GivEnergy®
Commercial

POWER CONVERSION SYSTEM (PCS)

INSTALLATION MANUAL

30 | 50 | 100 | 150 | 250 AND 500KW PCS

Safety instructions

Extra care and attention must be taken when installing and maintaining any GivEnergy equipment.
The system is capable of retaining a high voltage, even when disconnected.

- If you suspect something is wrong with the inverter, contact GivEnergy on **01377 252 874** or email **support@givenergy.co.uk**
- If there are any damaged or missing parts, please contact the distributor immediately. Returns must be provided in original or equivalent packaging
- All electrical installations must be carried out by a qualified and registered electrician and in accordance with local wiring regulations
- During operation, the heat sink may become hot. Do not touch the heat sink at the sides, or the top of the inverter when in operation
- The inverter is designed to be connected to the grid; connecting your inverter to a generator or other power source can result in damage to the inverter or external devices
- All GivEnergy equipment must be installed by a GivEnergy Approved Installer

Before removing any covers the PCS should have the AC and DC supply isolated for a minimum of 15 minutes

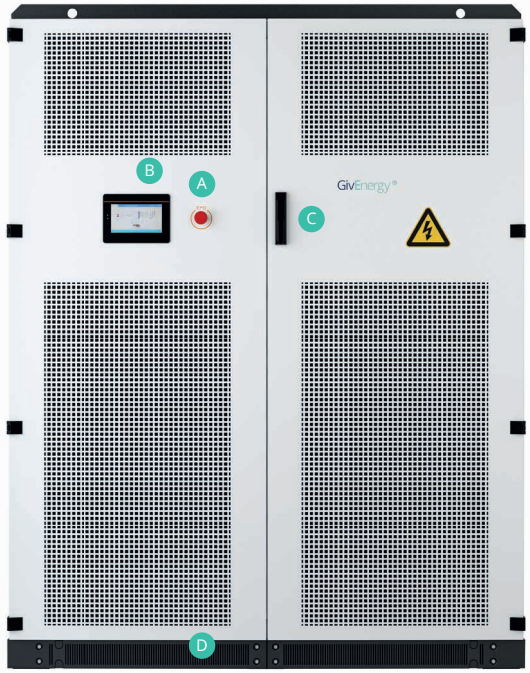
The PCS must be installed in an accessible location, the status display must be visible and not obstructed

The PCS must be installed in a well ventilated area, free of any obstacles. The ambient temperature should be below 45°C to ensure optimal operation

The inverter must be installed vertically with connections always positioned at the bottom, never install horizontally, and avoid tilting the unit

Do not install in direct sunlight or near water sources

Item	Item name
A	Emergency stop (EPO)
B	LCD screen
C	Door handle
D	Removable lower trim



HANDLING

Required tools and equipment

- Gloves
- Socket/spanner set
- Screwdrivers
- Suitably rated lifting equipment*

*Please note that due to the weight of the PCS, it may not be possible to utilise the delivery vehicle's tail lift. As such, a suitably rated forklift truck, telehandler, or similar will be required.

Delivery and unpackaging

The PCS will be delivered palletised in a wooden box.

1. Starting with the top, release the metal retaining clips by unfolding them to a straight position then lift the top off
2. Working around each side one at a time, release the remaining retaining clips and remove each panel
3. Remove the plastic and foam packaging
4. Remove the lower black trim on all sides of the PCS – be careful not to lose any of the bolts
5. Unbolt the PCS from its pallet on all sides
6. Lift the PCS to allow removal of the pallet, being careful not to put any body part in a potential trap area
7. The PCS can now be positioned using the lifting equipment or a standard pallet truck
8. The key to the door is attached to the handle

Key dimensions

Rating	30kW	50kW	100kW	150kW	250kW	500kW
Size (WxDxH)	800 x 800 x 2050				1200 x 800 x 2050	1600 x 1050 x 2050
Weight (kg)	600	650	910	950	1350	2460

INSTALLATION ENVIRONMENT

Environment criteria

To ensure optimal operation and lifetime of the PCS, it must be installed in an environment that meets the following criteria at a minimum:

- -30°C to 55°C
- 0 to 95% non-condensing humidity
- <5000m altitude
- In an area with adequate ventilation

The PCS must only be installed internally on level flat ground. It is possible to fix it to the floor on each corner if required.

Ventilation

The PCS must have a suitable airflow to ensure optimal operation. If the PCS is being fitted against a wall then a vent/duct must be installed prior to finally positioning the PCS.

Please see 'PCS Ventilation guide' for more information.

Access

It is recommended that access to the area the system is located within is restricted. A password protected screen and locked door prevent immediate danger to the general public, however some basic parameters and operations such as the emergency stop button are accessible.

The system should always be installed in a well lit area where access can be made available for maintenance purposes.

