of the inverter
RippleControl	- Disable/Enable	--	Disable
DRM	- Disable/Enable	--	Disable
ActivePowerSoftStartingAfterFaultEnable	- Disable/Enable	--	Disable
ActivePowerSoftStartingTimeAfterFault	1-1200s	1	600
ActivePowerSoftStartingEnable	- Disable/Enable	--	Enable

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ActivePowerSoftStartingRatioSetting	1-6000%Pn/min	1%Pn/min	30%Pn/min
ActivePowerRatioControlEnable	- Disable/Enable	--	Enable
ActivePowerFallingRatioSetting	1-6000%Pn/min	1%Pn/min	25%Pn/min
ActivePowerRisingRatioSetting	1-6000%Pn/min	1%Pn/min	25%Pn/min
ActivePowerSettingRetention	- Disable/Enable	--	Enable
Active power output dependent on grid frequency			
Parameter	Setting range	Setting step	Default value
FrequencyDroopModuleEnable	- Disable/Enable	--	Enable
Over-FrequencyDeadband1	0.20 Hz ... 65.000 Hz	0.001 Hz	50.200 Hz
Under-FrequencyDeadband1	0.20 Hz ... 65.000 Hz	0.001 Hz	49.800 Hz
Over-FrequencyChangeRatio1	0...10	0.001	0.050
Under-FrequencyChangeRatio1	0...10	0.001	0.050
Under-FrequencyResponseTime	0.1s...6000s	0.1s	5.0s
Over-FrequencyResponseTime	0.1s...6000s	0.1s	5.0s
PowerRecoveryRate	1%Pn/min ... 6000%Pn/min	1%Pn/min	10% Pn./min
Interface protection settings:			
Parameter	Setting range	Setting step	Default value
HVRT	- Disable/Enable	--	Enable
NumberOfMustTripActivePoints	1-5	1	2
GridVoltageLimit1High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.10 p.u.
TripTime1	0.05 s ... 14400 s	0.01 s	1s
GridVoltageLimit2High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime2	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit3High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit4High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit5High	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s
LVRT	- Disable/Enable	--	Enable
GridVoltageLimit1Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.800 p.u.
TripTime1	0.05 s ... 14400 s	0.01 s	1s
GridVoltageLimit2Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime2	0.05 s ... 14400 s	0.01 s	0.3s
GridVoltageLimit3Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit4Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridVoltageLimit5Low	0.001 p.u. ... 1.000 p.u.	0.001 p.u.	0.450 p.u.
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s
TripHFModuleEnable	- Disable/Enable	--	Enable
NumberOfMustTripActivePoints	1-5	1	2
GridFrequencyLimit1High	50.04 Hz ... 65.00 Hz	0.01 Hz	51.50 Hz
TripTime1	0.05 s ... 14400 s	0.01 s	5s
GridFrequencyLimit2High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime2	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit3High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit4High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit5High	50.04 Hz ... 65.00 Hz	0.01 Hz	52.50 Hz
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s

