INSTRUCTION MANUAL

Electronic Voltage & Frequency Regulator

last upgrade:

April 04 2004	----------	first edition	---rev. 00
December 27 2004	----------	RS232 & mechanical adjustment	--- rev. 01
January 25 2005	----------	general adjustment	--- rev.02
March 05 2005	----------	spare parts & maintenance procedure	--- rev.03

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INTRODUCTION

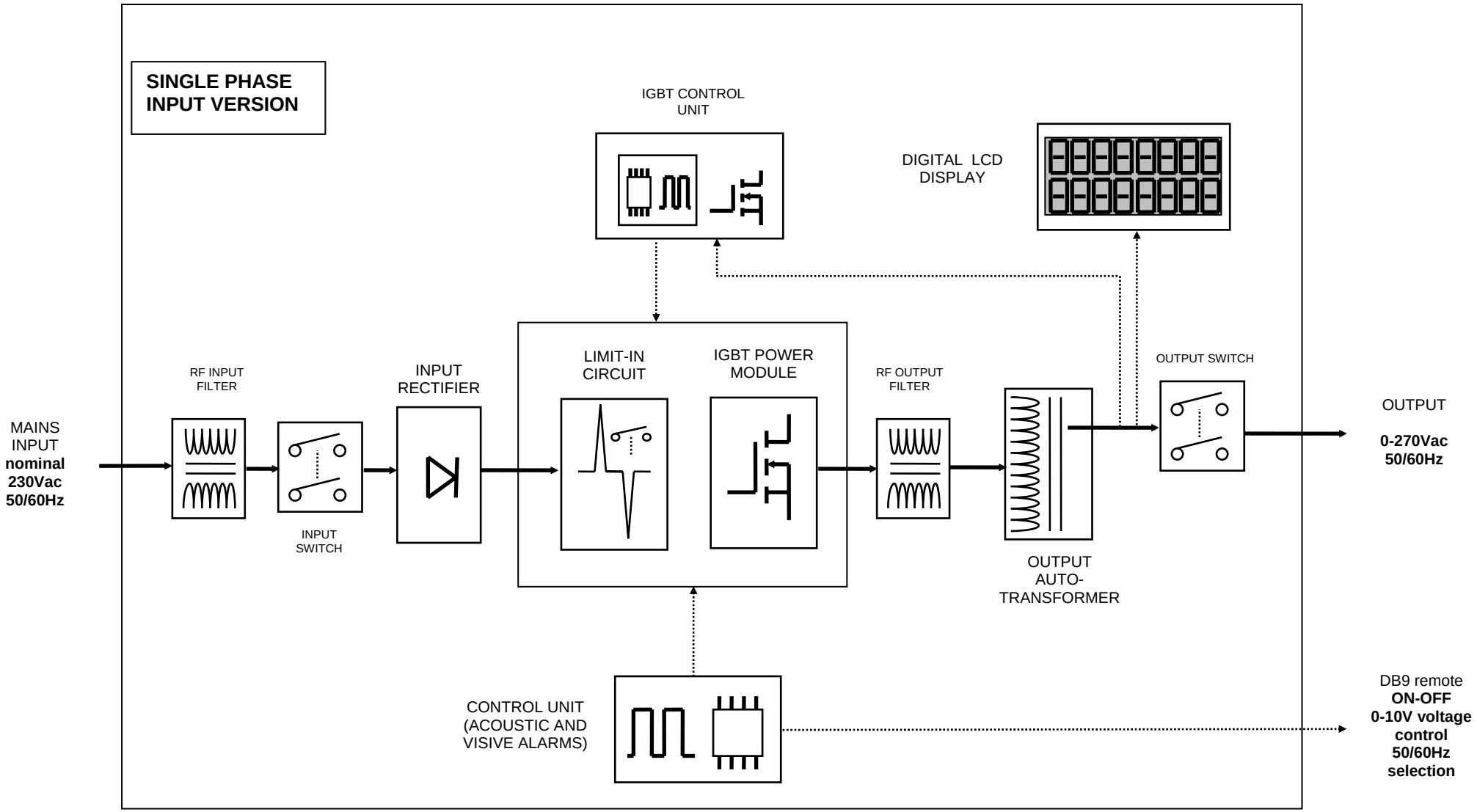
Many thanks for the choice of our products; we are in a position to grant you high quality products, which follow high quality insurance models, UNI EN ISO 9001 and which use the best materials that modern technology is able to offer.

