PROTOTYPE DECLARATION / Prototypenbescheinigung

Product prototype certificate number No:230027RECO26-PTCER

For the company: / *Für das Unternehmen*

GoodWe Technologies Co., Ltd.
No.90 ZiJin Rd., New District, Suzhou, 215011, 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).
- **VDE-AR-N 4120:2018.** Technical requirements for the connection and operation of customer installations to the high voltage network (TAR high voltage).
  VDE-AR-N 4120: 2018.. Technische Voraussetzungen für den Anschluss und Betrieb von Kundeninstallationen an das Hochspannungsnetz (TAR-Hochspannung).

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

Models / *Modelle:*		**GW125K-GT / GW110K-GT / GW100K-GT / GEP125-20 / GEP110-20 / GEP100-20**
Technical Data / *Technische Daten:*		
DC	Max. input voltaje / *Max.-Eingangsspannung:*	See Annex 3 / siehe Anhang 3
	MPPT Voltage Range / *MPPT-Spannungsbereich:*	See Annex 3 / siehe Anhang 3
	No. of MPPT inputs per tracker / *Anzahl der MPP-Eingänge pro Tracker*	See Annex 3 / siehe Anhang 3
	Max. input current / *Max.-Eingangsstrom:*	See Annex 3 / siehe Anhang 3
AC	AC output power/ *AC-Ausgangsleistung:*	See Annex 3 / siehe Anhang 3
	Max. AC output current / *Max. AC-Ausgangsstrom:*	See Annex 3 / siehe Anhang 3
	Nominal Grid Voltage / *Nominale Netzspannung:*	See Annex 3 / siehe Anhang 3
	Nominal Grid Frequency / *Nominale Netzfrequenz:*	See Annex 3 / siehe Anhang 3
	Max. input voltaje / *Max.-Eingangsspannung:*	See Annex 3 / siehe Anhang 3

We confirm that the above mentioned ESS inverters are considered as Prototypes in accordance with the VDE-AR-N 4110, the VDE-AR-N 4120 and the standard FGW TR 8 / *Hiermit bestätigen wir, dass es sich bei der genannten EZE nach VDE-AR-N 4110, VDE-AR-N 4120 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.

Brussels, 31st of January 2024

Calogero Lana
Certification Manager /
Zertifizierungsmanager

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:*

The photovoltaic generation unit (PV-PGU) enables the supply of direct current generated by means of photovoltaic modules from solar radiation into the public alternating current grid using power electronics. /
Die Photovoltaik-Erzeugungseinheit (PV-PGU) ermöglicht die Einspeisung von mittels Photovoltaik-Modulen aus Sonnenstrahlung erzeugtem Gleichstrom in das öffentliche Wechselstromnetz mittels 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.

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 und VDE-AR-N 4120 zu erfüllen. Dazu wird im Folgenden die Übereinstimmung der elektrischen Eigenschaften der EZE mit den Anforderungen nach VDE-ARN 4110 und VDE 4120 nachgewiesen:

VDE-AR-N 4110 & VDE-AR-N 4120	**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. / *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.* 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. / *ANMERKUNG 1 Diese Definition entspricht der Begriffsdefinition nach SDLWindV. Es besteht kein Zusammenhang zum Begriff „Pilotwindenergieanlage" im EEG [6].* 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. / *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.*	Checked / *Berücksichtigt:* - See annex 1 / siehe Anhang 1

VDE-AR-N 4110 & VDE-AR-N 4120	Comment and reference / *Kommentar und Bewertung*
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. / *Für einen Prototypen einer Erzeugungseinheit gelten die Anforderungen dieser VDE-Anwendungsregel. Innerhalb von zwei Jahren nach der lnbetriebsetzung der ersten Prototypen-Erzeugungseinheit in Deutschland ist für diese Prototypen anstelle des Einheitenzertiflkats 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.* For prototypes commissioned before 2019-04-27, the above-mentioned period starts 2019-04-27. / *Für Prototypen die vor dem 27.04.2019 in Betrieb gesetzt werden, beginnt die oben genannte Frist am 27.04.2019.*	Checked / *Berücksichtigt*

