CMZ hardware

SDPOWT

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CMZ SISTEMI ELETTRONICI

IMPORTANT

CMZ Sistemi Elettronici reserves the right to make changes to the products described in this user guide at any time without notice.

This user guide has been prepared by CMZ Sistemi Elettronici solely for use by its customers, guaranteeing that at the date of issue it is the most up-to-date document on the products.

Users use this guide under their own responsibility and certain functions described in this user guide should be applied with due caution to avoid danger for personnel and damage to the machines.

The term POWER SUPPLY used in this manual is to be considered as single-phase rectifier AC/DC not isolated.

No other guarantee is therefore provided by CMZ Sistemi Elettronici, in particular with regard to any imperfections, incompleteness or operating difficulties.

1. SAFETY PRECAUTION AND LIMITATIONS OF USE

The precautions described below are intended to ensure correct use of the product in order to prevent situations of hazard for users.

Only use the power supply after having carefully read and understood this guide.

THE POWER SUPPLY SDPOWT MUST NOT BE USED IN EXPLOSIVE OR CORROSIVE ENVIRONMENTS, IN THE PRESENCE OF FLAMMABLE GASES, IN PLACES SUBJECT TO WATER SPRAY OR NEAR FUELS. THERE COULD BE A RISK OF FIRE, ELECTRIC SHOCK OR INJURY.

In the event of faults due to accidental causes or incorrect wiring, under extreme conditions the power part could give rise to electric arcs. The power supply must therefore be installed in an environment with no flammable elements. In particular it must not be used in the presence of flammable gas or vapours.

Do not move or install the power supply SDPOWT or carry out connections or inspections when it is powered. In such cases always cut off the power supply and wait for a few seconds, otherwise there is the risk of electric shock or damage to the drive.

The power supply SDPOWT must be installed in protective cabinets or containers that meet applicable legislative requirements for the specific application, so that any live parts are inaccessible when the power supply is powered.

DO NOT DISCONNECT ANY WIRE WHEN THE POWER SUPPLY IS ON. ELECTRIC ARCS COULD FORM, WHICH WOULD NOT ONLY DAMAGE THE CONNECTOR AND SDPOWT, BUT COULD CAUSE A FIRE.

UNDER ALL CIRCUMSTANCES KEEP THE POWER SUPPLY WITHIN THE SPECIFIED RANGES TO AVOID THE RISK OF FIRE, ELECTRIC SHOCK AND DAMAGE TO SDPOWT. LIKEWISE, CONNECT THE CABLES SECURELY AND CORRECTLY.

Do not touch the SDPOWT connection terminals when it is powered. When carrying out maintenance, ensure that the residual voltages on the power connectors will not cause an electric shock.

Do not touch the SDPOWT during operation or immediately after having disabled it: the surface could be hot.

Do not open or alter the SDPOWR; contact CMZ Sistemi Elettronici for internal inspections or repairs.

The guarantee becomes void in the event of tampering with the drive.

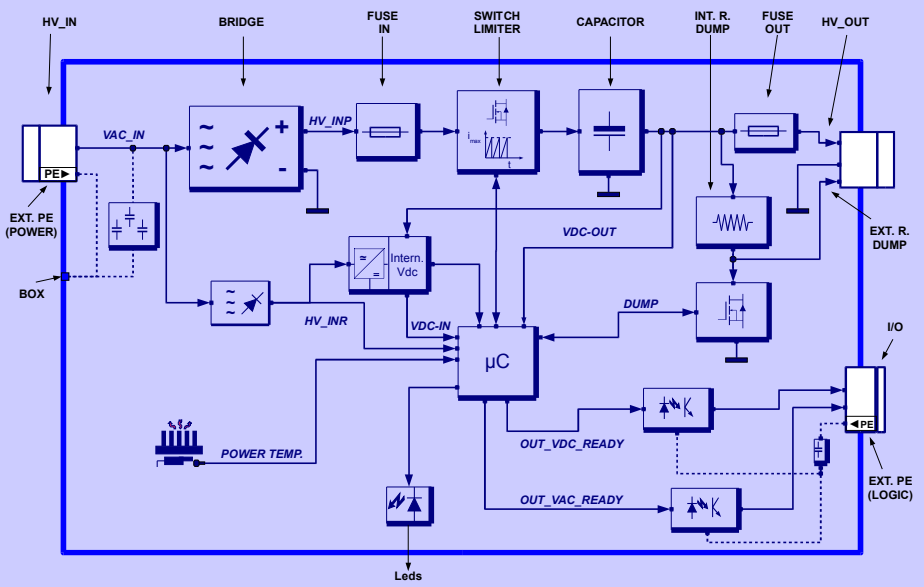
Do not place anything near the drive that could obstruct or limit ventilation of the same, otherwise it could be damaged.