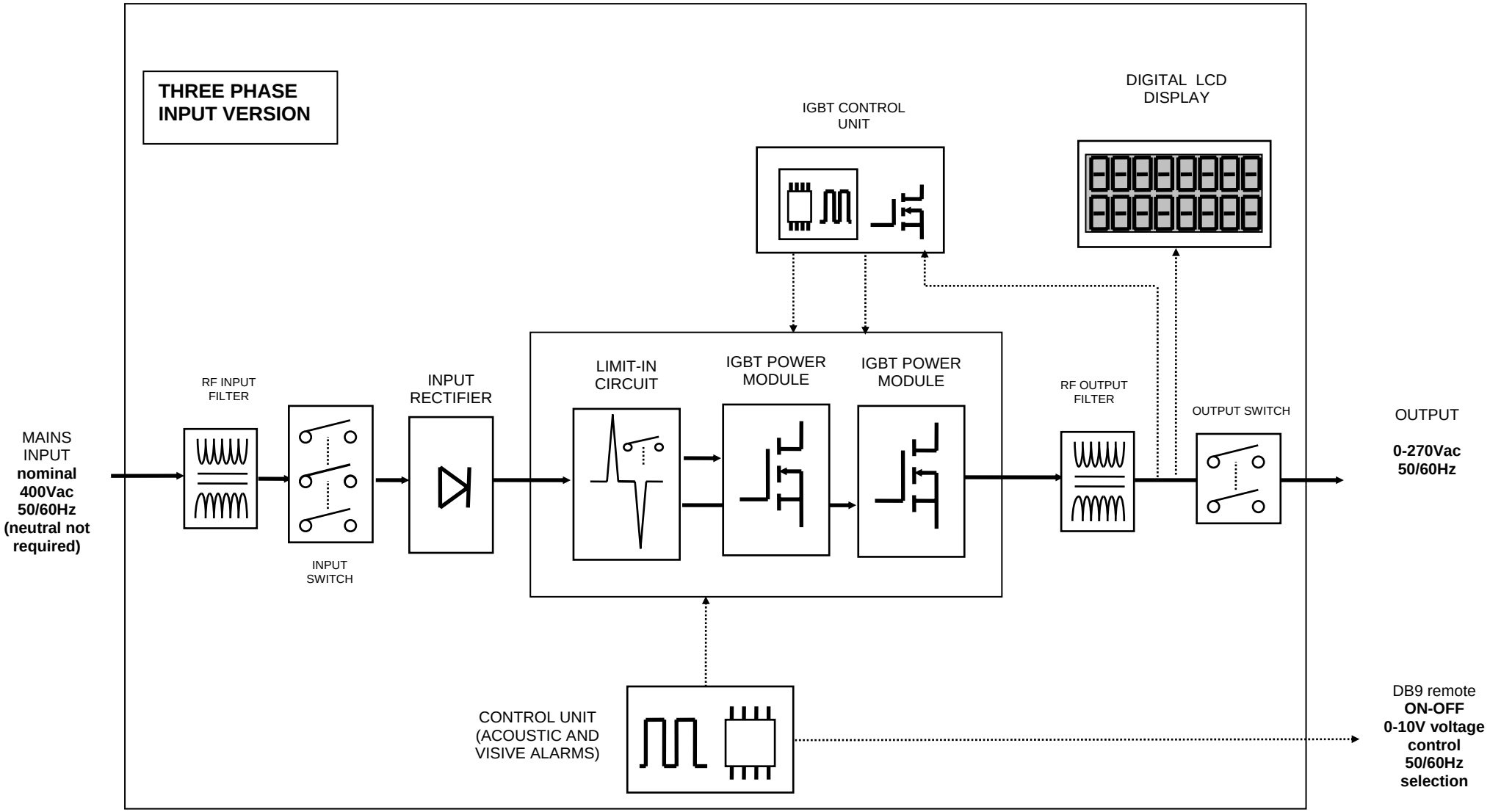
Our products are the synthesis of the experience that our engineers have gained in the field of planning and in the realization of uninterruptible power supplies, DC-AC inverters, power supplies, emergency light device, emergency DC power supply and a lot of customized products.

