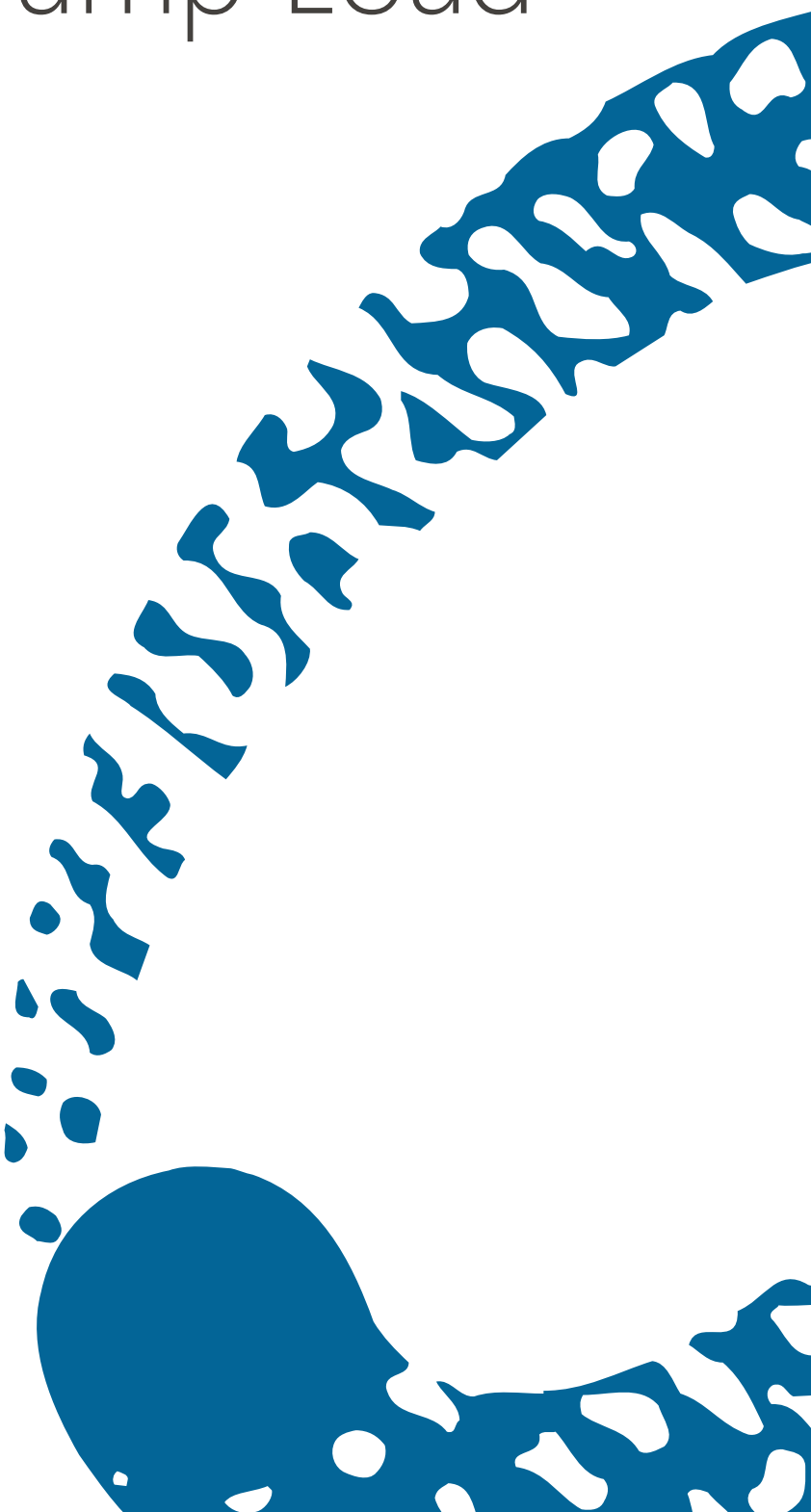
OrbiDLC Dump Load Controller

Datasheet



Version 1.4

Key Features

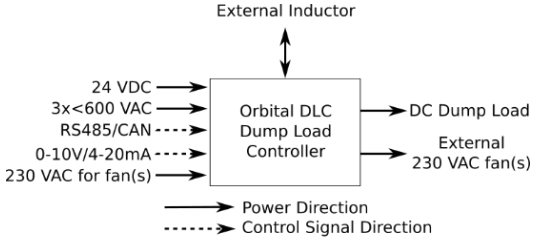
- Designed for <13.5 kW (500 VAC) continually and up 25 kW/0.5s peak.
- Very high efficiency
- Supports up to 3x600 VAC input voltage
- CAN Bus or RS485/Modbus controlled and up to 1.000 set points pr. second.
- 16 bit set point resolution
- Low response time <0.5ms for digital input.
- Dump load resistor monitoring
- Internal DC current, voltage and power measurements.
- Analog 0-10 VDC or 4-20 mA set point
- Power quality compliance as specified by European and International standards
- High quality components for long lasting industrial usage
- Built-in 230 VAC relay for external fan control

DLC System

Orbital dump load controller (OrbiDLC) is a highly efficient 3-phase to DC converter specially designed for bypassing overproduction and peaks from wind turbine generators to external dump load(s).