Keep any metal objects away from the drive ventilation apertures.

THE CABLE SECTION MUST BE SUITABLE FOR THE INSTALLED POWER.

IN ANY CASE ONLY USE THE PRODUCT WITHIN THE SPECIFICATIONS GIVEN IN THIS GUIDE.

2. HARDWARE FEATURES

Electrical features	
Supplier type	Double full-wave rectifier single-phase/three-phase AC/DC NOT INSULATED and non-stabilized
Input supply	Direct connection with insulation transformer.
Internal configuration	
Input features	
HV_IN	from 55Vac to 110Vac [1]
Frequency HV_IN	50 ÷ 60Hz
Soft_start	Duration=1sec., Ipeak pulse: 50A
Protection internal fuse	20A delayed (only on the internal HV_INP voltage obtained from HV_IN)
Protection external fuse	Typ : Single-phase: 16A delayed Three-phase: 3x16A delayed
Output features	
HV_OUT	Rectified and smoothed voltage starting from the HV_IN voltage (typ. 75 ÷ 155 Vdc)
IDC_OUT	7A countinuous @ Tamb.=40°C (VAC_IN single-phase) [2] 13A countinuous @ Tamb.=40°C (VAC_IN three-phase)
Max ripple	≤ 7% HV_OUT
HV_OUT capacity	13200 µF
HV_OUT protections	Overload, short-circuit[3] , overvoltage, undervoltage, overtemperature
Dump	
Intervention type	In case of overvoltages and for the HV_OUT residual discharge
VDthr (dump deactivation threshold)	HV_OUT < 50Vdc
Internal resistor	22Ω - 50W
Min. external resistor	≥ 18Ω
Dump protections	I^2T and overload on Rdump
Other	
Power parallel connection	YES, Max 2 SDPOWT [4]
Dissipated power	typ. 27W @ IDC_OUT=13A
Led	Vdc-out, Dump, Warning and Fault
I/O 24V	OUT_VDC_READY and OUT_VAC_READY opto-isolated digital output
Environment conditions	
Environment temperature	from +5 to +40 ^{0}C
Relative humidity	from 5% to 85% not condensation

[1] Net variation +/-10%

[2] Vertical displacement on aluminium plate dim. 30X30cm thickness 2,5mm, distance between the near components at least 10cm.

[3] With rev.HW ≤ 3 the HVOUT short-circuit electronic protection is only at the start-up phase. With rev. HW ≥ 4 the HVOUT short-circuit protection is even on steady conditions through the 20A fast internal fuse.

[4] Only with rev.HW > 1 and in particular conditions, see wiring notes on page 6.