Every device is given with an " **only and personal test certificate** "; the final check up is entrusted to an automatic machine (run by a personal computer), which provides a checking up certificate with the real data at the end of the process.

CAUTION !
Read through this manual respecting all the safety instructions, during the installation and the use of the device, as it works using dangerous voltages and currents.

SEE EMERGENCY SWITCHING OFF PROCEDURE.
Always refer to this manual for further references.


SINGLE PHASE
INPUT VERSION
IGBT CONTROL
UNIT
DIGITAL LCD
DISPLAY
MAINS
INPUT
nominal
230Vac
50/60Hz
RF INPUT
FILTER
INPUT
SWITCH
INPUT
RECTIFIER
LIMIT-IN
CIRCUIT
IGBT POWER
MODULE
RF OUTPUT
FILTER
OUTPUT
AUTO-
TRANSFORMER
OUTPUT SWITCH
OUTPUT
0-270Vac
50/60Hz
CONTROL UNIT
(ACOUSTIC AND
VISIVE ALARMS)
DB9 remote
ON-OFF
0-10V voltage
control
50/60Hz
selection


THREE PHASE
INPUT VERSION
IGBT CONTROL
UNIT
DIGITAL LCD
DISPLAY
RF INPUT
FILTER
INPUT
RECTIFIER
LIMIT-IN
CIRCUIT
IGBT POWER
MODULE
IGBT POWER
MODULE
RF OUTPUT
FILTER
OUTPUT SWITCH
MAINS
INPUT
nominal
400Vac
50/60Hz
(neutral not
required)
INPUT
SWITCH
OUTPUT
0-270Vac
50/60Hz
CONTROL UNIT
(ACOUSTIC AND
VISIVE ALARMS)
DB9 remote
ON-OFF
0-10V voltage
control
50/60Hz
selection

GENERAL DESCRIPTION

The Voltage & frequency regulator is composed as follows:

RF INPUT FILTER – EMI filter.

INPUT SWITCH – Input AC automatic switch. Mains protection.

INPUT RECTIFIER – Bridge rectifier.

LIMIT-IN CIRCUIT- Limit-in board. It is used to provide soft charging of internal capacitors (40 seconds) during start up procedure. (see “start-up procedure” section)

IGBT CONTROL UNIT (SINUSOIDAL INVERTER) - The inverter electronic circuit has been planned with pulse width modulation system (PWM) ; it provides control to drives IGBT power module and to protect it against short circuit, overload etc. An output electronic feed-back is provided directly from output due to reduce the transformer loss voltage insertion.

IGBT POWER MODULE – It is composed by a power IGBT and its driver.

RF OUTPUT FILTER – EMI filter.

OUTPUT AUTO-TRANSFORMER – The output transformer translates the voltage from IGBT (nominal 230Vac) into an higher voltage (about 270V). It is an auto-f transformer. It is included only in 20 & 30A version. An output coil associated to IGBT module, provides the perfect output sine wave
The transformer is not used in three phase input version.

