1.3.3 CE Directives

This chapter describes the requirements of the European low voltage regulations, including safety instructions and system licensing conditions, the user must comply with these regulations when installing, operating, and maintaining the inverter , otherwise it will cause personal injury or death, and the inverter will cause damage.

Please read the manual carefully when operating the inverter .If you do not understand "danger", "warning", "caution" and the description in the manual, please contact the manufacturer or service agent before installing and operating the inverter.

Grid-connected inverter comply with low voltage directive (LVD) 2014/35/EU and Electromagnetic compatibility directive (EMC) 2014/30/EU.Detection of components is based on:
EN 62109-1:2010;
EN 62109-2:2011;
IEC 62109-1(ed.1);
IEC62109-2(ed.1);
EN 61000-6-3:2007+A:2011;
EN 61000-6-1:2007;
EN 61000-6-2:2005;

For installation in photovoltaic module system, it is necessary to make sure that the whole system complies with the requirements of EC(2014/35/EU, 2014/30/EU, etc.) before starting the module (i.e. to start the operation). The assembly shall be installed in accordance with the statutory wiring rules. Install and configure the system in accordance with safety rules, including the use of specified wiring methods. The installation of the system can only be done by professional assemblers who are familiar with safety requirements and EMC. The assembler shall ensure that the system complies with the relevant national laws.

The individual subassembly of the system shall be interconnected by means of the wiring methods outlined in national/international such as the national electric code (NFPA) No. 70 or VDE regulation 0107.

2 Introduction

2.1 Basic Features

X1-Hybrid G4 series is a high-quality inverter that can convert solar energy into alternating current and store energy into batteries. The inverter can be used to optimize self-consumption, stored in batteries for future use or fed into the public grid. The way it works depends on user preferences. It can provide emergency power during power outages.

2.2 System Diagram

X1-Hybrid G4 series are designed to has four EPS(Off-grid) wiring schemes, customers can choose EPS(Off-grid) compatible parts Load and EPS(Off-grid) compatible with all load use.
There are different ways of wiring in different countries, one is to connect N line with PE line, the other is to separate the line from the PE line wiring, see below;

Diagram A: Neutral line and PE line are separated from each other, and the common load is connected to the EPS(Off-grid) port; (For most countries)
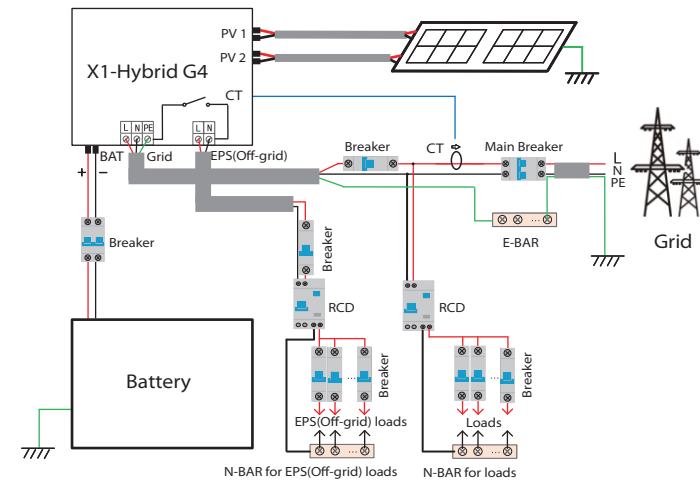
Diagram B: Neutral line and PE line are separated from each other, all loads connect to the EPS(Off-grid) port; (For most countries)
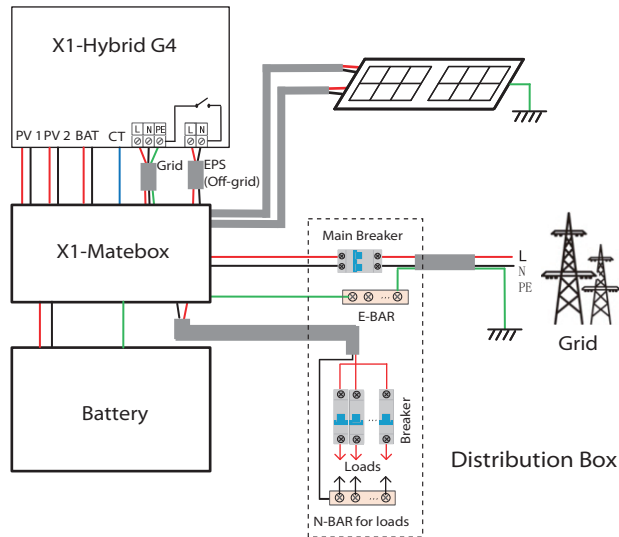
Diagram D: Neutral line and PE line are combined together, all loads connect to the EPS(Off-grid) port; (Apply to Australia)