3. MECHANICAL DIMENSIONS and CONNECTIONS

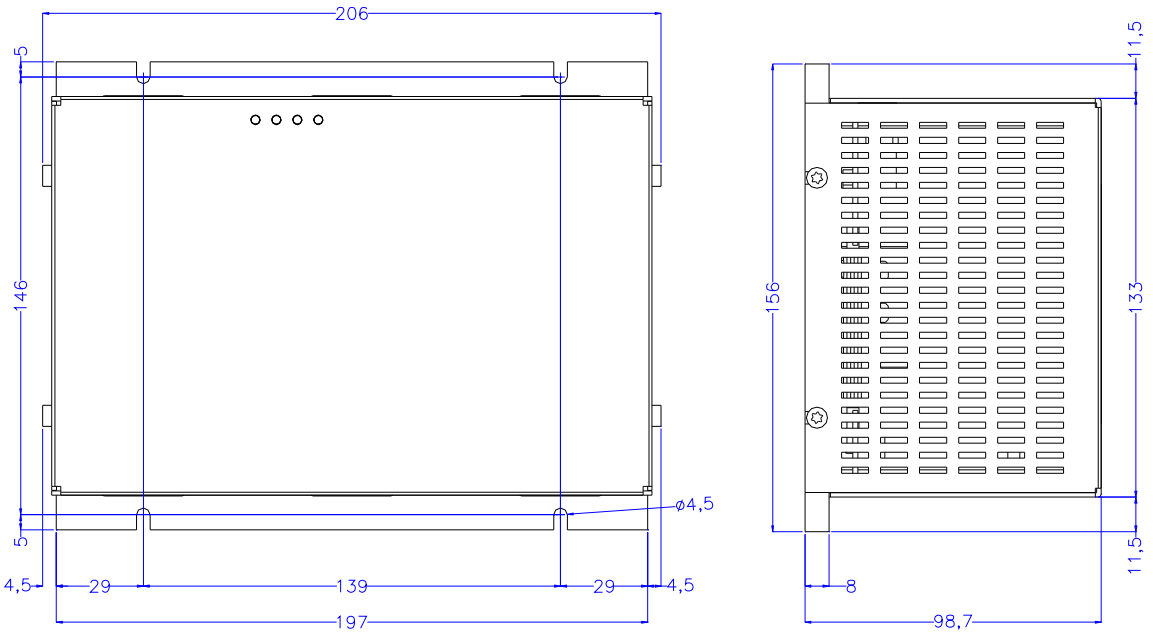


Figure 1. Mechanical dimensions [mm]

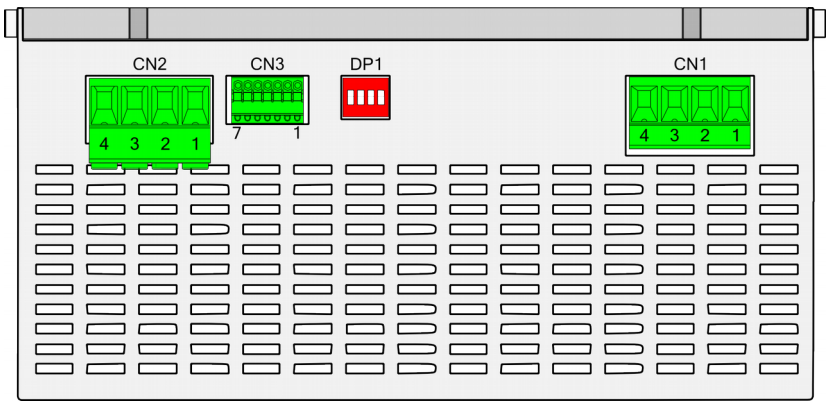
- Fixing mode: on the electric panel bottom plan.
- Approximate weight: about 2 Kg.

CN1	HV_IN (VAC from transformer) [5]
Pin1	PE
Pin2	VAC_IN1
Pin3	VAC_IN2
Pin4	VAC_IN3

CN2	HV_OUT (VDC)
Pin1	GND_OUT -
Pin2	VDC_OUT +
Pin3	Dump resistor
Pin4	Dump resistor

CN3	IN/OUT
Pin1	IN0 - (not used)
Pin2	IN0 + (not used)
Pin3	OUT_VDC_READY -
Pin4	OUT_VDC_READY +
Pin5	OUT_VAC_READY -
Pin6	OUT_VAC_READY +
Pin7	PE

DP1	Descrizione
SW1	Not used
SW2	Not used
SW3	Not used
SW4	Not used

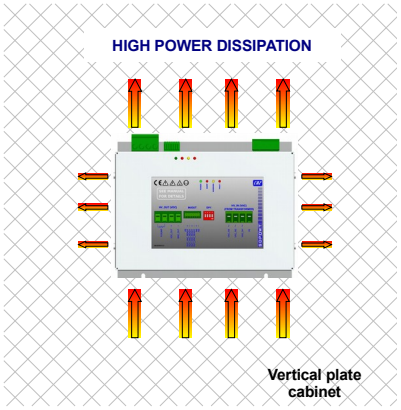
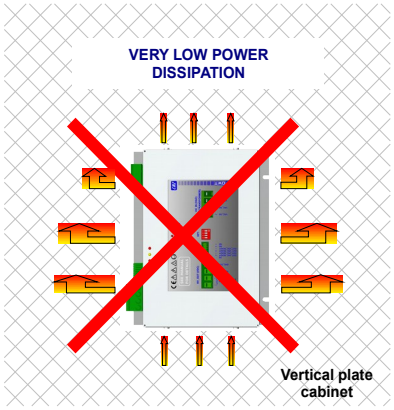
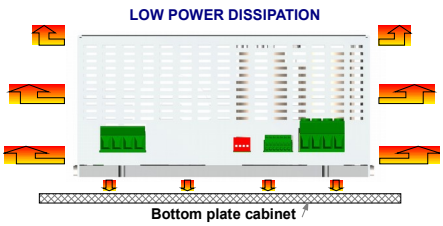


[5] Single-phase connection indifferently between pins 2, 3 and 4.

