CMZ hardware

SDPOWR

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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 SDPOWR 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 SDPOWR 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 SDPOWR 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 SDPOWR, 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 SDPOWR. LIKEWISE, CONNECT THE CABLES SECURELY AND CORRECTLY.

Do not touch the SDPOWR 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 SDPOWR 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.

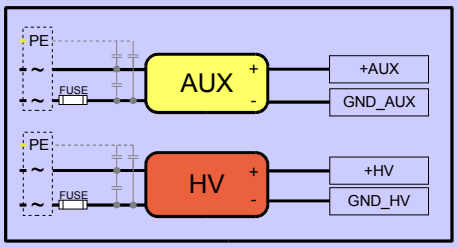
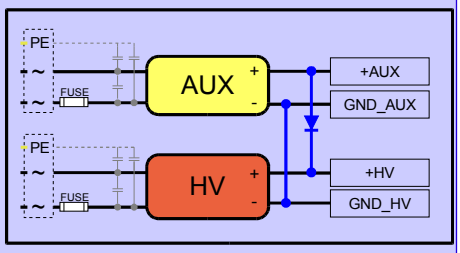
Do not place anything near the drive that could obstruct or limit ventilation of the same, otherwise it could be damaged.

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		
Version	SDPOWR.00	SDPOWR.10 [1]
Power supply type	Full wave single phase rectifier AC/DC NOT ISOLATED and not stabilized	
Power supply internal configuration		
Input power supply	● Direct connection with isolation transformer (700VA max[2]) ● Indirect connection through soft-start power resistor ➢ peak current at start-up on HV section: IpkmaxHV_IN = 150A[3] (no limit in the power of the transformer); ➢ peak current at start-up on AUX section: IpkmaxAUX_IN = 150A[4] (no limit in the power of the transformer).	
Input Features		
Frequency	50 ÷ 60Hz	
HV_IN (J8)	55 ÷ 110Vac[5]	
AUX_IN (J7)	Up to 32Vac[5]	Up to 27Vac[5] [6]
Output Features		
HV_OUT (J2-J4)	Up to 190Vdc, Inom=4A (Vripple=5V@4A, Tamb.=40°C) Overload Imax=6A (5sec[7])	
Capacitor on HV_OUT	8800 µF	
AUX_OUT (J1)	Up to 50Vdc, Inom=1A (VRipple=5V@1A) Overload Imax=2A (5sec[7])	
Overload protection on HV and AUX sections	NO	
Over-temperature protection on HV and AUX sections	NO	
Internal isolation HV - AUX	YES	NO
Internal references	GND_HV isolated from GND_AUX	GND_HV connected with GND_AUX
Led	HV_OUT (DL2), AUX_OUT (DL1), DUMP (DL3) intervention	
Fuses		
on INPUT	On HV_IN (10A time-delay) and AUX_IN (10A time-delay)	
on OUTPUT	On HV_OUT (8A time-delay) and Rext. DUMP	
Dump		
Intervention type	In case of overvoltage and for the discharge of the residual voltage on HV_OUT	
VDthr (Deactivation dump threshold)	HV_OUT < 45Vdc	
Internal resistance	110Ω [8]	
External resistance (J6)	≥ 56Ω	
Dump disable input (J5)	Yes	
Environmental conditions		
Operating environment temperature	from +5 to +40°C	
Relative humidity	from 5% to 85% non-condensing	

[1] Suggested in case of ISD drive with start-up and keep-alive voltage management.

[2] Whit this power it is possible to connect directly SDPOWR to the transformer without limiting the input current both on HV stadio and AUX stadio.

[3] On HV-IN section the soft-start power resistor can be calculated acording with what's reported in the SDPOWR CONNECTION TO TRANSFORMER paragraph.

[4] On AUX_IN section the soft-start power resistor can be calculated as follows: (HV_AUX*√2)/ IpkmaxAUX_IN (for example with HV_AUX=27Vac, the Rsoft-start=0,25ohm). Generally for the full power range can be used a series 0,33ohm resistance.

[5] Variation +/-10%

[6] Pay attention: in HV_IN absent condition and AUX_OUT upper Vdthr, the dump is active in prolonged way!

[7] See Additional Operating Notes Additional Operating Notes at pag. 12: OUTPUT CURRENT AND HV-AUX TEMPERATURE

[8] Test conditions: Overvoltage applied on HV_OUT=140Vdc, time ON=1sec., time OFF=20sec.