VDE-AR-N 4110 & VDE-AR-N 4120	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:/ *Damit die geforderte Plausibilitätsprüfung durch die Zertifizierungsstelle erfolgen kann, muss das Datenblatt der Erzeugungseinheit mindestens folgende Angaben enthalten:*	Checked / *Berücksichtigt* After documentation provided by the manufacturer (see annex 3 and Annex 4). / *Daten vom Hersteller stehen zur Verfügung (siehe Anhang 3 und Anhang 4).*
1. Electrical data (nominal and rated quantities) / E*lektrische Daten (Nenn- und Bemessungsgrößen);*	Compliant / *Erfüllt:* - See annex 3 / *siehe Anhang 3*
2. Schematic overview circuit diagram of the power generating unit with all relevant componentsschematisches / *Übersichtsbilcl der Erzeugungseinheit mit allen wesentlichen Komponenten.*	Compliant / *Erfüllt:* - See annex 4 / *siehe Anhang 4*
3. Operating ranges of the power generating unit / *Betriebsbereiche der Erzeugungseinheit:* • Limits in quasi-static operation / *Grenzen im quasistationären Betrieb.* • Reactive power adjustment range / Blindleistungsstellbereich. • FRT limit curve (U/t diagram) / *FRT-Grenzkurve(U/t-Diagramm).*	Compliant / *Erfüllt:* - See annex 4 / *siehe Anhang 4*
4. Protection functions with setting ranges / *Schutzfunktionen mit Einstellberemhen:* • Decoupling protection / Entkupplungschutz. • Self-protection / Eigenschutz.	Compliant / *Erfüllt:* - See annex 4 / *siehe Anhang 4*
5. Active power control / *Wirkleistungsregelung:* • Power/frequency behaviour / *Leistungs-Freqbenz-Verhalten.* • Active power gradient / *Wirkleistungsgradient.*	Compliant / *Erfüllt:* - See annex 4 / *siehe Anhang 4*

VDE-AR-N 4110 & VDE-AR-N 4120	Comment and reference / *Kommentar und Bewertung*
6. Reactive power control / Blindleistungsregelung.	Compliant / *Erfüllt:* - See annex 4 / *siehe Anhang 4*
7. Dynamic reactive current feed-in / *Dynamische Blindstromeinspeisung:* • Basic functionality / *GrundsätzlicheFunktionsweise.*	Compliant / *Erfüllt:* - See annex 4 / *siehe Anhang 4*
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 / *Erklärung des Herstellers, dass die Erzeugungseinheit so konstruiert wurde, dass die Anforderungen dieser Anwendungsregel an die Erzeugungseinheit erfüllt werden können.*	Compliant / *Erfüllt:* - See annex 4 / *siehe Anhang 4*
At the latest after expiry of the above-mentioned period, a unit certificate is required. / *Spätestens nach Ablauf der oben genannten Frist ist ein Einheitenzertifikat erforderlich.* *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. / ANMERKUNG 2 Sofern das Einheitenzertifikat vor Ablauf der Frist von zwei Jahren nach der Inbelnebsetzung der ersten Erzeugungseinheilt.*	Compliant / *Erfüllt*

Annex 3 / *Anhang 3*

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

Models	GW100K-GT	GW110K-GT	GW125K-GT
PV Input (DC)			
Recommended Max. PV input power(kW)	150	165	187.5
Number of MPP trackers	8	10	10
Number of DC inputs	2 for each MPPT		
Max. PV input voltage (V)	1100		
Min. PV input voltage / Startup input voltage (V)	200		
Rated input voltage (V)	600		
MPPT operating voltage	180~1000		
Full power MPPT voltage range(V)	500~850		
Max. input MPPT current(A)	8*42	10*42	10*42
Max. DC short-circuit current (A)	8*52.5	10*52.5	10*52.5
Output (AC)			
Rated power(kW)	100	110	125

Max. AC Apparent power(kVA)	110	121	137.5
Rated output current(A)	145.0	159.5	181.2
Max. output current(A)	167.1	183.4	199.4
Rated AC voltage (V)	230/400V,3L/N/PE or 3L/PE		
AC voltage range	304Vac-460Vac (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	< 5%		
DC current injection	< 0.5% In		
Power factor	1 (adjustable+/-0.8)		
Efficiency			
Max. efficiency / European efficiency	98.8%/ 98.4%	98.8%/ 98.4%	99.0%/ 98.5%
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	Yes		
Anti-PID function	Optional		
DC arc detection	Optional		
Input/ output SPD	PV:Type II(Type I+ II optional); AC:Type II		
General Data			
Dimensions (W*H*D, mm)	930*650*300		
Weight (kg)	85	88	88
Isolation method	Non-isolated		
Night power consumption	< 2W		

Operating ambient temperature range (℃)	-30~60℃ (up 45℃ derating)
Allowable relative humidity range (non-condensing)	0~100%
Cooling method	Smart Fan Cooling
Max. operating altitude (m)	4000
Display	LED, LCD (Optional) ,WLAN+APP
Communication	RS485, WiFi or 4G or PLC(Optional)
EMC	EN 61000-6-1,EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-2-2,EN 62920;EN 55011
Safety standards	IEC 62109-1/2
Grid standards	DEWA,IEC61727,IEC62116,NRS 097,RPPS,AS/NZS 4777.2, VDE 0126-1-1, VDE-AR-N 4105, VDE 0124-100,CEI 0-21,CEI 0-16, EN50549-1, EN50549-2,EN50549-10,G99, PSE 2018