The throughput can be precisely controlled through either analog or digital interfaces. Designed for real time operations with latency under 0.5 ms and up to 1.000 set points per seconds.

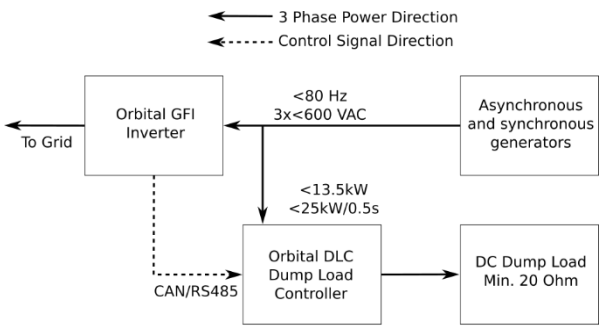
High frequency PWM IGBT switching provides high efficient and no audible switching noise. Optional inductors can be directly connected to the DLC in order to reduce harmonic current distortions. Input/outputs is illustrated below.



Usage

Typical usage is for wind turbine installations for which wind fluctuations can cause output power above imposed limitation.

OrbiDLC is designed to instantly forward peak power to the dump load thereby ensuring that the wind turbine system complies with power grid standards. It further allows for continuous load in situations for which the absolute power limitation is lower than the nominal value of the turbine and/or voltage suppression situation for which the turbine shall not shut down due to total grid disconnection for a given period. A common installation is illustrated in a block diagram below.



Specifications

Standards

Area	Standard	Title
Power quality	EN 61000-6-4	Emission
	EN 61000-6-2	Electrical safety
EU/EC Declaration of conformity	2014/35/EU	Low voltage directive (LVD)
	2014/30/EU	EMC Directive

*The table below summarizes the standards Orbital's DLC comply with.

Power Specifications

Power Input	Rated input voltage	3 x 400 VAC
	Maximum input voltage	700 VAC phase-phase
	Normal Operation voltage	0-600 VAC
	Nominal voltage at full load	400 VAC
	Rated input current	3 x 17 A RMS
	Input Power	10 kW (3x400 VAC) 13.5 kW (3x500 VAC) 22.5 kW peak (<0.5 s)
	Frequency range	10 - 80 Hz
Power Output (Dump Load resistor)	Rated output voltage	540 V_{dc} (at 3x400 VAC) 675 V_{dc} (at 3x500 VAC)
	Maximum output current	20 A_{dc}
	Output Power continually	10 kW (3x400 VAC) 13.5 kW (3x500 VAC) 22.5 kW peak (<0.5 s)
	Minimum Dump load resistance	20 Ohm
	Switching frequency	15 kHz using IGBT
	Dump load Resistor monitor	Yes. Periodically estimate resistor value and shutdown
Input reference signal	Analog	0-10V or 4-20 mA
	Serial communication	RS485, Modbus RTU or CAN Bus (depended on version)
Power supply	Voltage	24 VDC
	Current	< 1.0 A