Diagram C: Neutral line and PE line are combined together, and the common load is connected to the EPS(Off-grid) port;
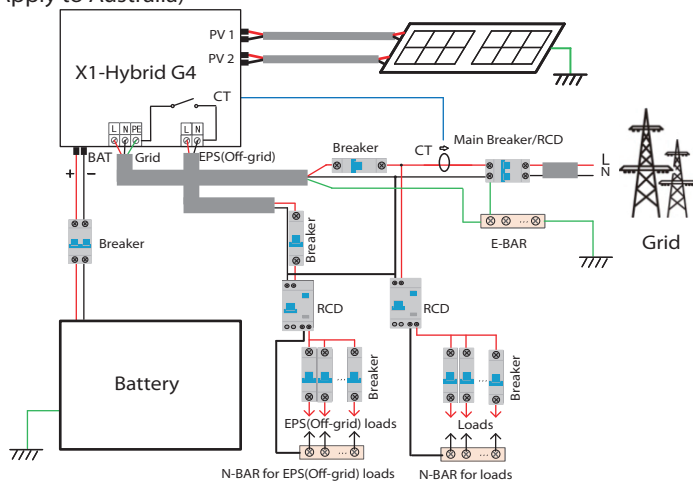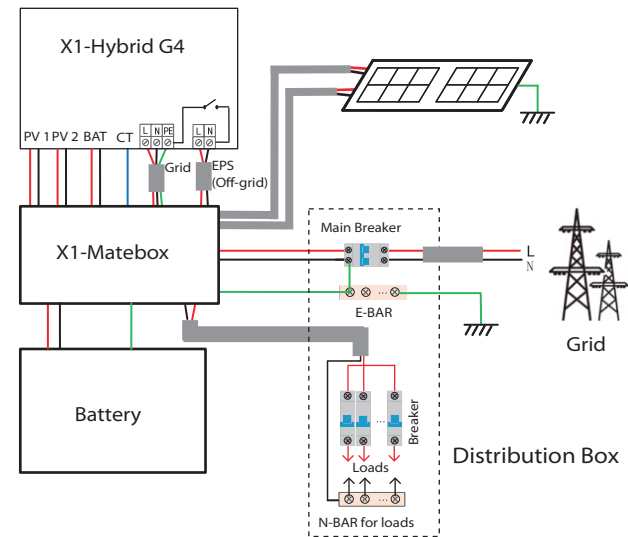(Apply to Australia)

Notice!
 • When power cuts suddenly, the inverter connects the N line of EPS(Off-grid) load with the ground through relay, providing a fxed zero potential for EPS(Off-grid) load and ensuring the safety of electricity use by users.

 • Please control the inverter load and make sure it is "output value" in "within " EPS(Off-grid) mode, otherwise the inverter will stop and alarm overload fault".

 • Please confirm with the grid operator whether there are special regulations for grid connection.

2.3 Work Modes

X1-Hybrid G4 series, can be based on different needs, there are a variety of models.

Self Use

The self-use mode is suitable for areas with low feed-in subsidies and high electricity prices.
① When the power of PV is sufficient
Active Charge or Discharge time period: PV will power the loads frstly, and surplus power will charge to the battery .
If the battery is fully charged, then sell the surplus power to the grid;(The inverter will limit the output if Feed-in limit or zero feed-in is needed)
(PV > Load, PV →Load→Battery → Grid)
② When the power of PV is insufficient
Active Charge time period: PV will power the loads frstly , the remaining power will be taken from the grid , the battery will not discharge at this time.
(PV < Load, PV + Grid → Load)
Active Discharge time period: PV+BAT will power the loads together. If the power is still not enough, the remaining power will be taken from the grid.
(PV < Load, PV + Battery + Grid → Load)
③ Without PV power
Active Charge time period: The grid supplies the loads and also can charge the battery;
(PV=0, Grid → Load + Battery)
Active Discharge time period: The battery will power the home loads frstly. If the battery power is not enough ,the remaining power will be taken from the grid. The inverter will enter into the standby state.
(PV=0, Battery+Grid → Load)
Battery min SOC can be set:10%-100%
Charge battery to min SOC can be set:10%-100%
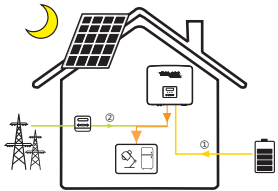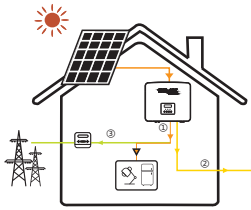
Feed-in priority