✯ INSTALLATION NOTES

The output power depends on the heat dissipation level of the power supplier with the environment; in case of insufficient heat dissipation the overtemperature alarm intervenes.

The best results can be obtained through the vertical displacement, as reported in the following table

Vertical displacement, connectors upwards. (Maximum internal heat dissipation)	Vertical displacement, connectors on side. (Insufficient internal heat dissipation)	Horizontal displacement (Reduced internal heat dissipation)
		

SIt is therefore advisable to install the power supplier in vertical position (connectors upwards), hardly secured to the electrical panel bottom (without spacers). Leave at least 10cm free on the upper and lower sides and 5cm on the sides and avoid the hot zones of the electrical panel; the thermal protection is made by measuring the temperature of the power supply bottom plate and intervenes with a temperature > 80°C.

It is recommended to not touch the power supplier while it is powered: its surface may be hot. This is true even immediately after the turn off, the box and/or the little wing may still be hot: wait the cooling down before to touch with hands.

✯ WIRING NOTES

In general, for the input and output voltages wiring, use cable sections adequate to the INSTALLED power. Connect the cables in safe mode by respecting the connections.

➧ **HV_OUT SUPPLY GROUNDING. WITH THE CMZ DEVICES AND FOR THE NOISES T'S IMPORTANT TO EXTERNALLY CONNECT THE GROUND REFERENCE POTENTIAL TO THE GND_OUT (TABLE 1) (1).**

➧ **IT IS NOT POSSIBLE TO CONNECT TO THE GROUND THE SECONDARY OF THE TRANSFORMER AND THE NEGATIVE POLE OF THE SUPPLY CONTEMPORARY BECAUSE IT MAY CAUSE A SORT-CIRCUIT IN THE NEGATIVE HALF-WAVE OF THE INPUT VOLTAGE**

Here follows the SDPOWT connection examples. The analyzed cases are the following:

CASE 1: connection of a single SDPOWT
CASE 2: connection of 2 or more SDPOWT on circuits that are separated, but referred to the same potential.
CASE 3: parallel connection of 2 SDPOWT

The Table 1 describes the above reported wiring types.

While wiring, pay attention to not make the errors reported in the Table 2 . In particular in the CASE 3, that is the parallel connection of 2 SDPOWT, avoid connections that don't guarantee a balanced distribution of the currents. Otherwise it may happen an overcharge fault.

For a balanced distribution of the currents in the power suppliers the following points must be verified:

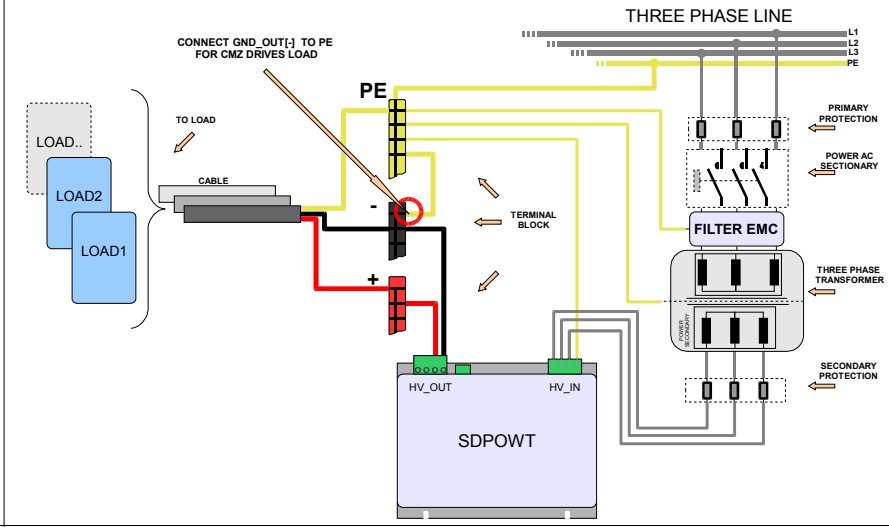
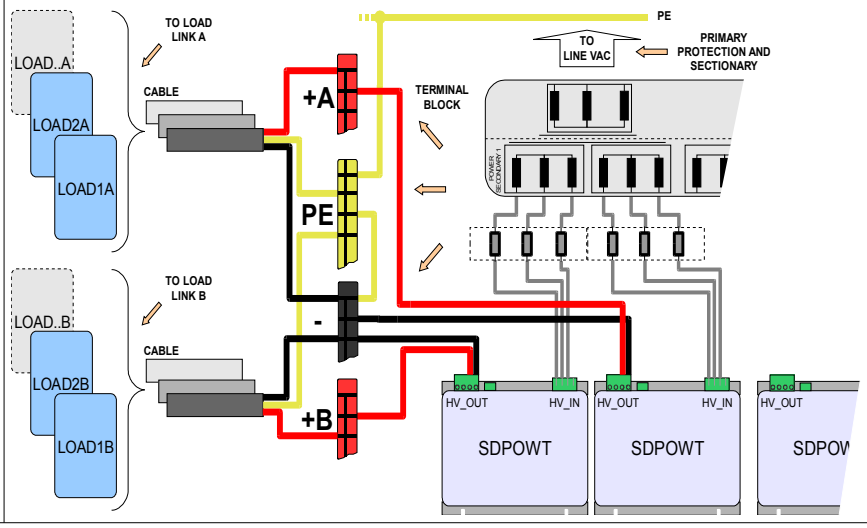
1- cables for the HV_IN input voltage connection, connected in Y mode, starting from the transformer insulated secondary to the CN1 (HV_IN) connectors with the same electrical characteristics (section) and with connection with the same length.