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TripLFModuleEnable	- Disable/Enable	--	Enable
NumberOfMustTripActivePoints	1-5	1	2
GridFrequencyLimit1Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.50 Hz
TripTime1	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit2Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime2	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit3Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime3	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit4Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime4	0.05 s ... 14400 s	0.01 s	0.1s
GridFrequencyLimit5Low	45.00 Hz ... 59.96 Hz	0.01 Hz	47.00 Hz
TripTime5	0.05 s ... 14400 s	0.01 s	0.1s
Connection condition settings:			
Parameter	Setting range	Setting step	Default value
PermitEnterService	- Disable/Enable	--	Enable
ConnectVoltageHighLimit	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.10 p.u.
ConnectVoltageLowLimit	0.500 p.u. ... 1.000 p.u.	0.001 p.u.	0.90 p.u.
ConnectFrequencyHighLimit	50.02Hz...65Hz	0.01Hz	50.20Hz
ConnectFrequencyLowLimit	45.00Hz...59.98Hz	0.01Hz	47.50Hz
ConnectTime	10...900s	1s	60s
ConnectRampTime	1...2000s	1s	600s
Reconnection condition settings:			
Parameter	Setting range	Setting step	Default value
OverFrequencyRecoveryValue	50.02Hz...64.98Hz	0.01Hz	50.10Hz
UnderFrequencyRecoveryValue	45.02Hz...59.98Hz	0.01Hz	49.90Hz
OverVoltageRecoveryValue	100.01%...139.99%	0.01%	109%
UnderVoltageRecoveryValue	10.01%...100%	0.01%	95%
StandbyTime	10...900s	1s	20s
FaultRecoveryTime	0...3600s	1s	60s
ActivePowerSoftStartAfterFaultEnable	- Disable/Enable	--	Disable
ActivePowerSoftStartAfterFaultEnable	1...1200s	1s	600s
Dynamic network support			
Parameter	Setting range	Setting step	Default value
LVRT_ZeroPowerMode (Dynamic grid support, active current priority at apparent current limit)	- ZeroPowerMode; - ReactivePowerMode; - ActivePowerMode;	--	- ReactivePowerMode
LVRT_K-factor (Dynamic grid support, k-factor of react. current stat. for undervolt)	0...60	0.1	2
NumberOfActivePoints	1...5	1	4
MomCess-VoltagePoint1	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.900 p.u.
MomCess-TimePoint1	0.00 s ... 14400 s	0.01 s	60.00s
MomCess-VoltagePoint2	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.850 p.u.
MomCess-TimePoint2	0.00 s ... 14400 s	0.01 s	3.00s
MomCess-VoltagePoint3	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.150 p.u.
MomCess-TimePoint3	0.00 s ... 14400 s	0.01 s	1.5s
MomCess-VoltagePoint4	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.150 p.u.
MomCess-TimePoint4	0.00 s ... 14400 s	0.01 s	0s
MomCess-VoltagePoint5	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.150 p.u.
MomCess-TimePoint5	0.00 s ... 14400 s	0.01 s	0s

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ZeroPowerMode	0.000 p.u. ... 1.000 p.u.	0.001 p.u.	0.700 p.u.
VoltageFluctuationRideThroughEnable	- Disable/Enable	--	Enable
VoltageFluctuationRideThroughThreshold	0 - 10%	1%	5%
Dynamic network support			
Parameter	Setting range	Setting step	Default value
HVRT_ZeroPowerMode	- ZeroPowerMode; - ReactivePowerMode; - ActivePowerMode;	--	- ReactivePowerMode
HVRTK-factor	0 ... 60	0.1	2
NumberOfActivePoints	1...5	1	4
MomCess-VoltagePoint1	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.100 p.u.
MomCess-TimePoint1	0.00 s ... 14400 s	0.01 s	80.00s
MomCess-VoltagePoint2	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.150 p.u.
MomCess-TimePoint2	0.00 s ... 14400 s	0.01 s	60.00s
MomCess-VoltagePoint3	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.200 p.u.
MomCess-TimePoint3	0.00 s ... 14400 s	0.01 s	5s
MomCess-VoltagePoint4	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
MomCess-TimePoint4	0.00 s ... 14400 s	0.01 s	0s
MomCess-VoltagePoint5	1.000 p.u. ... 1.400 p.u.	0.001 p.u.	1.250 p.u.
MomCess-TimePoint5	0.00 s ... 14400 s	0.01 s	0s
VoltageFluctuationRideThroughEnable	- Disable/Enable	--	Enable
VoltageFluctuationRideThroughThreshold	0 - 10%	1%	5%
Automatic shutdown			
Parameter	Setting range	Setting step	Default value
Communication Interruption Configuration	- On/Off	--	Communication Interruption Configuration: On (VDE-AR-N 4110)

17. Short-circuited current of PGU

Type of power generating Unit	Information	Symbol	Value [p.u.]
PGU with full-scale converters	RMS value of the source current for three-phase fault	I_{skPF}	1.1In
	RMS value of the source current for two-phase fault	$I_{(1)sk2PF}$	1.1In
	RMS value of the source current for single-phase fault	$I_{(1)sk1PF}$	1.1In
	Negative-sequence short-circuit impedance for integer k-factors	$Z_{(2)PF}$	1/KOhm

- End -