CONTROL UNIT – Provides acoustic and visive alarms and functioning situation. It also control the 50/60Hz selector and external enable & 0-10V control input.

LCD DIGITAL DISPLAY – Output voltage and current indication (this is not an instrument).

OUTPUT SWITCH – Output AC automatic switch. Output disconnection and protection device.

ELECTRICAL CHARACTERISTICS

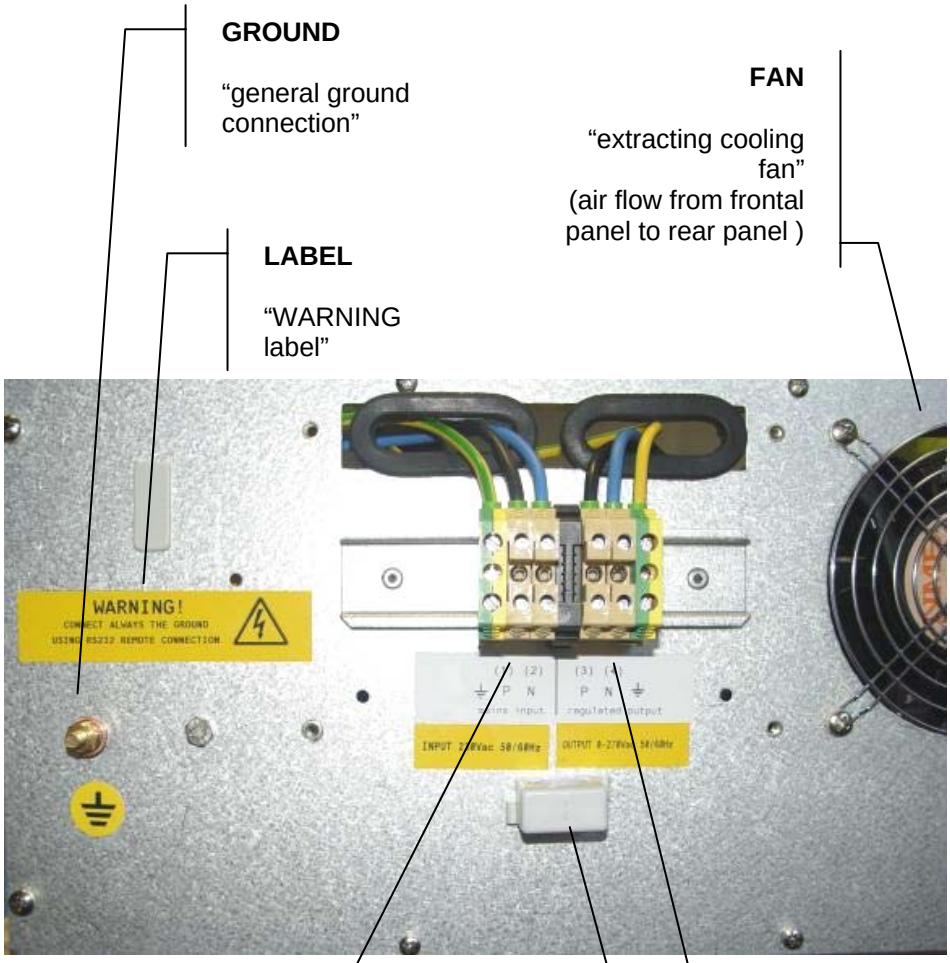
Requirement	
Input voltage	230Vac ±15% N/PE 45 to 66Hz 400V ± 15% L1/L2/L3/PE (no neutral is required) 45 to 66Hz
Output voltage (single phase input version)	From 0 to 270Vac SINEWAVE 1F + N (output neutral referred to ground) 50 / 60Hz ± 0,1% selectable
Output voltage (Three phase input version)	From 0 to 270Vac SINEWAVE (floating line) (output neutral NOT referred to ground) (output neutral referred only with insulation transformer OPTION) 50 / 60Hz ± 0,1% selectable
Output harmonic distortion	<3%
Maximum Output current	20A , 30A , 45A , 65A (constant current from 0 to 270Vac output voltage)
Output voltage accuracy	< 5% from 0 to 100% load < 1% at fixed load
Device efficiency	< 87%
Input / output connections	Screw plugs on rear panel
Local / remote regulation control	ON-OFF, 50/60Hz, enable, voltage adjustment