Models	GEP100-20	GEP110-20	GEP125-20
PV Input (DC)			
Recommended Max. PV input power(kW)	150	165	187.5
Number of MPP trackers	8	10	10
Number of DC inputs	2 for each MPPT		
Max. PV input voltage (V)	1100		
Min. PV input voltage / Startup input voltage (V)	200		
Rated input voltage (V)	600		
MPPT operating voltage	180~1000		
Full power MPPT voltage range(V)	500~850		
Max. input MPPT current(A)	8*42	10*42	10*42

Max. DC short-circuit current (A)	8*52.5	10*52.5	10*52.5
Output (AC)			
Rated power(kW)	100	110	125
Max. AC Apparent power(kVA)	110	121	137.5
Rated output current(A)	145.0	159.5	181.2
Max. output current(A)	167.1	183.4	199.4
Rated AC voltage (V)	230/400V,3L/N/PE or 3L/PE		
AC voltage range	304Vac-460Vac (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	< 5%		
DC current injection	< 0.5% In		
Power factor	1 (adjustable+/-0.8)		
Efficiency			
Max. efficiency / European efficiency	98.8%/ 98.4%	98.8%/ 98.4%	99.0%/ 98.5%
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	Yes		
Anti-PID function	Optional		
DC arc detection	Optional		
Input/ output SPD	PV:Type II(Type I+ II optional); AC:Type II		
General Data			
Dimensions (W*H*D, mm)	930*650*300		

Weight (kg)	85	88	88
Isolation method	Non-isolated		
Night power consumption	< 2W		
Operating ambient temperature range (℃)	-30~60℃ (up 45℃ derating)		
Allowable relative humidity range (non-condensing)	0~100%		
Cooling method	Smart Fan Cooling		
Max. operating altitude (m)	4000		
Display	LED, LCD (Optional) ,WLAN+APP		
Communication	RS485, WiFi or 4G or PLC(Optional)		
EMC	EN 61000-6-1,EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-2-2,EN 62920;EN 55011		
Safety standards	IEC 62109-1/2		
Grid standards	DEWA,IEC61727,IEC62116,NRS 097,RPPS,AS/NZS 4777.2, VDE 0126-1-1, VDE-AR-N 4105, VDE 0124-100,CEI 0-21,CEI 0-16, EN50549-1, EN50549-2,EN50549-10,G99,PSE 2018		

