

WNG series

Pitch Switched Mode Power Supply AC/DC



Description

The power supply (PPS) consists of a 3-phase line rectifier and a switch mode push-pull converter. The power supply converts the incoming three phase alternating grid voltage into an insulated direct circuit DC-link voltage inside the pitch control system. The RSG-PPS works as a constant current source with voltage limitation and supplies the inverter of a pitch control system (PCO) and a the buffered DC-link pitch backup unit (PBU) at the same time. The DC-link backup unit may consist of double layer capacitors or accumulators. The incoming grid supply voltage and the DC output voltage are insulated by safety insulation from each other. In continuous operation, the WNG PPS is designed to provide a constant power of 5kW under forced air cooling conditions and to deliver a peak output power of 10kW for a fixed and controlled time of 10s. The maximum output power drops according to the output characteristic and charging time controlled by a processor. An internal safety management controlled by a processor, shuts down the PPS if a certain heatsink temperature or a critical internal temperature is exceeded. The PPS is restarted automatically after cooling down, a permanent temperature failure will shut down the PPS until manual reset. The heat dissipation is conducted by the fan supported heat sink. The fan has to be installed by the customer.

General information

Application:

Pitch control systems of wind turbine generators

Numbers of components:

One PPS per axis (in each hub), three units in a wind turbine generator.

Technical design:

Unit in compact, ruggedized construction. Specification: "Highly stressed operating".

Output characteristic:

At a constant nominal power of 5kW and an output voltage of 100Vdc a constant current of 50A maximum is provided. The PPS unit works according to the CV-characteristic complying to the DIN 41772 respectively DIN 41773. Starting the unit with discharged Ultra Caps connected, the unit delivers a charge current of $I_2=80A$ until half of the nominal output voltage of app. 50V. For a time period of 10s a charge current of $I_3=100A$ is provided until reaching the nominal output voltage or until the time frame is not valid any more. After that time frame the charge current is reduced to 50A until reaching the nominal output voltage.

In case of error:

In case of a mains failure, the charging will be stopped and will continue after a stable mains supply condition recovers and after reset of the digital alarm output.

Features:

2 digital alarm outputs:

- „Warning Power Supply“ - PPS warning out.
 - Selftest error - signaling
 - Power circuit error - signaling
 - Fuse defect of output fuse - signaling
 - Mains voltage fault at input - self receiving
 - Heat sink temperature - self receiving
 - Ambient temperature - self receiving
 - Output undervoltage - self receiving

- „Error Power Supply“ - PPS error out.
 - Output surge (overvoltage) - 3 x self receiving, then switching off.
 - Reference voltage - switching off
 - Temperature sensor defect - switching off

Digital input: „PPS CUT OFF“

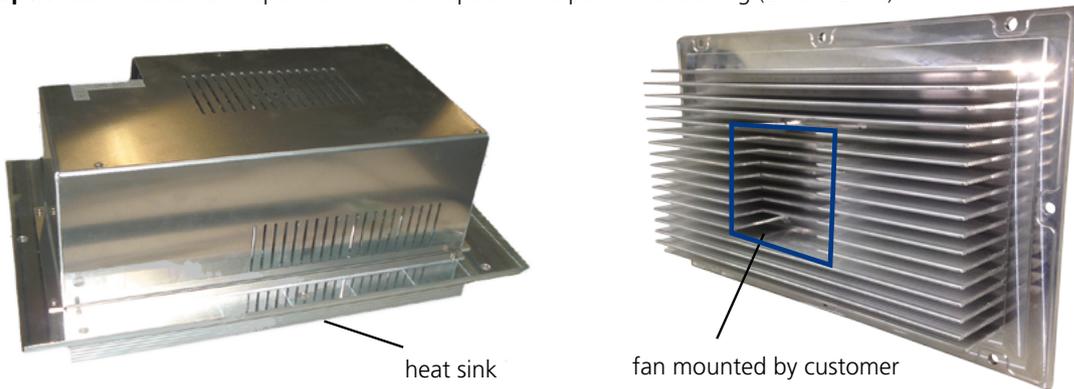
Analog output:

Temperature „Temperature Power Supply“; PT100 IEC 60751.

Accuracy class min. $B \cdot dT = \pm (0.30^\circ C + 0.005 \cdot T)$

Sensor signal shall be used to control the mandatory external fan installed by the customer inside the mounting bay of the heatsink.

Optional: Fieldbus: CANopen for firmware update and parameter setting (EN 50325-4)



Additional features PPS according to agreement with the customer. All electric interfaces are pluggable or conducted with screwless terminals. Dissipation of power losses by fan assisted heatsink, mounted on surface.