2- cables for the HV_OUT output voltage connection, connected in Y mode, starting from the CN2 connectors of the suppliers output (HV_OUT) and end in Y mode on the (-), (+) and (PE) pins of the electrical panel. Even for these cables, the electrical characteristics must be the same and with connection with the same length.

3- same displacement of the SDPOWT so that to guarantee a temperature that is comparable with the bottom plates of the SDPOWT.

In the CASE 2 (connection of 2 or more SDPOWT on circuits that are separated but referred to the same potential) pay attention to not connect more than two SDPOWT starting from the same secondary of the transformer. The regeneration currents (-) may all focus and circulate, in unfavorable cases, in a single SDPOWT (causing the overcharge fault) and even permanently damage the SDPOWT in which flows the current provided by the other SDPOWTs. To avoid this situation, use more insulated secondaries so that to separate the regeneration currents (See Table 1-caso2).

DO NOT DISCONNECT/CONNECT ANY CONNECTOR AND/OR WIRE WHEN THE SUPPLY IS STILL PROVIDED OR IMMEDIATLY AFTER THE TURN OFF. WAIT THAT THE OUTPUT VOLTAGE OF THE POWER SUPPLIER IS NO MORE PRESENT.

CASES	SCHEME	DESCRIPTION
1		Connection of 1 SDPOWT
2		Connection of 2 or more SDPOWT on separated circuits In this case the voltage supply is divided in 2 or more separated circuits (e.g. (+A) separated from (+B)). The masses (-) are connected together in Y mode (pin (-)) and connected to PE. Attention! The transformer/transformers secondary wirings must be insulated.

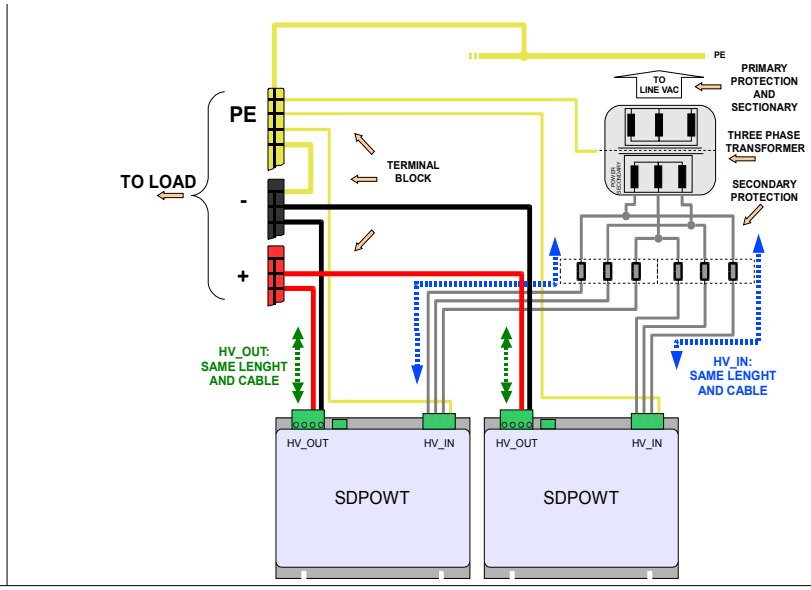
3		PARALLEL connection of 2 SDPOWT. In this case the SDPOWT input alternating voltage bust be provided by the same insulated secondary of the transformer. Furthermore, in order to guarantee an equal distribution of the suppliers output currents, the HV_IN input wires of both suppliers must have the same length and section (the same electric resistance). The same applies to the HV_OUT output wiring to the electrical junction box pins (-), (+) and PE of the electrical panel.