Annex 4 / *Anhang 4*

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

Schematic overview of GW125K-GT

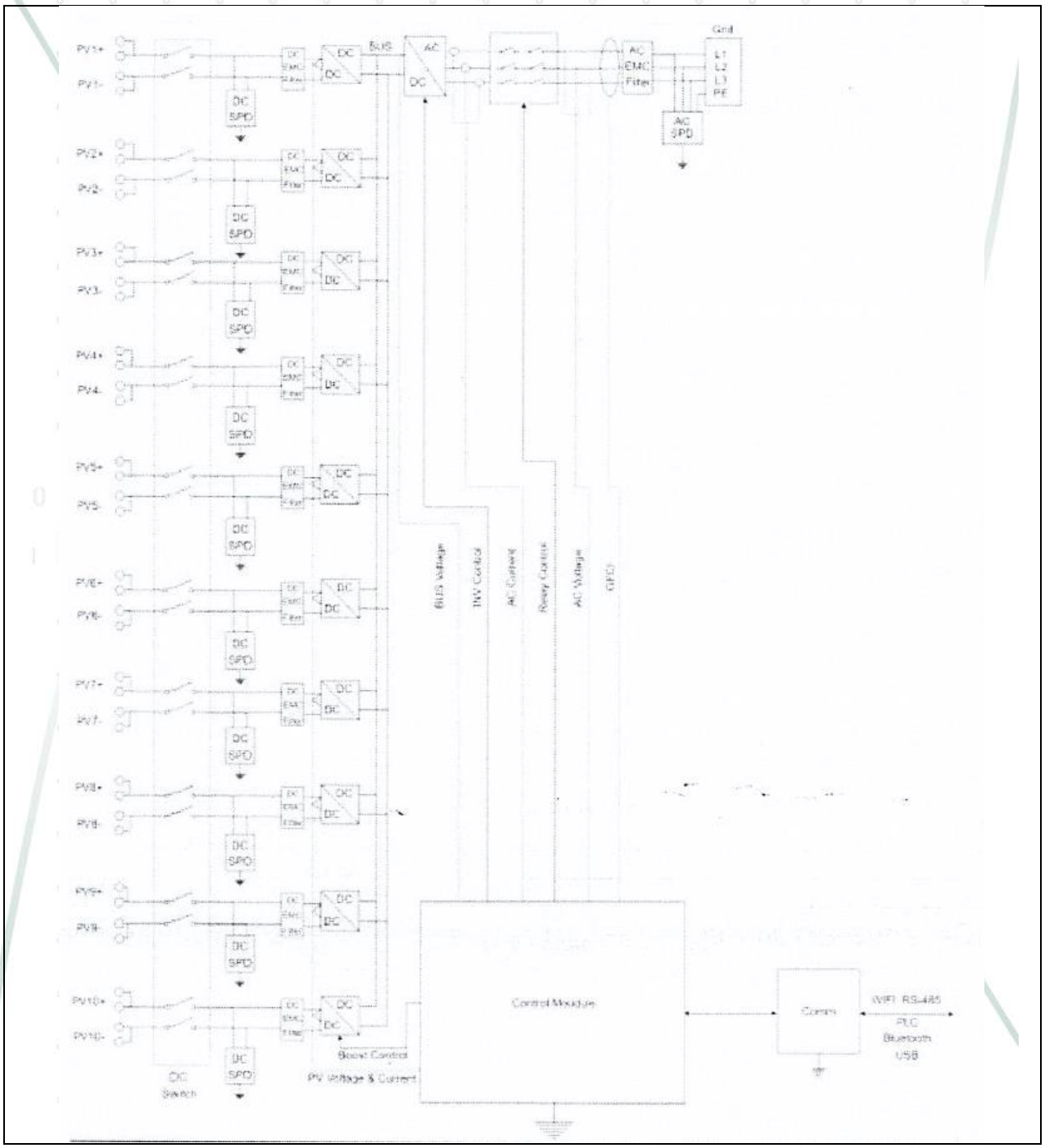

Figure 1

Selection for VDE-AR-N 4110 and VDE-AR-N 4120

First downloading the APP "Solargo" from the APP Store.
Then connecting PV inverter GW125K-GT to Solargo and setting safety code according to Figure 2 below

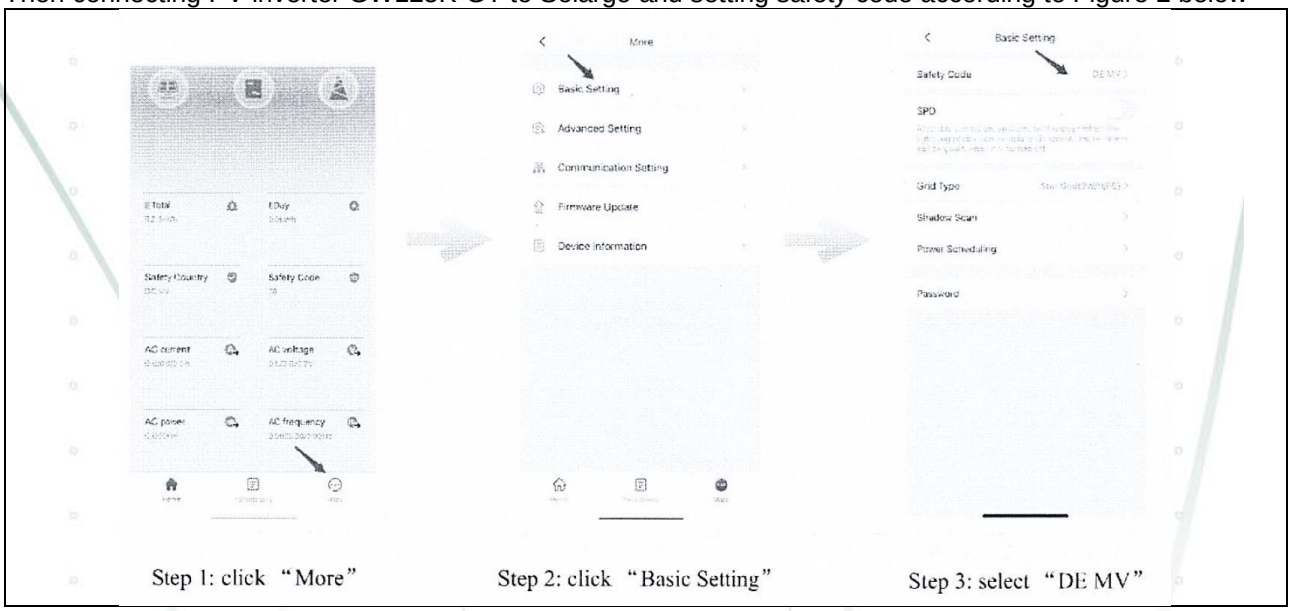

Figure 2

Operational areas of MODEL GW125K-GT

Limits during quasi-stationary operation

For VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, in the entire frequency range from 47.5 Hz to 51.5 Hz and voltages in the range of 85% Un to 115% Un at the MODEL GW125K-GT PV inverter AC connection terminal, while voltage gradient <5% Uc / min and a frequency gradient of <0.5% fn / min, for quasi-stationary operation, MODEL GW125K-GT 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 ΔU ≤ 10% Uc with voltage gradients of ≥ 5% Uc / min within the voltage band from 90% Uc to 110% Uc occur, inverter has no reduction for active and reactive power and keep connected to the grid.