Different solutions are available on request

FOR MORE TECHNICAL DETAILS PLEASE REFER TO TEST CERTIFICATE OR ELECTRICAL LABEL ON PRODUCT

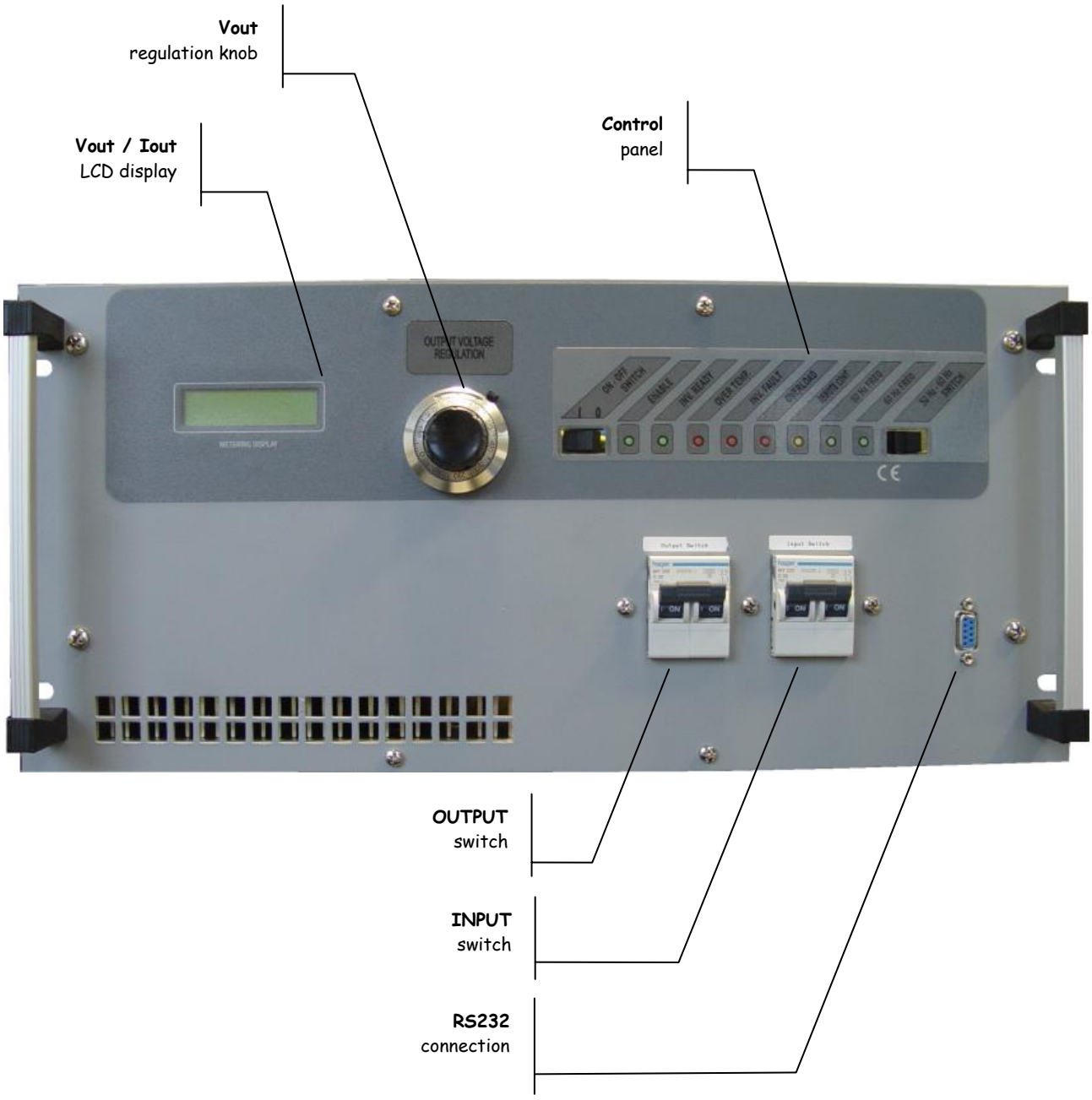
FEATURES

Rear panel view



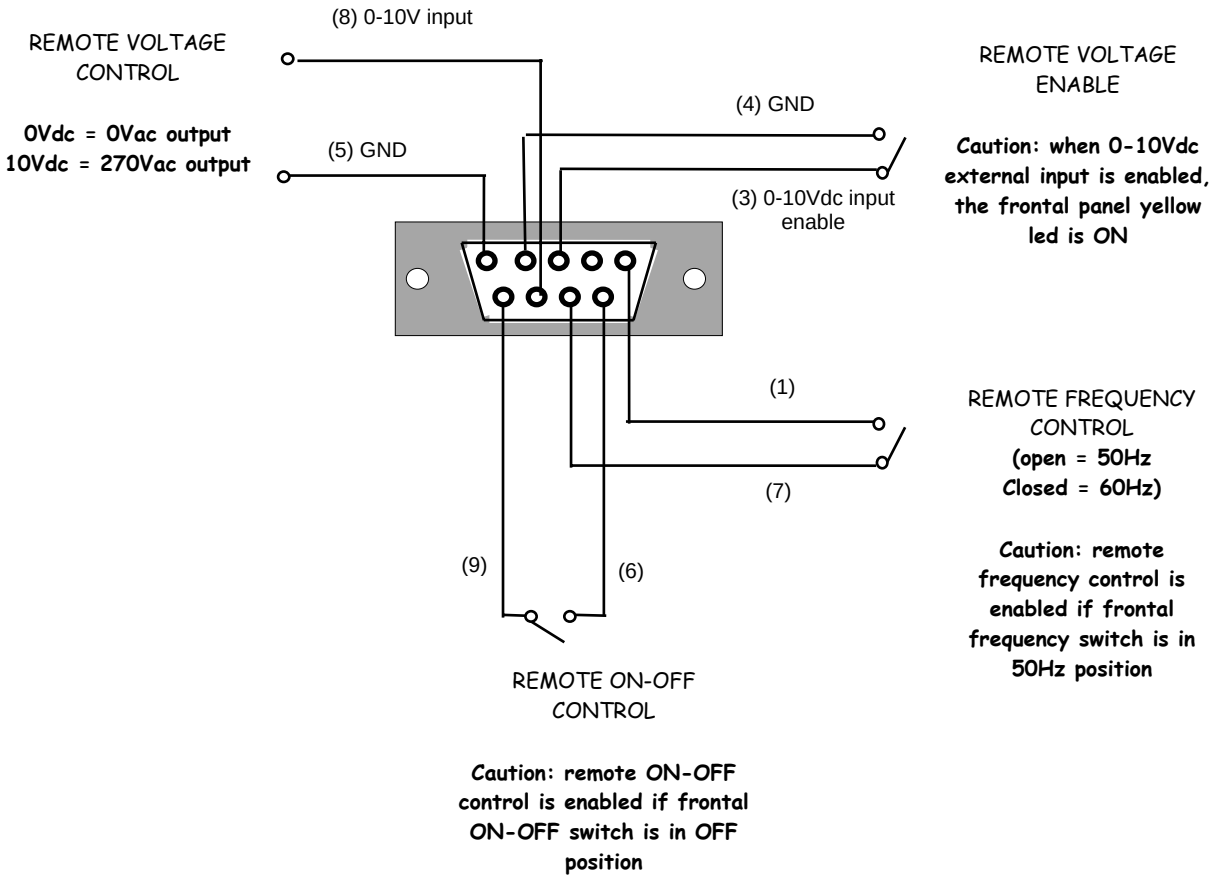
Caution: always respect "phase" and "neutral" indication