The Feed-in priority mode is suitable for areas with high feed-in subsidies, but has feed-in power limitation.
①When the power of PV is sufficient
Active Charge time period: First, PV supply power to the load, then charge the battery to the set capacity, and then sell the power to the grid. If the local grid company limits the grid-connected power of the inverter, the excess energy continues to charge the battery.
(PV＞Load, PV → Load → Battery→ Grid → Battery)
Active Discharge time period :PV will power the loads frstly, and surplus power will feed-in to the grid.
(PV＞Load, PV → Load → Grid)
②When the power of PV is insufficient
Active Charge time period:PV will power the loads frstly, the remaining power will be taken from the grid. The battery will not discharge.
(PV＜Load, PV + Grid → Load)
Discharge time period: PV+BAT will power the loads together. If the power is still not enough, the remaining power will be taken from the grid.
(PV＜Load, PV + Battery + Grid → Load)
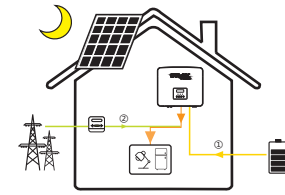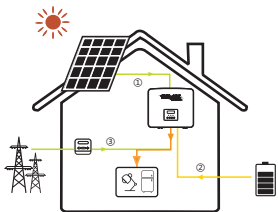
③Without PV power
Active Charging time period: The grid will power the home loads and also charge the battery;
(PV=0, Grid → Load +Battery)
Active Discharge time period: The battery will power the home loads frstly. If the battery power is not enough, the remaining power will be taken from the grid. The inverter will enter into the standby state.
(PV=0, Battery+Grid → Load)
Battery min SOC can be set:10%-100%
Charge battery to min SOC can be set:10%-100%

Backup mode

The back-up mode is suitable for areas with frequent power outages.
Same working logic with "Self-use" mode. This mode will maintain the battery capacity at a relatively high level. (Users' setting) to ensure that the emergency loads can be used when the grid is off. Customers no need to worry about the battery capacity.
Battery min SOC can be set: 30%-100%.
Charge battery to min SOC can be set: 30%-100%.
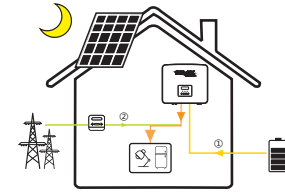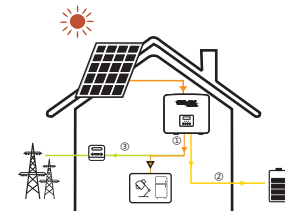
EPS(Off-grid)

In case of power failure, the system will power EPS loads through PV and battery.

(Battery must be installed, and EPS loads shall not exceed battery's max. output power.)

①When the power of PV is sufficent
PV will power the loads frstly, and surplus power will charge to the battery.
(PV > Load, PV → Load → Battery)
②When the power of PV is insufficient
The remaining power will be taken from the battery.
(PV < Load, PV → Load)
③ Without PV power
The battery will power the emergency loads until the battery reached the min SOC, then the inverter will enter into the idle mode.
(PV=0, Battery → Load)
EPS(off-grid) SOC-min condition is adjustable within the range of 1 0%-25%;
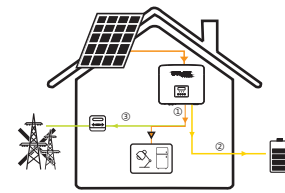
Notice: in the case of grid connection, all working modes work normally when the battery SOC >5%. When the battery charge rate is below 5%, the PV or Grid will first charge the battery SOC11%, and then return to the working mode selected by the user.