✯ DUMP DISABLE INPUT (J5) [9] FEATURES

Galvanic isolation	With optocoupler
Protection against reverse polarity	YES
Input voltage	-30 ÷ +30 Vdc
• Nominal	24Vdc
• For LOW signal	-30 ÷ +4 Vdc
• For HIGH signal	+12V ÷ +30 Vdc

Table 1. Digital input "DISABLE DUMP" features

✯ DUMP INTERVENTION FEATURES

HV_INR (Internal rectified voltage from HV_IN)	*HV_OUT*	*DISABLE DUMP Input*	*DUMP*	*Description*
Present	HV_OUT=HV_INR	OFF	OFF	Dump off with HV_IN and HV_OUT stable (P1 Fig.1)
Present	HV_OUT>HV_INR	OFF	ON	Dump on in case of over-voltage on HV_OUT (P2 Fig.1)
Absent	HV_OUT>HV_INR	OFF	ON	Dump on with no supply HV_IN (P3 Fig.1)
Absent	HV_OUT<VDthr	OFF	OFF	Dump off when HV_OUT < VDthr (P4 Fig.1)
Present	HV_OUT>HV_INR	ON	ON	Dump on with over-voltage on HV_OUT even if IN_DISABLE DUMP=ON (P5 Fig.1)
Absent	HV_OUT>HV_INR	ON	OFF	Dump off with IN_DISABLE DUMP=ON and absence of supply HV_IN (P6 Fig.1)