General

Area	Variable	Value
General	Manufacturer	Orbital A/S

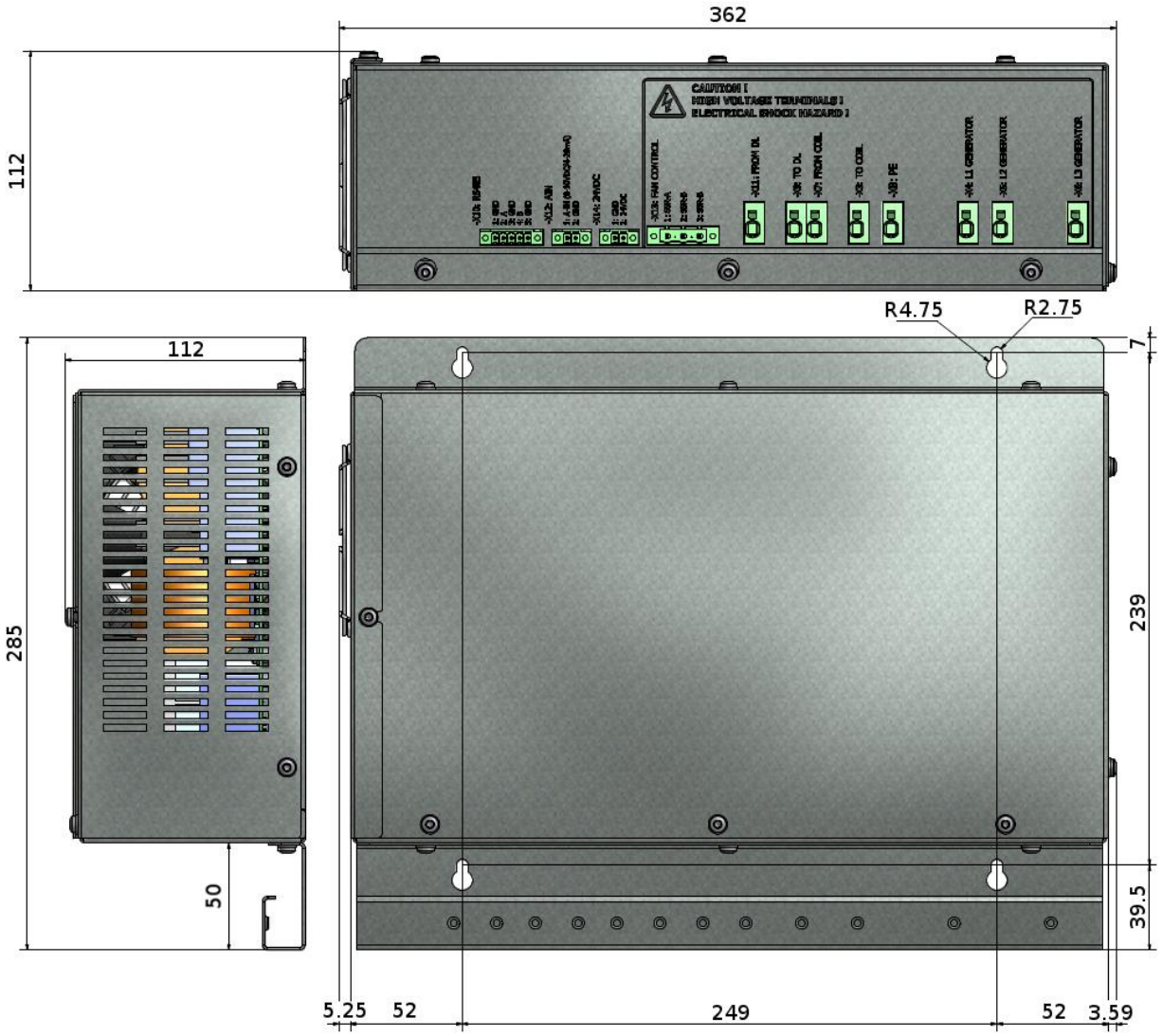
	System type	Passive rectifier with PWM controlled power output.
	Model nr.	OrbiDLC – 10450 Issue 00/02
Environment and surroundings	Ambient temperature (operation, storage and transport)	-20 to 60 °C. Continuously full load up to 40 °C.
	Ambient temperature recommended	20 °C
	Relative humidity (operation, storage and transport)	Up to 95% Relative humidity, non-condensing.
	Altitude above mean sea level	2.000 m (Full load)
	Clearance	>30 cm minimum around the device
	Earthing	TN-S
	Dust	Avoid dusty environments. No filters installed.
	Noise level	78 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.
	Size (HxWxD)	285 x 362 x 112 mm
	Weight	~10 kg
	Power input	3 phases + PE, 2.5-4 mm^2 terminal.
	Power output	DC+, DC-, 2.5-4 mm^2 terminal
	DC power	24 V DC. 1.5 mm^2 terminal.
	Warranty and guarantee	1 year from date of delivery. Please see hardware installation manual for claims.
Service	Check and clean air inlets for dust.	Every 3-12 Months. (Interval depends on environment.)

Safety Features

Area	Variable	Value
Power Input from 3 phase installation	Temperature	Yes. Built-in temperature sensors.
	AC voltage protection	(Yes. Monitor output voltage on DC side)
	AC current protection	(Yes. Monitor output current on DC side).
	IGBT overcurrent protection	Yes
	Electromagnetic interference protection	Yes
	Transient surge protection	No. External surge protection recommended.
	Build-in fuse(s)	No. External circuit breaker recommended. Recommends 40 A with B curve IEC 947-2.
	Build-in RCD protection	No. External 300 mA class A, B or AC are recommended
	Over frequency protection	No. Maximum 80 Hz is recommended.
Power output to Dump Load	Build-in fuse(s)	No. External DC circuit breaker not required, and DC line monitored by build-in current measurement.

	Transients surge protection	No.
	DC voltage limit protection	Yes. Max. 700 V (+/- 5.0 V) measured with 150 Hz. Can be digital adjusted.
	DC current limit protection	Yes. Max 20 A (RMS) measured with 150 Hz. Can be digitally adjusted.
Control signal	Loss of signal (RS485/CAN)	Yes. Default stop if not set point received with 0.5 s interval. Can be digital adjusted.
Internal	Redundant Microcontroller	No.
	Watch-dog	Yes.
	Overheat	Yes. Build-in NTC temperature sensors.

Measurements



Changelog

Date	Revision	Author	Change
21/3-17	1.0	JSK/TD	First version
03/5-17	1.1	TD	Added 500 VAC and corrected input current to 15 A.
23/5-17	1.2	TD	Changed input current to 17 A rated. Changed peak power and rated DC output voltage. Changed name to OrbiDLC.
02/10-17	1.3	JSK	Added measurement picture
05/03-18	1.4	MKM	Layout update

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This document does NOT include safety or installation instructions! Please see the relevant manuals for further details include safety instructions!

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