Table 1: SDPOWT connections examples

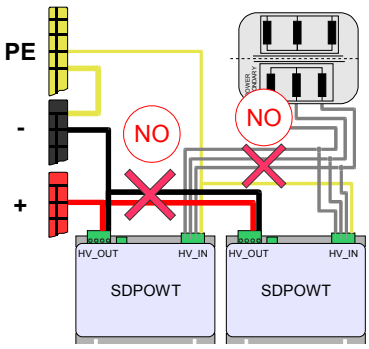
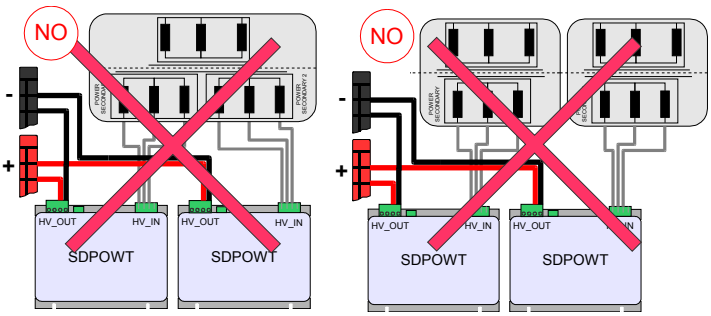
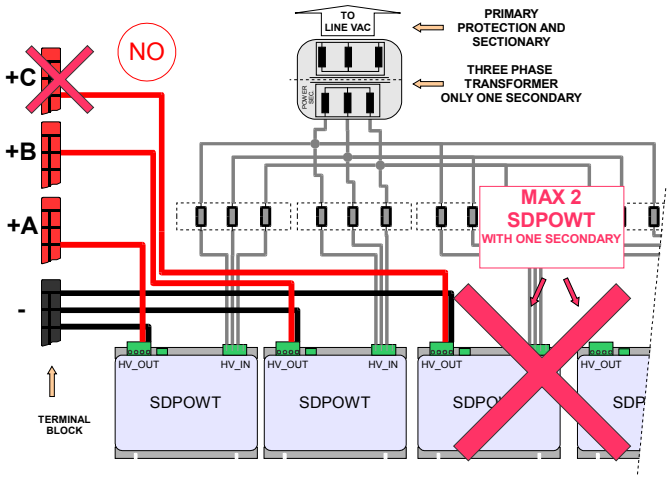
SCHEME	DESCRIPTION
	Do not connect the HV_IN input alternating voltage in series between the power suppliers. Connect this voltage in Y mode starting from the secondary of the transformer. The same applies to the HV_OUT output voltage wiring. Connect this voltage on Y mode to the pins PE, (-) and (+) (see Table 1 - case 3). The serial connections don't allow an equal distribution of the power suppliers output currents.
	Do not connect the input alternating voltages of the 2 SDPOWTs starting from 2 separated secondary both in case of a single transformer and in case of two. The transformer secondaries output voltages don't guarantee the same output voltage so the currents that are provided by the two SDPOWTs are not balanced. Connect these voltages starting from the same secondary of the transformer (see Table 1 - case 3).
	Do not connect more than 2 SDPOWTs starting from the same transformer secondary. The regeneration currents (-) may all focus and circulate, in unfavorable cases, in a single SDPOWT (causing the overcharge fault) and even permanently damage the SDPOWT in which flows the current provided by the other SDPOWTs. Use more insulated secondaries (see Table 1 - case 2).

Table 2: Wrong wirings in case of connection of many SDPOWT.

✯ DUMP INTERVENTION CHARACTERISTICS

As reported in Table 3 this condition happens in case of overvoltage or residual voltage discharge on HV_OUT. The **overvoltage condition** happens when HV_OUT exceeds HV_INR of about 9V.