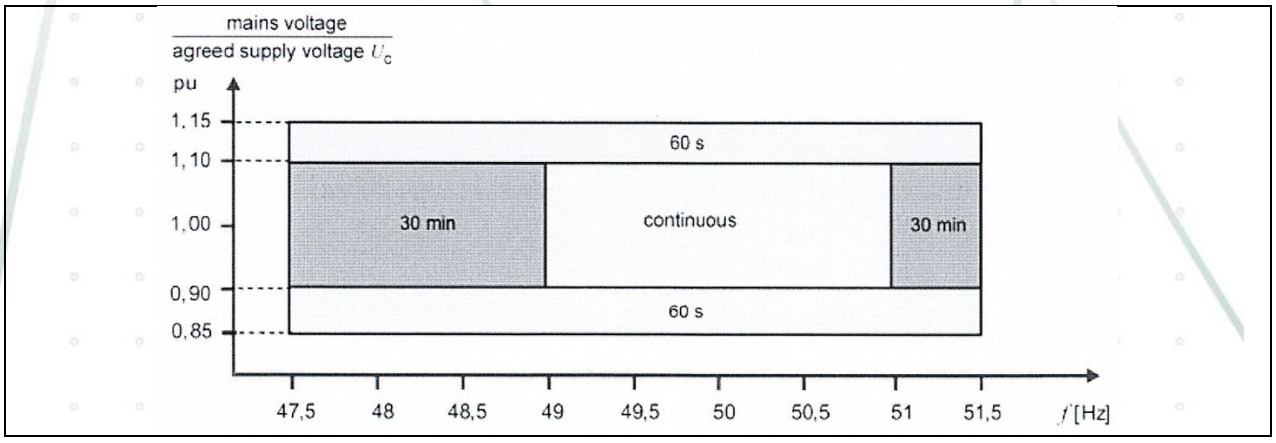

Figure 3. Quasi-stationary operation range for MODEL GW125K-GT

Reactive power capability

For VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, the reactive power capability of MODEL GW125K-GT PV inverter is according to Figure 4 below.

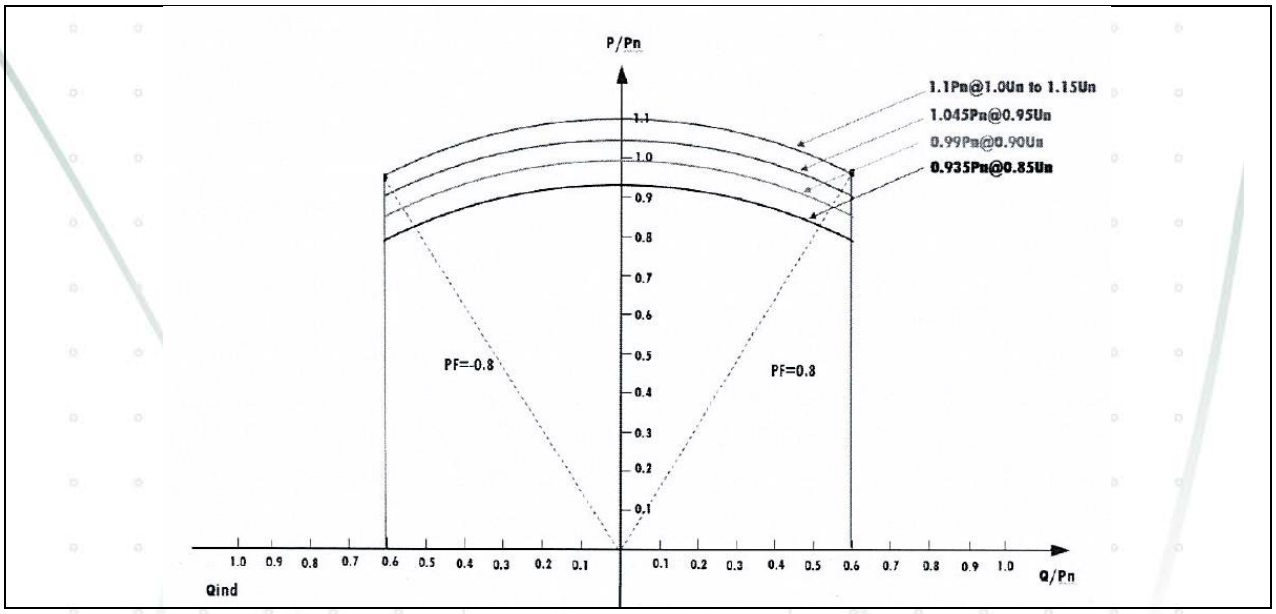

Figure 4. Voltage-dependent PQ diagram for MODEL GW125K-GT

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

For VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, the FRT limit curve of MODEL GW125K-GT PV inverter is according to Figure 5 below.