2.4 Dimension

482mm

417mm

181mm
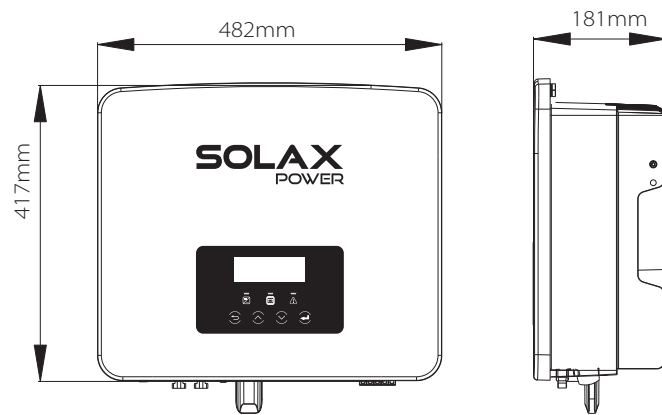
2.5 Terminals of Inverter
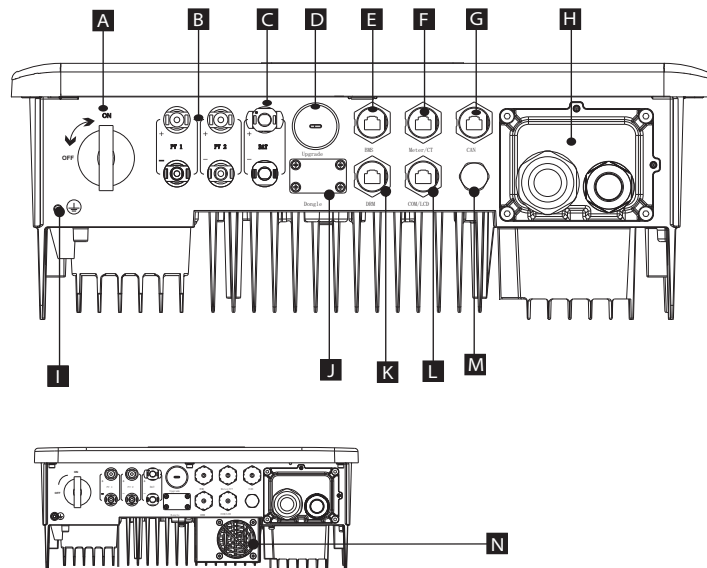
Object	Description
A	DC switch
B	PV connection port
C	Battery connection port
D	USB port for upgrading
E	Battery communication
F	Meter/CT Port
G	CAN is a reserved port
H	Grid/EPS(Off-grid) output port
I	Ground connection port
J	External monitoring connection port
K	DRM Port(only for Australia)
L	Communications/ LCD is a reserved port
M	Waterproof valve
N	Fan2 (only for X1-Hybrid-7.5-D and X1-Hybrid-7.5-M)

⚠ **Warning !**
Qualified electrician required for the installation.

3 Technical Data

3.1 DC Input

Model	X1-Hybrid-3.0-D X1-Hybrid-3.0-M	X1-Hybrid-3.7-D X1-Hybrid-3.7-M	X1-Hybrid-5.0-D X1-Hybrid-5.0-M	X1-Hybrid-6.0-D X1-Hybrid-6.0-M	X1-Hybrid-7.5-D X1-Hybrid-7.5-M
Max. recommended PV power [W]	4500	5500	7500	9000	10000
Max. DC voltage [V]	600	600	600	600	600
Nominal DC operating voltage [V]	360	360	360	360	360
MPPT voltage range [V]	70-550				
MPPT Full Powervoltage range [V]	115-480	135-480	190-480	225-480	280-480
Max. input current [A]	16/16	16/16	16/16	16/16	16/16
Max. short circuit current [A]	20/20	20/20	20/20	20/20	20/20
Start output voltage [V]	90	90	90	90	90
No. of MPP trackers	2	2	2	2	2
Strings per MPP tracker	1	1	1	1	1

3.2 AC Output/ Input

Model	X1-Hybrid-3.0-D X1-Hybrid-3.0-M	X1-Hybrid-3.7-D X1-Hybrid-3.7-M	X1-Hybrid-5.0-D X1-Hybrid-5.0-M	X1-Hybrid-6.0-D X1-Hybrid-6.0-M	X1-Hybrid-7.5-D X1-Hybrid-7.5-M
AC Output					
Nominal AC power [VA]	3000	3680	5000(Germany 4600,AU 4999)	6000	7500(PEA 6900)
Max. apparent AC power [VA]	3300	3680	5500(Germany 4600, AU 4999)	6600	7500(PEA 7300)
Rated AC voltage [V]	220/ 230/ 240 (180 to 270)				
Rated grid frequency [Hz]	50/60				
Max. AC current [A]	14.4	16	23.9(Germany 20, AU 21.7)	28.6	32.6(PEA 33)
Displacement power factor	0.8 leading...0.8 lagging				
Total harmonic distortion (THDi)	< 2%				
AC Input					
Max. apparent power [VA]	6300	7360	9200	9200	9200
Rated AC power [W]	3000	3680	5000	6000	7500
Rated grid voltage(range) [V]	220/230/240 (180 to 270)				
Rated grid frequency [Hz]	50/60				
Max. AC current [A]	27.4	32	40	40	40
Displacement power factor	0.8 leading...0.8 lagging				