Frontal panel view



REMOTE BOARD DB9 CONNECTION

WARNING!: To prevent possible damage, using REMOTE CONTROL is always necessary connect GROUND BOLT.



WARNING!: During REMOTE CONTROL situation, please turn the frontal knob in the minimum output voltage level.
Verify the frontal knob voltage setting is always recommended!.
When “remote enable” is disabled, the output voltage comes back immediately to level setting by frontal knob.

START-UP & EMERGENCY SWITCHING OFF

Unpacking

Check the external conditions of the packaging. In case it is damaged, verify the integrity of product inside. In case the product inside is damaged too, refuse collecting the goods or collect them with reservation.
Separate the parts of the packaging , but always keep the " test certificate "of the device and the "use and maintenance manual".

Installation and starting up procedure

Operation	Verify
All switches in OFF position	
Connect the AC input	
Connect the OUTPUT to load	WARNING! Respect always "phase" & "neutral" position
Turn the AC input automatic switch in ON position (Leave the output switch in OFF position)	Frontal panel: "Overload" red led is ON
Wait about 40 seconds for internal capacitor pre-charge	Wait until the: "Inv. Ready" green led is ON
Turn the ON-OFF frontal switch in ON position	Frontal panel; "Enable" green led is ON "Inv. Ready" green led is ON "Overload" red led is OFF
Adjust frontal knob (or remote 0-10V) to the required voltage. Select the required output frequency.	
Turn the OUTPUT automatic switch in ON position	Load supplied

Repeat the operation in case of further installations.

Switching off procedure

If necessary and in case of dangerous situation, it is possible to insulate the device totally, using the following switching off procedure:

- ***disconnect the AC source;***
  wait few seconds for total discharge

or

- ***open the output protection switch that disconnect the output wires. This procedure does not insulate the device but interrupts the output voltage.***

DEVICE PROTECTIONS

The device has the following protections:

Input protection

Automatic switch to protect mains.

Output protection

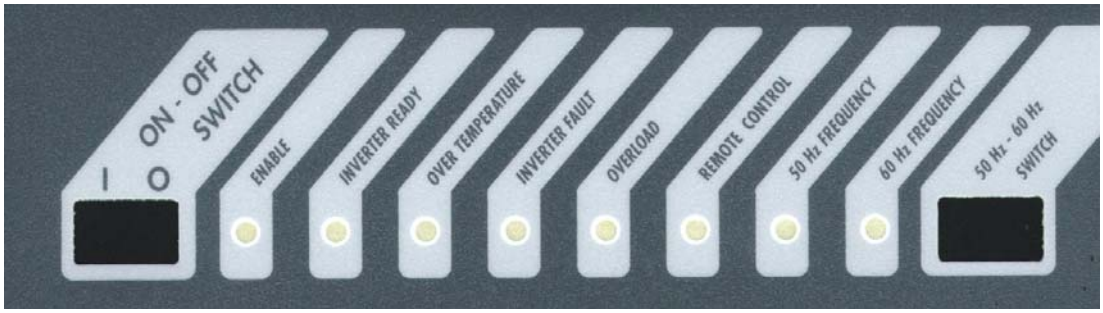
Overload
The equipment is electronically self-protected, cutting off the output voltage after 5 seconds. The overload red indicator is lit. To restart the unit, use ON-OFF frontal switch.

Short circuit
The equipment is electronically self-protected, cutting off the output voltage after 5 seconds. The overload red indicator is lit. To restart the unit, use ON-OFF frontal switch.