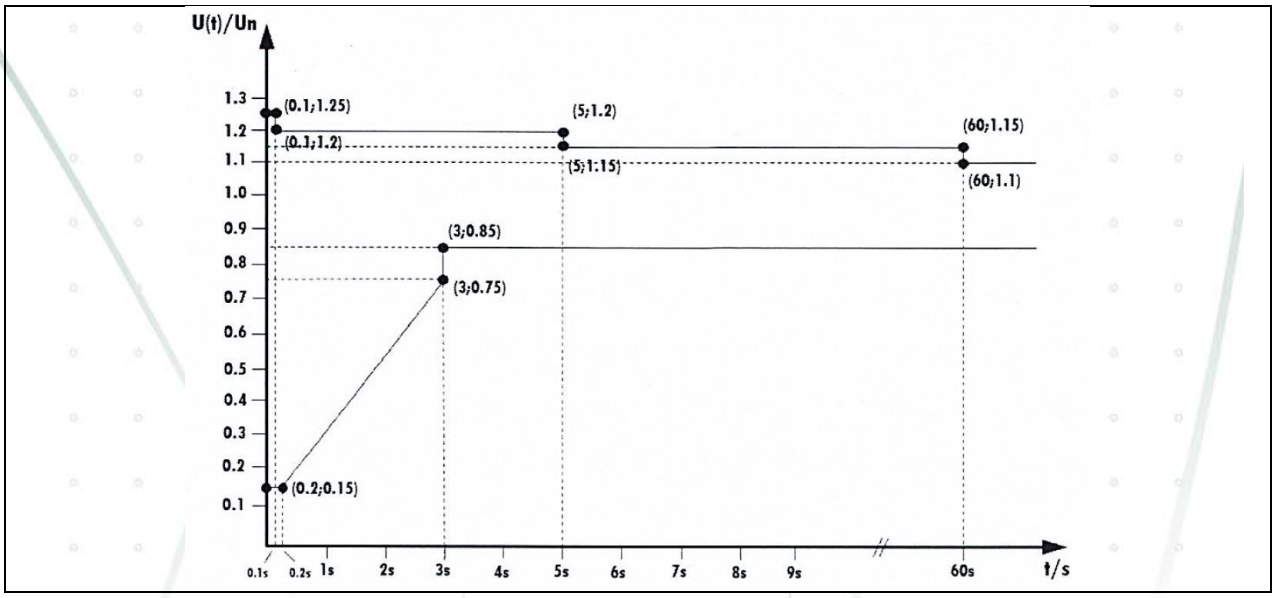

Figure 5 FRT limit curve for MODEL GW125K-GT

Note: For the reason of limited dynamic grid support requirement, MODEL GW125K-GT provide ZP(Zero Power) mode as well, when select this mode, MODEL GW125K-GT will supply no active and reactive power during LVRT for the voltage drop ≤70%Un， but for voltage range from 70%~90%Un, even choose ZP mode, inverter will enter into normal LVRT period with reactive power supplied by K factor.

Protection functions:

Grid protection

The default grid protection of MODEL GW125K-GT for VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11 is according to Table 1 below:

Function	Protection value	Trip time
U>	Default: 1.25 Un Range: 1.0-1.35Un	Default: 0.08s Range: 0-600s
U>>	Default: 1.25 Un Range: 1.0-1.35Un	Default: 0.08s Range: 0-600s
U<	Default: 0.80 Un Range: 0.0-1.0Un	Default: 2.00 s Range: 0-600s
U<<	Default: 0.3 Un Range: 0.0-1.0Un	Default: 0.70s Range: 0-600s
f>>	Default: 52.5 Hz Range: 50.0-55.0Hz	Default: 0.08s Range: 0-600s
f>	Default: 51.5 Hz Range: 50.0-55.0Hz	Default: 4.8 s Range: 0-600s
f<	Default: 47.5 Hz Range: 45.0-50.0Hz	Default: 0.08s Range: 0-600s

Table 1 MODEL GW125K-GT default protection setting for VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11

Function	Protection value	Trip time
Step for Voltage protection	0.1V	0.02s
Step for Frequency protection	0.1Hz	0.02s

Table 2 MODEL GW125K-GT setting step for voltage/frequency protection

The protection functions are independence from other set point.

After the inverter trip for protection, when the voltage recovers to at least 82%Un and frequency is between 49.9~50.1Hz, MODEL GW125K-GT has the setting of the delay time of recovery for both VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, the setting range is from 0 to 30 mins, default setting is 300s.

Notes: MODEL GW125K-GT 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.

Intrinsic ("self") protection

For both VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, MODEL GW125K-GT 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 1.365Un for 1ms.

Active power control

Frequency control (P(f)-diagram):

For both VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, P(f)-diagram is default according to the Figure 6 below.