Electrical and data connections

A 400v 3 phase AC supply is required. For maintenance purposes, it is recommended that this supply can be locally isolated. AC and DC connection terminals are found at the bottom of the PCS below the MCCBs and switches within the front door. Connections are accessed by removing the terminal cover. Depending on the PCS version, this may be the lower section below the MCCBs and switches or, the whole lower front cover. Take care not to lose the fixing bolts.

All connections require ring terminal lugs, do not over tighten the connections.

Cable sizing will be determined by length of run, cable type, installation type and maximum current rating of the PCS.

Rating	30kW	50kW	100kW	150kW	250kW	500kW
Max. Current (A)	48	80	160	240	400	800

Type Capacity	Type Capacity	Zero Line	Ground Wire	Positive and Negative DC input (per pole)
30kW	≥25mm² x 3	≥25mm²	≥16mm²	input 50mm²
50kW	≥35mm² x 3	≥35mm²	≥16mm²	input 70mm²
100kW	≥50mm² x 3	≥50mm²	≥25mm²	input 95mm²
250kW	≥120mm² x 3	≥120mm²	≥50mm²	2-way input 120mm²
500kW	≥185mm² x 3	≥185mm²	≥95mm²	4-way input 120mm²
630kW	≥240mm² x 3	≥120mm²	≥120mm²	4-way input 120mm²

Bolt dimensions and required torques

Bolt Size	M4	M5	M6	M8	M10	M12	M14	M16
Torque (N.m)	2	3.2	7	16	34	46	58	68

AC grid supply

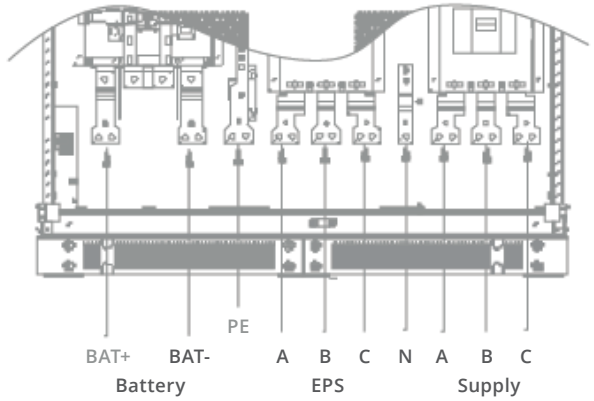
Before connecting to any terminals, ensure all MCCBs and switches are in the OFF position and ALL supplies are safely isolated and tested.

The grid supply is connected to the QAC2 terminals marked grid. If uncertain the grid MCCB can easily be identified as it has a large contactor directly above.

If off grid functionality is a selected option this can be achieved via the same cable as the supply. This is common when providing back-up power to a whole site – please speak to a GivEnergy representative if uncertain.

The AC supply must be tested for correct voltage, polarity and phase rotation before turning on the MCCB within the PCS.

A 'clean' earth should be provided to the PCS, this should be a separate earth ran directly from the MET of the site.



EPS/UPS output

Before connecting to any terminals, ensure all MCCBs and switches are in the OFF position and ALL supplies are safely isolated and tested.

The EPS/UPS output is connected to the QAC1 terminals marked EPS or Backup. If uncertain this can easily be identified as the MCCB does not have a contactor directly above.

The backup output terminals can be used when installing the PCS with a two cable method, this is common when providing back-up power to certain dedicated or essential circuits. Please speak to a GivEnergy representative if uncertain.

DC connections

Before connecting to any terminals, ensure all MCCBs and switches are in the OFF position and ALL supplies are safely isolated and tested.

Using the cables provided, connect the positive and negative cables to the DC input terminals on the left hand side marked QDC.

Take great care to ensure correct polarity, the DC supply must be tested for correct voltage and polarity before turning on the DC switch within the PCS.

Supply to battery/DC cabinet

A power supply is required to supply the battery cabinet (or DC cabinet if fitted), using the wiring harness provided connect into battery cabinet output terminals in the bottom right hand side of the PCS.

Data connections

The PCS takes an external control signal from the GivEnergy EMS located within the battery racking/ cabinet(s) or DC cabinet.

Depending on the version of the PCS, the data connections can either be found to the left hand side outside of the AC and DC connection cover, OR in the centre behind the AC and DC connection cover.

The PCS communicates with the EMS via CAN bus, using the cable supplied with the battery cabinet(s) connect to the terminals marked BMS CAN H and CAN L.

Once all connections are made and tested, the lower black trim can be re-installed on all accessible areas using 2 bolts on each side to secure.

Once electrical testing is completed the lower cable entry cover should also be reinstalled.