If necessary, it's possible to verify the DUMP by analyzing the HV_OUT voltage during the overvoltage transitions: the HV_OUT voltage variation, before and after the overvoltage, mustn't be higher than the overvoltage condition. If this voltage difference is higher it means that the SDPOWT internal DUMP is ineffective, so it is necessary to externally connect a DUMP resistor so that to encrease the discharge energy. Note! Correctly dissipate the added DUMP resistor.

The dumps efficacy can be evaluated by the DUMP led ON state duration. The shorter is this duration the more effective is the DUMP.

HV_INR (internal rectified voltage obtained from HV_IN)	*HV_OUT*	*DUMP STATUS*	*Description*
Present	HV_OUT=HV_INR	OFF	Stable HV_IN and HV_OUT: INACTIVE DUMP (P1 Fig.2)
Present	HV_OUT>HV_INR	ON	Overvoltage on HV_OUT: ACTIVE DUMP (P2 Fig.2)
Absent	HV_OUT>HV_INR	OFF	Supply absence on HV_IN for less than 4sec : INACTIVE DUMP (P3 Fig.2)
Absent	HV_OUT>HV_INR	ON	Supply absence on HV_IN for more than 4sec: ACTIVE DUMP (P4 Fig.2)
Absent	HV_OUT<VDthr	OFF	HV_OUT < VDthr : INACTIVE DUMP (P5 Fig.2)

Table 3: DUMP activation and deactivation

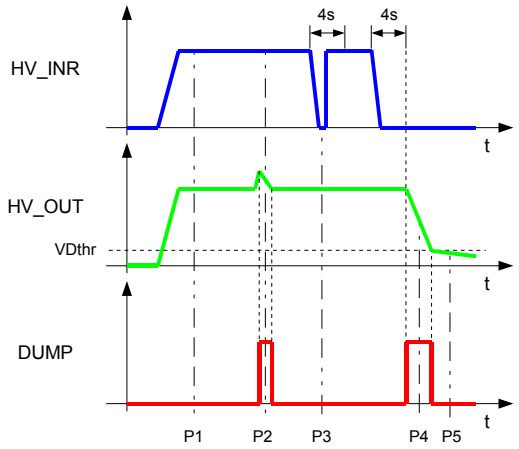


Figure 2. DUMP intervention

ATTENTION: IN CASE OF I2T OR DUMP SECTION OVERCHARGE FAULT, THE DUMP CIRCUIT IS DEACTIVATED. PAY ATTENTION THAT THE RESIDUAL VOLTAGES DISCHARGE MAY CONTINUE ESPECIALLY WITHOUT A LOAD ON HV_OUT. THE VDC_OUT LED SHOWS THE PRESENCE OF THIS VOLTAGE.

✯ DIGITAL OUTPUTS

The power supplier is provided of 2 opto-isolated outputs: OUT_VDC_READY and OUT_VAC_READY.

The OUT_VDC_READY output is active (state ON, transistor on) when the supplier is correctly working. Otherwise, in case a fault happens, with consequent deactivation of the HV_OUT, the output is deactivated (state OFF, transistor off).

In this situation the warning leds show which alarm is active.

The OUT_VAC_READY output is active (state ON, transistor on) when the alternating voltage VAC (mono-phase or three-phase) on the HV_IN input is present. The output is inactive after about 6ms since the VAC on HV_IN has been deactivated.

The following table summarizes the digital output electrical features.

Connection types	NPN, PNP
Vout output voltage (OFF state)	30 Vdc max
Output compatibility	Compatible relay[6]
Vout (ON state) ($I_{OUT\ MAX}$ =50mA)	1V

Table 4. OUT_VDC_READY and OUT_VAC_READY outputs features

➧ The alarm reset (both on leds and on the OUT_VDC_READY output) is made by rebooting (turn off and on again) the power supplier.