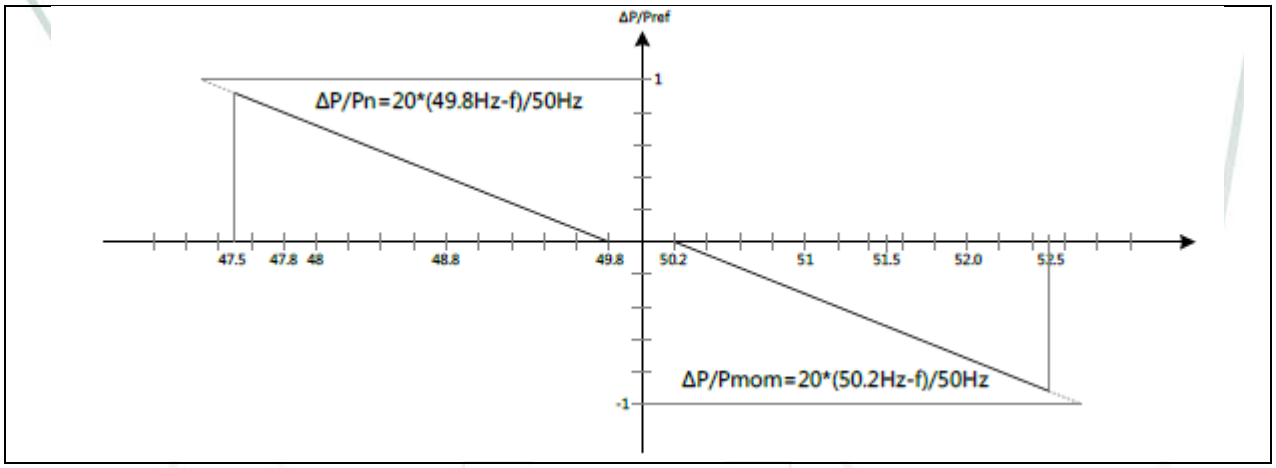

Figure 6 MODEL GW125K-GT P(f)-diagram

Note: Here Pmom is the active power freeze at that moment when the frequency to 50.2Hz. Pn is nominal 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.

Related gradients, dynamics and functions:

For VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, the following active power control applied to MODEL GW125K-GT.
Normal active power gradients: 0.33%Pn/s~0.66%Pn/s (default is 0.5%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 GW125K-GT enter into FTR, the reactive current is given priority according to the K value, and additional active current is provided when the reactive current does not reach Imax., after the FTR end the active power will recover by max ramp rate within 1s..

Set point

For both VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, the active power control set point applied to MODEL GW125K-GT is according to Table 4 Underfrequency increment and Overfrequency derating.

Overfrequency derating		
Function	Default Set point	Set range
Frequency-power response(Overfrequency derating)	ON	ON/OFF
Overfrequency Start	50.20Hz	50.00-55.00Hz
Overfrequency Slope	40%Pm/Hz	16.67-100.0%Pm/Hz
Overfrequency Stop	50.20Hz	50.00-55.00Hz
Intentional delay Time	0.00s	0-1200s
Recover power slope after overfrequency Stop	9%Pmax/min	1-3000%Pmax/min
Underfrequency increment		
Function	Default Set point	Set range
Frequency-power response(Underfrequency derating)	ON	ON/OFF
Underfrequency Start	49.80Hz	45.00-50.00Hz
Underfrequency Slope	40%Pn/Hz	16.67-100.0%Pn/Hz
Underfrequency Stop	49.80Hz	45.00-50.00Hz
Intentional delay Time	0.00s	0-1200s
Recover power slope after overfrequency Stop	9%Pmax/min	1-3000%Pmax/min

Table 4 Active power set point for MODEL GW125K-GT

Reactive power control

Related gradients, dynamics and functions

For VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, MODEL GW125K-GT reactive power control is following according to Figure 7 below.

