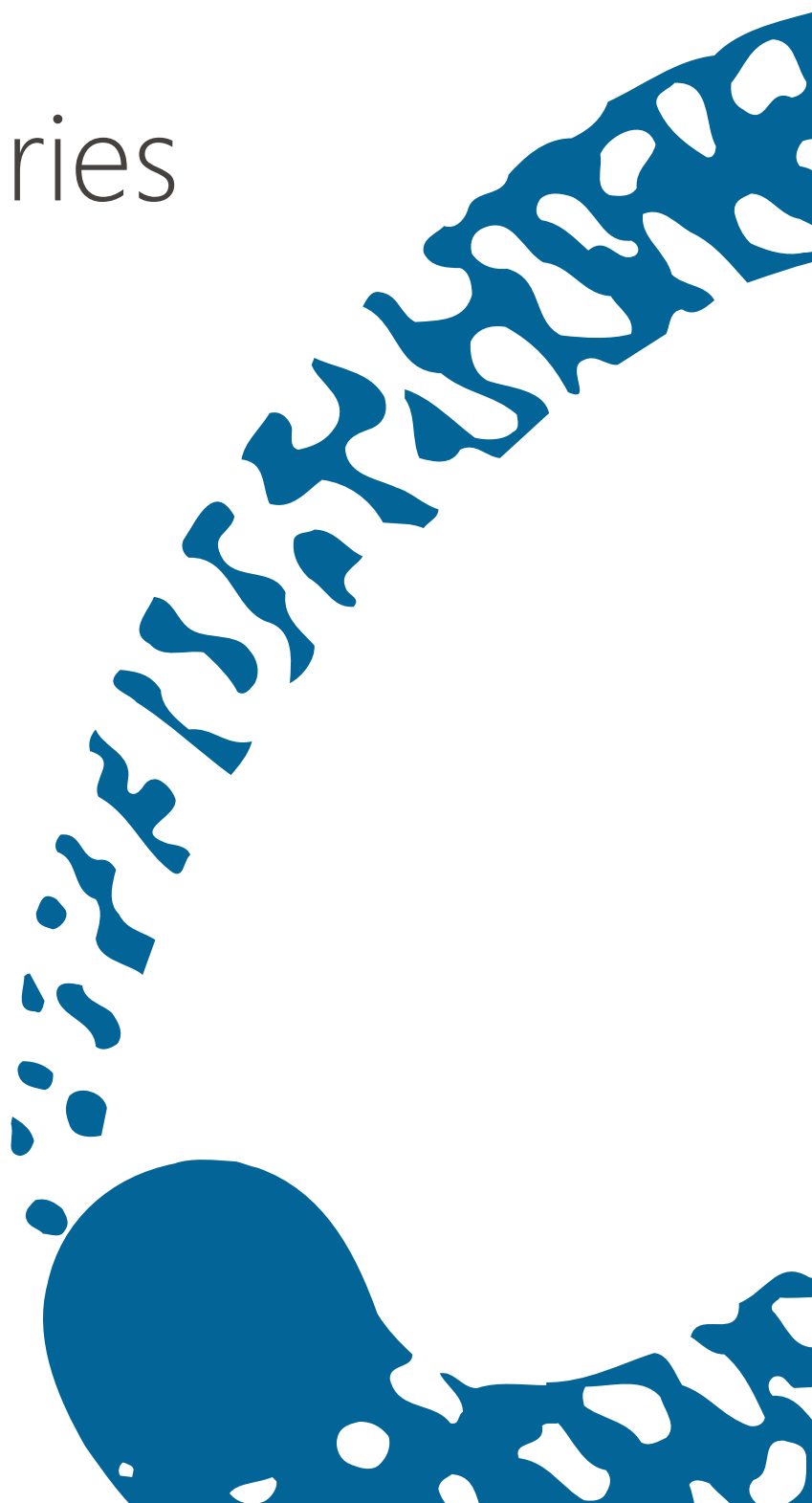


Orbital GFI

Inverter Series

Datasheet



Key Features

- One, split or three phases and up to 25 kVA
- Superior efficiency of 95%
- CAN Bus control and DAQ
- Power quality and EMC compliance in accordance with European standards
- High frequency PWM and no audible noise
- Passive and active anti-islanding detection
- Power measurement and overload detection
- Built-in power curve and advanced control incl. ramp start/stop
- Low power consumption standby
- High quality components and long-life
- Induction and permanent magnet generator