3.3 Battery

Model	X1-Hybrid-3.0-D X1-Hybrid-3.0-M	X1-Hybrid-3.7-D X1-Hybrid-3.7-M	X1-Hybrid-5.0-D X1-Hybrid-5.0-M	X1-Hybrid-6.0-D X1-Hybrid-6.0-M	X1-Hybrid-7.5-D X1-Hybrid-7.5-M
Battery type	Lithium batteries				
Battery Full Voltage [V]	80-480				
Maximum charge/discharge flow [A]	30A				
Communication interface	CAN/RS485				
Reverse connection protection	Yes				

3.4 Efficiency, Safety and Protection

Model	X1-Hybrid-3.0-D X1-Hybrid-3.0-M	X1-Hybrid-3.7-D X1-Hybrid-3.7-M	X1-Hybrid-5.0-D X1-Hybrid-5.0-M	X1-Hybrid-6.0-D X1-Hybrid-6.0-M	X1-Hybrid-7.5-D X1-Hybrid-7.5-M
MPPT efficiency	99.9%	99.9%	99.9%	99.9%	99.9%
European efficiency	97.0%	97.0%	97.0%	97.0%	97.0%
Maximum efficiency	97.6%	97.6%	97.6%	97.6%	97.6%
Max. battery charge efficiency (PV to BAT)(@ full load)	97.0%	97.0%	97.0%	97.0%	97.0%
Max. battery discharge efficiency (BAT to AC)(@ full load)	97.0%	97.0%	97.0%	97.0%	97.0%
Security & Protection					
DC SPD Protection	Integrated(TypeIII)				
AC SPD Protection	Integrated(TypeIII)				
Over/under voltage protection	YES				
Grid protection	YES				
DC injection monitoring	YES				
Back feed current monitoring	YES				
Residual current detection	YES				
Anti-islanding protection	YES				
Over load protection	YES				
Over heat protection	YES				
Array insulation resistance detection	YES				

3.5 EPS(Off-grid) Output

Model	X1-Hybrid-3.0-D X1-Hybrid-3.0-M	X1-Hybrid-3.7-D X1-Hybrid-3.7-M	X1-Hybrid-5.0-D X1-Hybrid-5.0-M	X1-Hybrid-6.0-D X1-Hybrid-6.0-M	X1-Hybrid-7.5-D X1-Hybrid-7.5-M
EPS(Off-grid) rated power [VA]]	3000	3680	5000	6000	7500
EPS(Off-grid) rated voltage [V]	230VAC				
Frequency][Hz]	50/60				
EPS(Off-grid) rated current [A]	13	16	21.7	26.1	32.6
EPS(Off-grid) Peak Power [VA]	120%rated,1h	120%rated,1h	120%rated,1h	120%rated,10min	100%rated
Switching time(typical value) [ms]	internal switch<10, external switch＜100				
Total harmonic distortion (THDv)	<2%				

3.6 Generic Data

Model	X1-Hybrid-3.0-D X1-Hybrid-3.0-M	X1-Hybrid-3.7-D X1-Hybrid-3.7-M	X1-Hybrid-5.0-D X1-Hybrid-5.0-M	X1-Hybrid-6.0-D X1-Hybrid-6.0-M	X1-Hybrid-7.5-D X1-Hybrid-7.5-M
Dimensions (W/H/D) [mm]	482*417*181				
Dimensions of Packing (W/H/D)[mm]	590*530*315				
Net weight [kg]	24	24	24	24	25
Gross weight [kg]	28	28	28	28	29
Heat dissipation treatment	Natural Cooling				Smart Cooling
Noise emission(typical) [dB]	<30				<45
Storage temperature range [℃]	-40~+65				
Operating temperature range [℃]	-35~+60 (derating at 45)				
Humidity [%]	0%~100%				
Altitude [m]	<3000				
Protection level	IP65				
Security level	I				
Cold standby consumption	<3W				
Over voltage category	III(MAINS), II(PV, Battery)				
Pollution Degree	III				
Installation mode	Wall mounted				
Inverter Topology	non-isolated				
Communication interface	Meter/ CT, external control RS485, Pocket series (optional), DRM, USB				
Standard warranty	Standard 10 years				

4 Installation

4.1 Check for Transport Damage

Ensure that the inverter is in good condition via transportation. If there is any visible damage such as cracks, please contact the dealer immediately.

4.2 Packing List

Open the package and check the materials and accessories according to the following list.

A B C D

E F G H

I J K L

M N O P

Q R