Internal protection

Over temperature protection
In case of internal over temperature, the equipment is automatically protected at 70°C.
The system shut downs the output voltage and red stop temperature indicator is on.

CONTROLS AND ALARMS



ON-OFF switch
On-off function switch

ENABLE indication
Green led. Lit if frontal switch (or remote control) ON

INV. READY indication
Green led. Lit when internal controls are finished

OVER-TEMPERATURE alarm
Red led. Lit if the internal temperature is 70°C. The inverter is stopped.

INVERTER FAULT alarm
Red led. Fault.

OVERLOAD alarm
Red led. Overload situation. A manual restart is necessary using ON-OFF switch.
(Caution: the overload indication is already ON if the unit is turned OFF)

INPUT remote
Yellow led. Lit when the remote 0-10V input is enabled (see DB9 diagram pin 3&4)
In *"local control"* situation the voltage regulation is made by frontal knob
In *"remote control*" situation the voltage regulation is made by a DB9 output due to an external 0 to 10V voltage

OUTPUT 50Hz
Green led. 50Hz output

OUTPUT 60Hz
Green led. 60Hz output

50 / 60Hz switch
Frequency selector. Local frequency selector. Using remote frequency selector (by DB9) this switch have to be leaved in 50Hz position.

OUTPUT VOLTAGE REGULATION knob
In *"local control"* position it is used to regulate the output voltage
In *"remote control*" position it is not enable

MAINTENANCE PROCEDURE

The equipment does not require special maintenance procedure.

Every 6 month (or before if necessary) disconnect the unit from mains (and load).
Wait for totally discharging situation.
Remove dust from fan, from frontal and side grids.

Every 5 years the internal capacitors and fan have to be replaced.
Please contact your dealer for more details.

SPARE PARTS LIST

The spare parts list is composed as follows:

Part description	***Device reference***	***Code***
TRANSFORMER	20A model 30A model 45A model 65A model	SPTAR170 SPTAR171 SPTAR194 (50VA) SPTAR194 (50VA)
IGBT control unit	All models	CONTROLVARIAC
PILOT card (acoustic and visive alarm)	All models	MOBR033
POWER HEAT SINK UNIT Complete assembled heat-sink module, included rectifier bridge, limit-in circuit, IGBT power module and IGBT driver	20A model 30A model 45A model 65A model	PWUNITCONV20 PWUNITCONV30 PWUNITCONV45 PWUNITCONV65
LCD display	20A model 30A model 45A model 65A model	MOBR043 MICRO “N” MOBR043 MICRO “P” MOBR043 MICRO “R” MOBR043 MICRO “R”

Part description	***Device reference***	***Code (description)***
INPUT switch	20A model	TC25 (automatic switch 25A curve C)
	30A model	TC40 (automatic switch 40A curve C)
	45A model	TC320 (three phase switch 20A curve C)
	65A model	TC332 (three phase switch 32A curve C)
OUTPUT switch	20A model	TC20 (automatic switch 20A curve C)
	30A model	TC32 (automatic switch 32A curve C)
	45A model	TC50 (automatic switch 50A curve C)
	65A model	TC63 (automatic switch 63A curve C)
RF INPUT filter	20A model	FILT20VW1
	30A model	2 x FILT20VW1
	45A model	spare part not available
	65A model	spare part not available
RF OUTPUT filter	20A model	FILT20VB1
	30A model	2 x FILT20VB1
	45A model	spare part not available
	65A model	spare part not available
OUTPUT coil	20A model	COILVAR20
	30A model	COILVAR30
	45A model	COILVAR45
	65A model	COILVAR65
FAN	20A model	VENTB30
	30A model	VENTB50
	45A model	VENT7855ES
	65A model	VENT7855ES
MECHANICAL PARTS	All models	All mechanical parts can be ordered by description (Please contact your dealer for more details)