Grid Feed Inverter

The Orbital grid feed inverter (GFI) is a highly efficient power inverter designed for efficient control of permanent magnet (PM) and induction generators.

Its full bridge 4-quadrant transformer-less power converter allows for both power generation and motor operation including for ramp start/stop.

High frequency switching ensures no audible noise and eliminates vibrations in the generator, providing optimal efficiency of the generator by greatly reducing unwanted harmonic loads compared to passive rectifier inverter models. Combined with electrical filters that eliminates the need for shielded power cables, the overall cost for cables and generator are lowered.

Orbital GFI complies with highest standards for power quality, safety and power control. The build-in highspeed controllers includes advanced features including power curve control and anti-island protections, well suited for both grid and off-grid wind turbine power production.

Manufactured in several configurations from one, split and three phase grid connections and from 10 to 25 kVA.

Variable	Value
AC Phase failure	Yes
Redundant voltage and frequency window monitor (QNS)	Yes
Independent cut-off	2 Pole relay and solid state switch (ENS) (Comply with VDE 4105:2011-08)
Temperature and overload protection	Yes. Built-in temperature sensors and phase load measurement.
AC current limiting	Yes (monitor each phase)

Specifications

Standard

Area	Standard	Title
Power quality	EN 61000-3-4	Harmonics
	EN 61000-3-11	Flicker
	EN 61000-6-2	EMC Immunity
	EN 61000-6-4	EMC Emissions
Grid compliance	EN 50438	Electrical protection
	DIN VDE AR-N 4105	Germany
	G83/2	UK
	G59/3	UK
	JEAC 9701-2012	Japan
EU/EC Declaration of conformity	2014/35/EU	Low voltage directive (LVD)
	2014/30/EU	EMC Directive

Electrical/Power

Area	Variable	Value	
Power Input (Generator side)	Rated input voltage	3 x 400 VAC	
	Maximum input voltage	700 VAC phase-phase	
	Operation voltage	0-540 VAC	
	Nominal voltage at full load	400 VAC	
	Maximum input current	GFI-x10K	3 x 18 A RMS
		GFI-x15K	3 x 30 A RMS
		GFI-320K	3 x 36 A RMS
	Input Power	GFI-x10K	11 kW
		GFI-x15K	16.5 kW
		GFI-320K	21.5 kW
Frequency range		0 – 150 Hz	
Permanent magnet generator support		Yes	
Asynchronous generator support		Yes	
Power Output (Power grid side)	Rated output voltage	1-3 x 230 VAC + N + PE (4 wire Y \pm 20%)	
	Maximum output current	GFI-110K	1 x 48 A RMS
		GFI-115K	1 x 72 A RMS
		GFI-215K	2 x 36 A RMS
		GFI-310K	3 x 18 A RMS
		GFI-315K	3 x 30 A RMS
	GFI-320K	3 x 36 A RMS	
Output Power continually	GFI-310K	10 kW – 11.7 kVA	
	GFI-315K	15 kW – 17.6 kVA	
	GFI-320K	20 kW – 23.3 kVA	