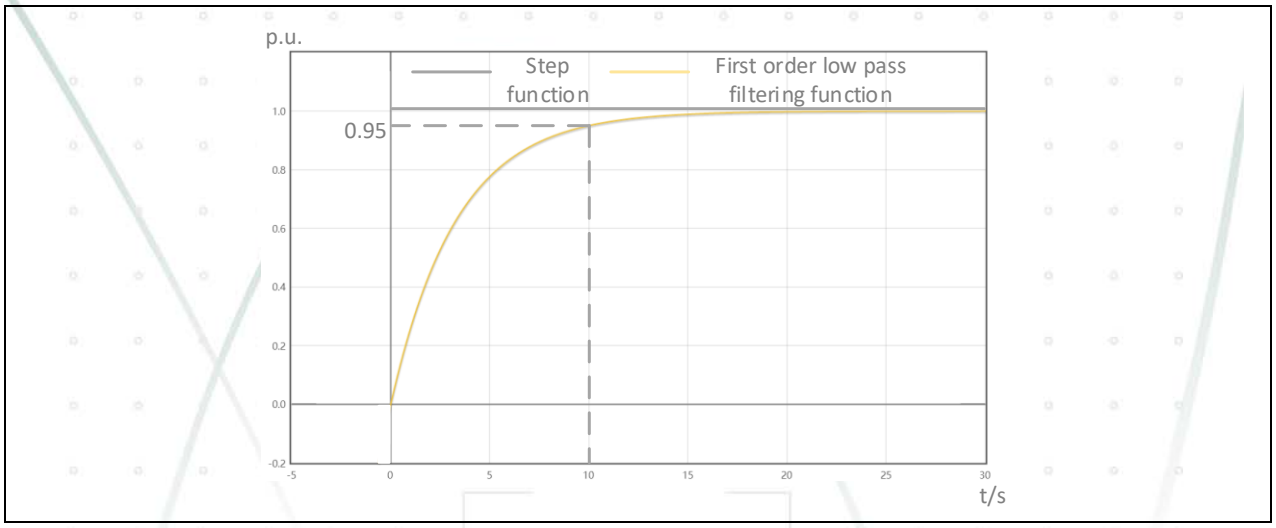

Figure 7 MODEL GW125K-GT reactive power control feature

The reactive power is supplied by equation (1):

Q = Qset * [1-e^(3t/3Tau)] (1)

Here the time constant 3Tau is settable as the time for 95% target value.
For VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, the 3Tau setting range is from 1~60s, the default setting is 10s.

Set point

For VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11, the reactive power control set point applied to MODEL GW125K-GT is according to Table 6:

Function	Default Set point	Set range
Reactive mode	OFF	Off/Mode1/2/3/4(1)
Mode 1		
Power factor (0.0001)	1.00	-1 ~ -0.8, +0.8 ~ +1
Mode 2		
Fixed Reactive Percentage (0.01%)	0%	0~60%Sn
Mode 3		
Reactive response period	10	1~600s
Point A power	50%Pn	0~100%Pn
Point A reactive power	0	-60%Pn~+60%Pn
Point B power	60%Pn	0~100%Pn
Point B reactive power	-5%Pn	-60%Pn~+60%Pn
Point C power	90%Pn	0~100%Pn
Point C reactive power	-33%Pn	-60%Pn~+60%Pn
Mode 4		
Reactive response period	10	1~600s
U1	96%Un	80~100%Un
Q1	60%Sn	-100~100%Qmax
U2	100%Un	80~100%Un
Q2	0	-100~100%Qmax
U3	100%Un	100~120%
Q3	0	-100~100%Qmax
U4	104%Un	100~120%
Q4	-0.6Sn	-100~100%Qmax

Table 6 Reactive power set point for MODEL GW125K-GT

(1) Off The PF is limited to +1.000s 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 reactive power can be regulated by the parameter Reactive 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

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 GW125K-GT is proportional to the voltage deviation Δu ($\Delta i_B = k*\Delta u$), 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 GW125K-GT k factor for VDE-AR-N 4110:2018-11 & VDE-AR-N 4120: 2018-11 is 2.

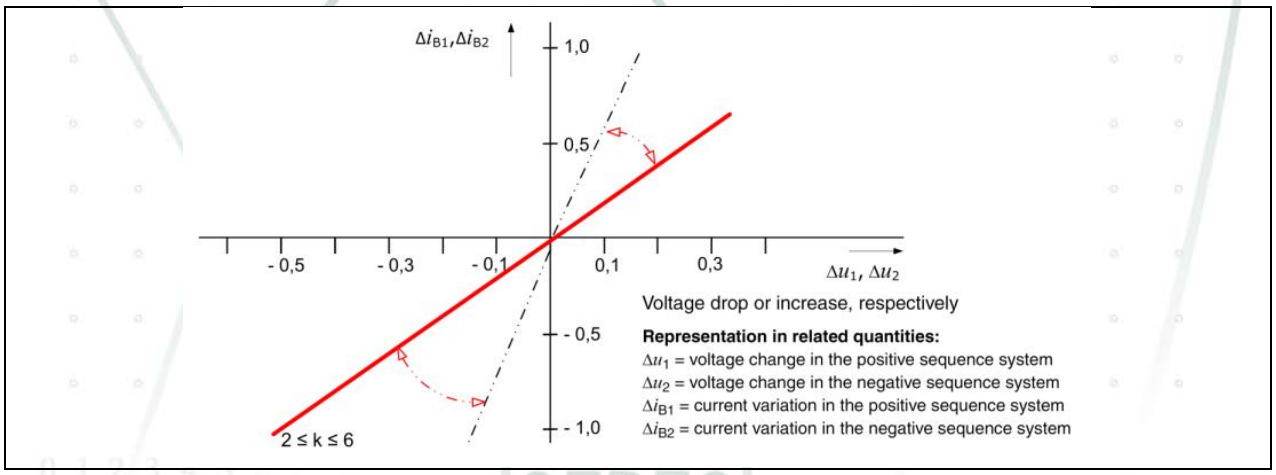

Figure 8 k factor of voltage support in the event of a network fault

----------END OF THE PROTOTYPE DECLARATION ----------