Weight and dimensions:

- Weight: 15.3 kg (incl. cover)
- Dimensions: 50 x 30 x 22 cm (L x B x H, approx.)

Environment:

Temperatures

- Temperature range of heat sink during operation: -20°C up to +60°C
- External auxiliary fan: recommended starting point of operation @ 40°C heatsink temp.
Fan power 117m³/h
- Internal air temp during operating of the PPS: 0°C up to 65°C air temp.
- External Heatsink temp during operating of PPS: -20°C to 60°C Heatsink temp
- Cold Start Condition: Internal air temperature has to exceed 0°C without condensation, Respect the start up procedure of the system provider
- Storage temperature: -40°C up to +40°C
- Application altitude: < 1.500 m

SMPS type: Power PSU AC/DC. In compact, ruggedized construction - „heavy duty operation“

we energize electronics!



Technical Data:

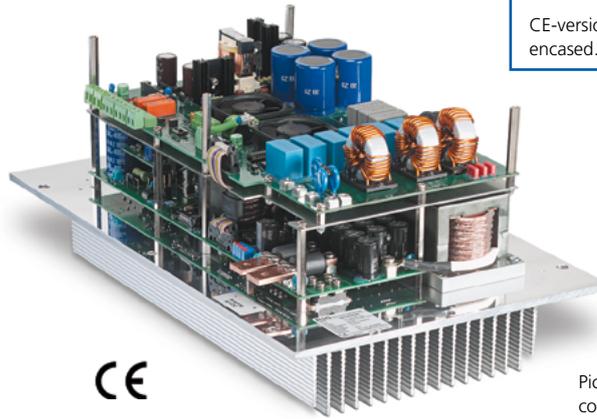
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Features:

- Input voltage range:
360 - 440VAC (x-400 Models)
- Isolation voltage I/O 3000VAC
- Open frame or encased version
- Continuous short circuit protection
- Input filter acc. to EN55022 Level A



WNG 090/100/400	Input V/A	Power	Output V/A
Nominal [Peak for 10s]:	400VAC±10% / 24A max.	5kW [10kW]	90VDC / 55A [100A max.]

Input	
Input voltage	(see table) / 47-63Hz / 3ph
Input current	24A -20A @ 5kW cont.
Power factor	0,75 typ.
Efficiency	>90% typ.
Input filter	acc. EN55022 Level A
Inrush current	<300 Apeak (cold)
Leakage current	< 5mA max.

Output	
Output power	5 kW (fan cooled)
Output voltage	Output voltage adjustment: Analog setup value 0-10V linear
Initial tolerance	± 1%
Output current	55A/100A
Ripple & noise (20MHz BW)	250mV max.
Static Line regulation	± 0,5% max. (360VAC - 440VAC)
Static Load regulation	± 0,5% max. (I = 0% - 100%)
Short circuit protection	Continuous CV characteristic, 10s 200% nominal current @V _{o2}

General information	
Isolation Voltage Input/ Output	3.000VAC (only if output not connected to PE)
Isolation Voltage Input / Frame Ground	2.000VAC
Hold up time	>10ms @ 400VAC 5kW
Voltage accuracy	1% typ.
Dynamic Load regulation	1.2Vpeak (I = 90%I _N - 10%I _N)
Transient time	2ms max. up to initial tolerance
Operating temperature range	0°C ~ +65°C internal air temperature
Operating heat sink temp range	-20°C ~ +60°C maximum temp provided by customers fan
Storage temperature range	-40°C ~ +40°C
Cooling	Fan cooling
Dimensions	50 x 30 x 22 cm (L x B x H, approx.)
Weight	15.3 kg (incl. cover)

Fuse	As device protection use external 3-phase combined circuit breaker (25A at 3x400VAC version) with characteristic C
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Safety	
Protection Class	I
Protection category	IP00
Burst protection	acc. EN61000-4-4
Surge protection	acc. EN61000-4-5
Safety standards	CE
EMC	EN55022 A, EN61000-4-2, 3, 4, 5
Options	
Overtemperature with shutdown.	
All options and modifications upon request.	

All specifications typical at nominal line, full load and 25°C, unless otherwise noted.
The information and specifications contained in this data sheet are believed to be correct at time of publication. However, we accept no responsibility for consequences arising from printing errors or inaccuracies.

Subject to change without notice.

Relay outputs:

potential-free

Signal level: 0 VDC ... 24 VDC

Contact load: Min. 0,5 mA, Max. 2 A

Vibrations:

Maximum vibration velocity $V_{max} \leq 2$ mm/s

Maintenance:

Maintenance-free

Compliance:

CE-compliant



Picture: One SMPS per rotor blade, i.e. three SMPS for the complete pitch control of a wind turbine generator system.