	Frequency, 50 Hz grid	45 – 55 Hz
	Frequency, 60 Hz grid	55 – 65 Hz
	Nominal power factor	>0.99 at full load
	Power factor	0.85 under-excited to 0.85 over-excited with step size of 0.01
	Total harmonic distortion (THD)	< 5 %
	Higher harmonics output	< 3 % per harmonic up to 40 th
	DC current injection	< 20 mA
	AC connection	Plastic glands on detachable plate bottom plate
	Maximum Inrush current	< 61 A peak. See fuse for recommended circuit breaker.
Power usage and efficiency	At 20/50/100% output load	91/94/95 %
	Power usage during idle	10 W
DC Input	Voltage	24 VDC (24 VDC PSU included)
	Current	< 1.25 A

General

Area	Variable	Value
General	Manufacturer	Orbital A/S
	System type	PWM 4 quadrant AC-DC-AC converter
Environment and surroundings	Ambient temperature (operation, storage and transport)	-20 to 60 °C. Continuously full load up to 40 °C.
	Ambient temperature recommended	18-20 °C
	Relative humidity (operation, storage and transport)	Up to 95% Relative humidity, non-condensing.
	Altitude above mean sea level	2.000 m (Full load)
	Clearance	>100 mm top and bottom >300 mm sides
	Earthing	TN-S
	Dust	Avoid dusty environments to increase lifetime.
	Noise level	62 dB
Enclosure and content	Safety class	Class I (metal enclosure with earth connection)
	Ingress protection	IP20 (IEC 60529)
	Ventilation	Forced using internal temperature controlled fans.
	Mounting Surface	Vertically to weight bearing wall. Tilt not recommended.
	Mounting brackets	Included and bolted using Ø6 bolts.
	Size (HxWxD)	961x607x337 mm
	Size bottom compartment (HxWxD) (terminal block)	145x540x120 mm
Weight	70 kg	

	CAN Bus	1
Interfaces to GFI	Display	Yes (with TMC3 controller)
	Web interface	Yes (with TMC3 and OrbiSCADA)
	Serial (RS232/484)	Yes (with TMC3 controller)
	Power input	1-3 phase + PE, 6-10 mm ² terminal.
	Power output	1-3 phase + N + PE, 6-10 mm ² termin
	Warranty and guarantee	1 year from date of delivery. Please see hardware installation manual for claims.
Service	No serviceable parts.	

Inverter control and safety features

Area	Variable	Value
Power input	Generator phase loss detection	Yes
	Temperature and overload protection	Yes. Built-in temperature sensors and phase load measurement.
	Power curve control	Yes
	Soft start	Yes – start and stop
	Ramp start/Max acceleration rate setting	Yes/Yes
	Separate Emergency ramp rate	Yes
	Build-in fuse(s)	No. External circuit breaker mandatory. Recommends 40 A with B curve IEC 947-2.
	Build-in RCD protection	No. External 300 mA class A, B or AC is recommended
Power output	Instantaneous voltage drop (FRT)	Yes – comply with JETGR0003-1-6.1(2016)
	Transients surge protection	Yes (built-in varistors class II)
	Independent cut-off	2 Pole relay and solid state switch (ENS) (Comply with VDE 4105:2011-08)
	AC over/under voltage protection	Yes – step size 0.1 V from 150 to 290 VAC and delay time from 0 to 655 sec. with step size 0.01 sec.
	Trip precision	+/- 1.0 %
	Delay precision	+/- 0.1 sec.
	AC over/under frequency protection	Yes – setpoint step size 0.01 Hz from 40 to 70 Hz and delay time from 0 to 655 sec. with step size 0.01 sec.
	Frequency measurement precision	+/- 0.05 Hz
	Delay precision	+/- 0.1 sec.
	Independent operation detection (Anti-Islanding)	Yes – Passive/active
	Passive detection tripping	400 – 480 ms
	Active detection tripping	500 – 950 ms

DC current injection projection	Yes
Reclosure time	Wait 1 – 600 s after grid fault (country dependent)
Leakage current protection (ground fault)	Yes
Voltage rise suppression	Yes
Sudden input power change	Yes
Redundant voltage and frequency window monitor (QNS)	Yes – two microcontrollers
Independent grid measurement circuits.	Yes – one for each microcontroller
Standby mode (disconnect output (grid) and delayed auto-reconnect)	Yes – together with TMC3 controller
Grid synchronization control	Yes