Power-on procedure

Once all connections are terminated correctly with satisfactory test results, the following turn-on procedure should be followed:

1. Release the emergency stop button if pressed
2. Turn on the AC Supply MCCB (QAC2)
3. Wait for the screen to power up and display grid voltage*
4. Turn on the EPS output MCCB (QAC1)
5. Wait for the screen to show voltage on ‘load’
6. Turn on the battery system following the instructions
7. Turn on the DC switch and check for the correct DC voltage on the screen
8. Follow instructions in the ‘Operational Settings’ section

*On first start up/initial commissioning, it is advised that the operational settings are checked after step 2 before proceeding to next steps.

Shutdown procedure

In an emergency press the emergency stop button on the PCS first then all battery cabinets/racks.

1. Follow instructions in the ‘Operational Settings’ section
2. Press the emergency stop button
3. Turn off the AC and EPS MCCBs
4. Turn off the DC switch

Caution: Always wait at least 15 minutes for the internal capacitors to discharge before removing safety covers.

OPERATIONAL SETTINGS

A number of settings should be confirmed on initial start-up to ensure correct operation. It is recommended that these settings are checked prior to connecting the PCS to the battery system. The commissioning engineer will provide the required settings. The setup can be accessed by pressing Menu > System. The default password for access to the settings with the PCS screen is: '888888'.*

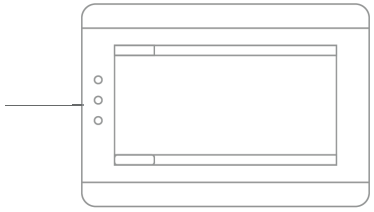
To run the PCS in automatic mode

Press *Menu > System > Parameter Setting > Control Mode > Remote*
The EMS will then automatically control the PCS based on the parameters set via the online portal, the PCS will automatically turn on or off as required.

To run the PCS in local mode

Press *Menu > System > Parameter Setting > Control Mode > Local*
Set the required power using constant power, discharging is a positive number, charging is a negative number (eg. 15 = 15kW discharge, -32 = 32kW charge).
Press *Menu > Turn On*

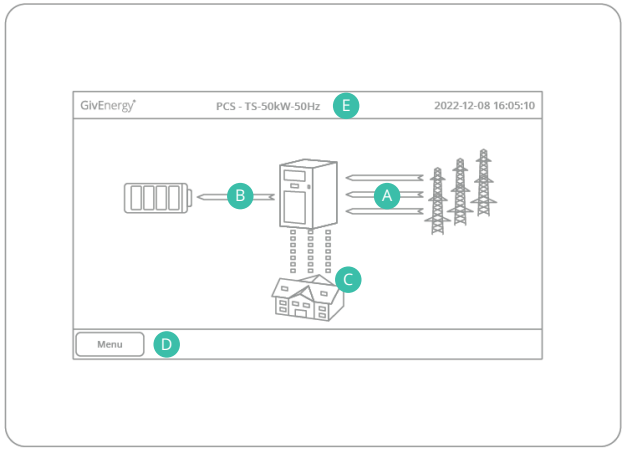
LED	Status	Definition
	Flashing	Grid on
	Solid	Operational
	Flashing	Fault



*If the default password is changed please inform GivEnergy for maintenance and warranty purposes. If the default password is forgotten, the PCS will have to be fully reset at the purchaser's cost.

PCS SCREEN INFORMATION

Item	Item name
A	AC charge/discharge current
B	DC charge/discharge current
C	Backup charge/discharge current
D	Menu
E	PCS type and size



Operational information can be seen on the screen. Tap the screen to light it up if it is off or dull.
Settings access is for access to the menu — speak to your installer or GivEnergy.
Each of the icons on the screen can be pressed to show more detailed live information.

Menu button	System parameter setting	**Control mode**	Local – Control operation from PCS screen Remote – Control via EMS
		Constant power	Operating power of PCS (Auto set when in remote control)
		Advanced settings	GivEnergy operation only
	System battery setup	GivEnergy operation only	
	System automatic operation	Set time schedules for local operation	

INITIAL TESTING / COMMISSIONING

All GivEnergy commercial storage solutions include an on-site commissioning service. Our engineer will ensure correct communication with meter, battery packs, EMS and PCS. To aid in this testing, the engineer will initially run a low power test in 'manual' mode — setting the system to complete a 5 minute charge followed by a 5 minute discharge and a rate of 10kW.

Once this is complete, where electrical supply parameters allow, a full power charge and discharge will be ran for a period of 15 minutes each. Depending on electrical limitations on site, this test can be adjusted to power levels with site tolerance.

Any additional tests can now be completed, including system specific operation such as back up power.

Once the above testing is successfully completed, the system will be set to run in its agreed operational modes and a demonstration can be given to the client and/or installer.

Our engineer will supply commissioning paperwork once complete, the date of which will commence the PCS warranty.

MAINTENANCE AND SUPPORT

Maintenance

Ensure that the front door and rear ventilation are not restricted or clogged with dust.
An annual check of all emergency stop buttons and protective devices is recommended.

Support

Free remote support is included with all systems for the period of the warranty.

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