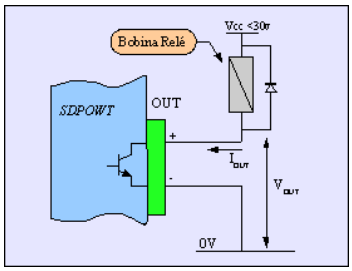


Figure 3: Output NPN for relay connection

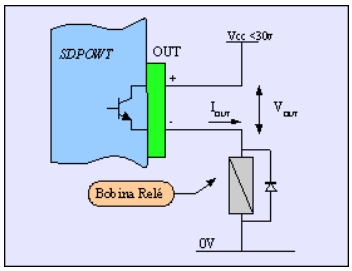


Figura 4: Output PNP for relay connection

✯ WARINING LEDS

LED	*COLOUR*	*MEANING*	*STATUS* [7]
Vdc-out	Green	VDC-OUT output voltage present	On
Dump	Red	Dump intervention	On
Warning	Yellow	Temporary overcharge on steady condition Heat sink temperature ≥ 70°C Voltage temporary missing on HV_IN	1 flash 2 flash 3 flash
Fault	Red	Overload on start-up phase Overload on steady condition HV_OUT overvoltage HV_OUT undervoltage I2T exceeded or overload on DUMP section Overtemperature (heat sink temperature > 80°C)	1 flash 2 flash 3 flash 4 flash 5 flash 6 flash

Table 5: Warning led

➧ The alarm reset is made by rebooting (turn off and on again) the supplier (the alarms are retentive). The Warnings on the leds is automatically deactivated after about 60 seconds since the warning cause disappears.

[6] ATTENTION: insert a diode in parallel with the load in case of inductive load.

[7] 1 flash= 0.3s ON, 1.2s OFF (approx), 2 flash= 0.3s ON, 0.3s OFF, 0.3s ON, 1.2s OFF (approx), etc.

✯ FURTHER NOTES ABOUT THE FUNCTIONING

Analysis points	Description
INPUT VOLTAGE	Check that the provided SDPOWT input voltage in within the permitted limits. Pay attention to the electrical characteristics that can modify the input voltage, e.g. transformer technical tolerances (with-without load characteristic, transformation ratio) and tolerance of the electrical network (typ. variation +/-10%). It is advisable to check the above written instructions even directly on the panel in which the SDPOWT is installed and in the worst functioning conditions: without load and in the with-without load (the voltage can increase over the permitted limits).
OUTPUT VOLTAGE	The VDC_OUT rectified voltage varies according to the network alternating voltage variations in which the transformer primary is supplied. Therefore it may happen that in unfavorable conditions, the maximum admitted voltage is exceeded on the devices that are connected to the HV_OUT (e.g. drives, etc.). In this case it is advisable to decrease the transformer secondary voltage value.
OUTPUT CURRENT	The IDC_OUT current reported in the hardware characteristics refers to a continuous functioning in defined displacement and temperature conditions, previously described. An estimation of the overload level on HV_OUT is reported by the WARNING LED (see the WARINING LEDS), in particular when it happens the 10% overload threshold has been exceeded. Attention! The overload may happen in different ways: 1- excessive steady load (e.g. motors commanded with constant velocity). 2- excessive and repeated pulse load (es. Motors that execute sharp acceleration ramps). 3- sudden and temporary decreasing of the VAC voltage on HV_IN. It is therefore important to distinguish the previously reported cases, in particular in the 1 and 2 cases it is advisable to reduce the load or to change the wiring configuration, e.g. between 2 BDPOWT in parallel. Typically with a three-phase supply the overload with constant load of 16A can continue for several seconds, while in case of a pulse load the duration is reduced to less than 1 second. The same applies to a mono-phase supply, but with overload current of 9A.
START-UP	The supplier start-up starts after about a second since the VAC_IN alternating voltage is applied on CN1 (HV_IN) and its duration is at most 1 second. The maximum absorbed and delivered current iwithin this period is about 50A. If the load connected to HV_OUT is excessive (e.g. short-circuit) the VDC_OUT voltage on CN2 is deactivated and the “overload on start-up phase” fault will be activated (see WARINING LEDS).
REBOOT	In case of **CONTINUOUS** system reboot it is necessary to wait, between a turn-off an turn-on, a time of at least 3s for Vout 120Vdc and at least 5s for Vout 160Vdc. In case of less frequent reboots/not continuous this waiting time is not necessary.
GROUNDING	It is important for the CMZ devices and in relation to the noises, to connect to the ground the GND_OUT- as reported in the previously described examples. In order to limit the noises on the supplier input it is better to connect to the ground even the pin1-CN1. Note! In general it is **NOT** possible to contemporary connect to the ground the transformer secondary and the supply negative, because it will cause a short-circuit on the input voltage negative half-wave.

4. ORDER CODE

The order code is the following: SDPOWT.00