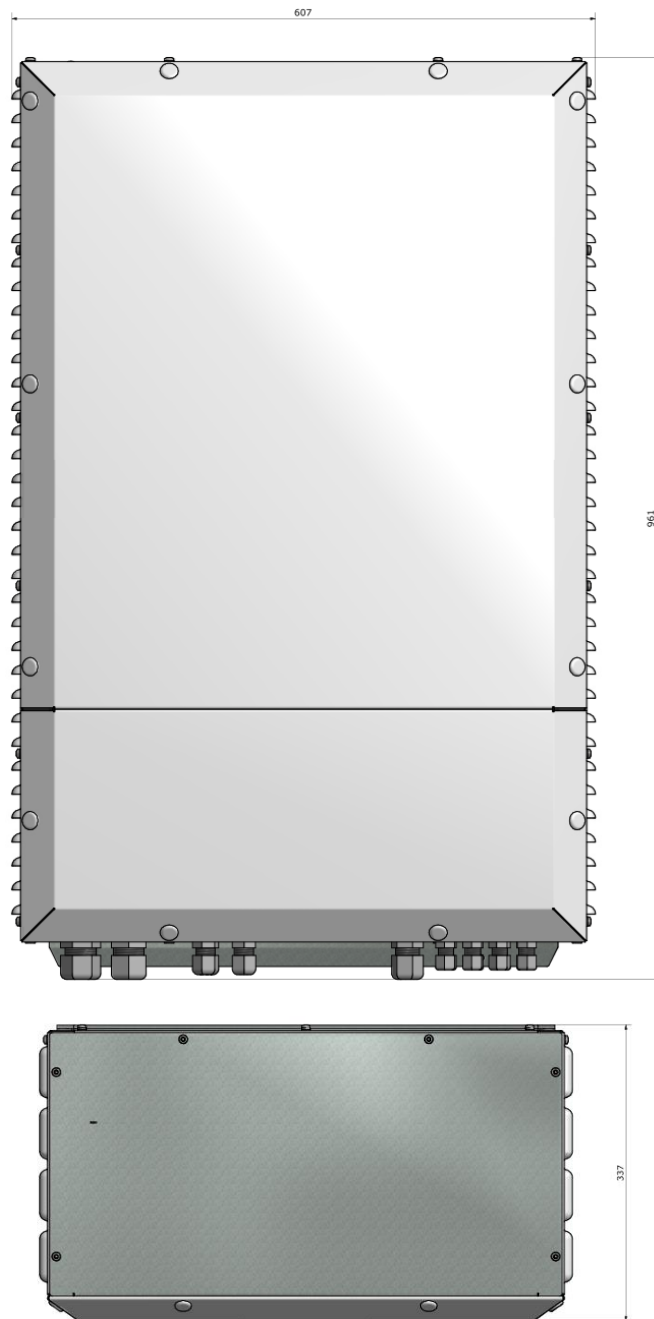
Mechanical protection relay specification

Area	Variable	Value
Power output	Manufacturer	Finder
	Model	67.23.9.012.4300S
	Rated voltage	400 VAC
	Rated current	50 A
	Mechanical life	>1 million cycles
	Electrical life at rated load	>30,000 cycles

Surge protection elements (Generator and grid side)

Area	Variable	Value
Power input protection	Manufacturer	EPCOS/TDK
	Model	B72220S2621K101
	Rated voltage	625 VAC
	Maximum current	10000 A

Measurements



Changelog

Date	Revision	Author	Change
22/01-18	0.1	TD	First version
08/03-18	0.2	MKM	Layout change
20/03-18	1.0	TD	Added inverter types. Minor corrections for first release
01/05-18	1.1	MKM	Weight correction
23/08-18	1.2	MKM	Minor typos

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