Table 2: Enable/disable status DUMP

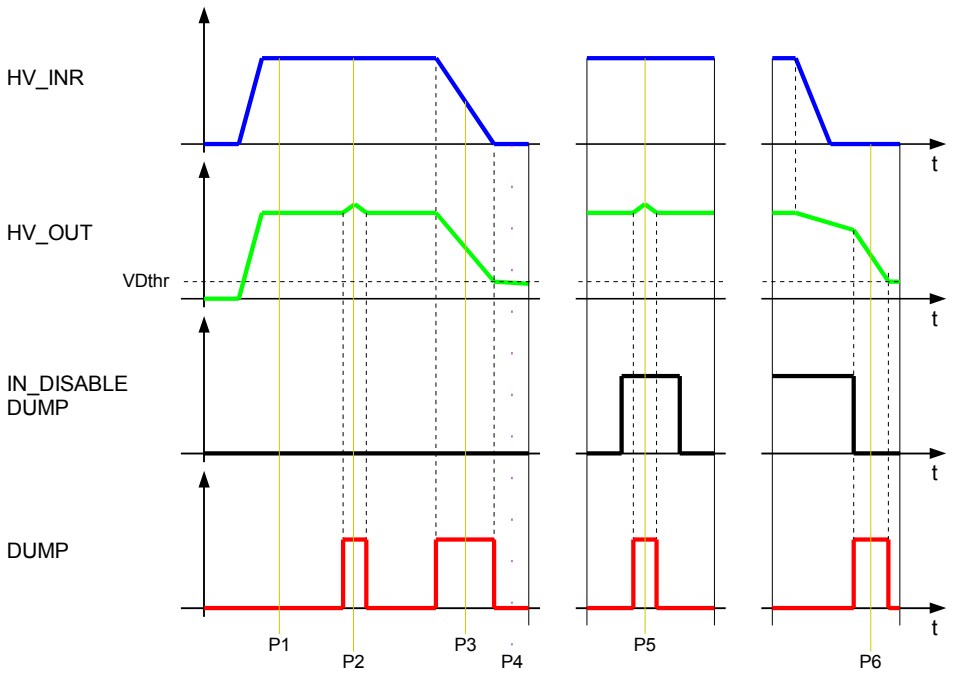


Figure 1. DUMP intervention

[9] The dump remains always active in case of overvoltage on HV_OUT

3. OVERALL DIMENSIONS AND CONNECTIONS

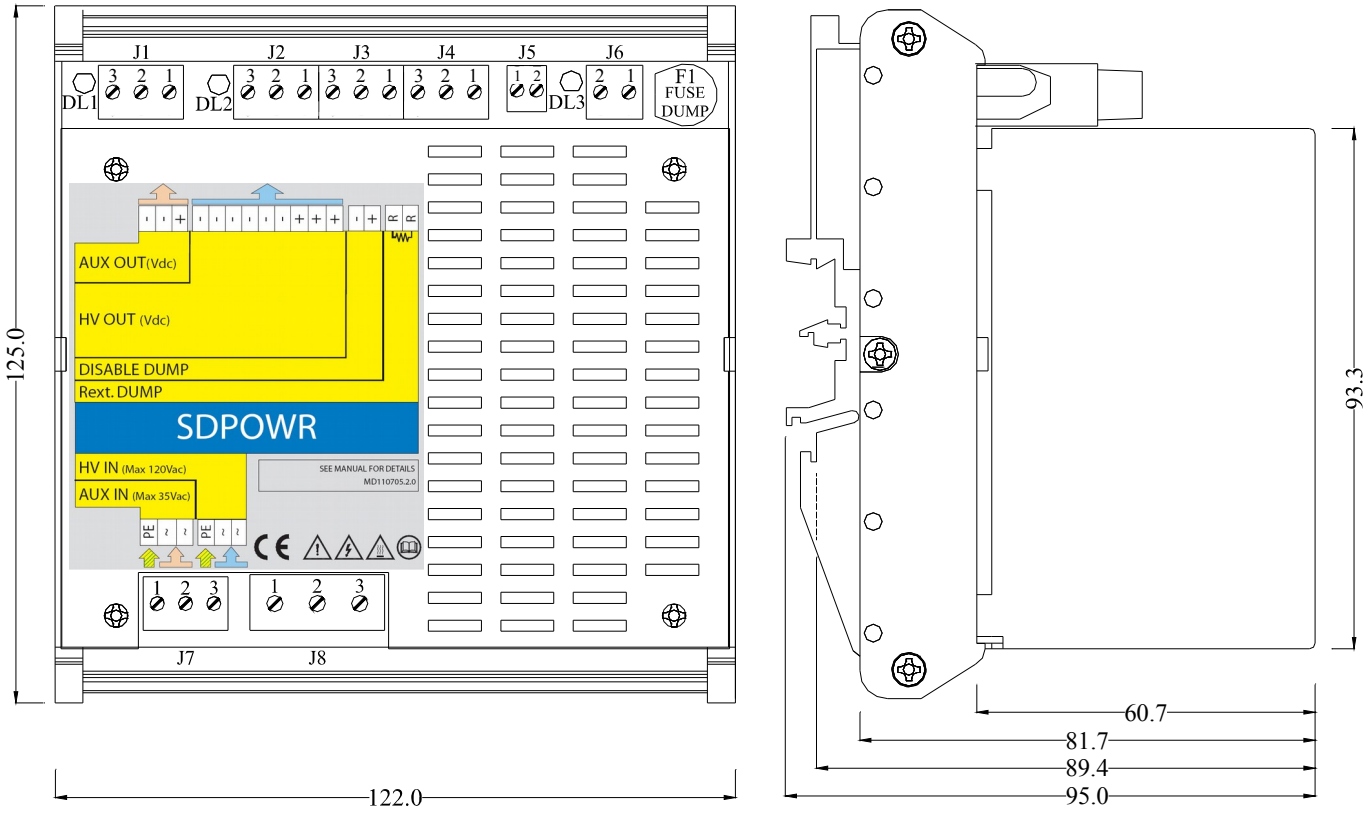


Figure 2: Overall Dimensions [mm]

- Fixing type: on DIN guide
- Approximate weight of SDPOWR: 750 gr.

J8	HV_IN
Pin1	PE
Pin2	HV (VAC)
Pin3	HV (VAC)

J7	AUX_IN
Pin1	PE
Pin2	AUX (VAC)
Pin3	AUX (VAC)

J5	IN_DISABLE
Pin1	-IN_DISABLE DUMP
Pin2	+IN_DISABLE DUMP

	HV_OUT
J4	
Pin1	+HV
Pin2	+HV
Pin3	+HV
J3	
Pin1	GND_HV
Pin2	GND_HV
Pin3	GND_HV
J2	
Pin1	GND_HV
Pin2	GND_HV
Pin3	GND_HV

J1	AUX_OUT
Pin1	+AUX
Pin2	GND_AUX
Pin3	GND_AUX

J6	DUMP
Pin1	Dump resistor
Pin2	Dump resistor

✭ SDPOWR CONNECTION TO TRANSFORMER

It is possible a direct connection (without Soft Start Power Resistor) between SDPOWR and transformer only if it is verified in any case that the inrush current doesn't exceed IpkmaxHV_IN on the secondary of transformer. This is generally true for power transfomers which power is up to 700VA.

In case this current condition is not guaranteed or verifiable, it is necessary to add a inrush current limitation resistor (Soft Start Power Resistor). See Fig.3.

With transformers which power is included between 700VA and 3000VA, a generally acceptable value of the resistor is 0,47Ω – 50W.

With transformers which power is higher than 3000VA, select the Soft Start resistor according to the following formula:

*(HV_IN *√2)/ IpkmaxHV_IN (for example with HV_IN=110Vac, the Rsoft-start=1ohm)*

The Fig.3 shows the indirect connection of SDPOWR through current limiting resistor at start-up, when a power transformer with an output exceeding 700VA is used.

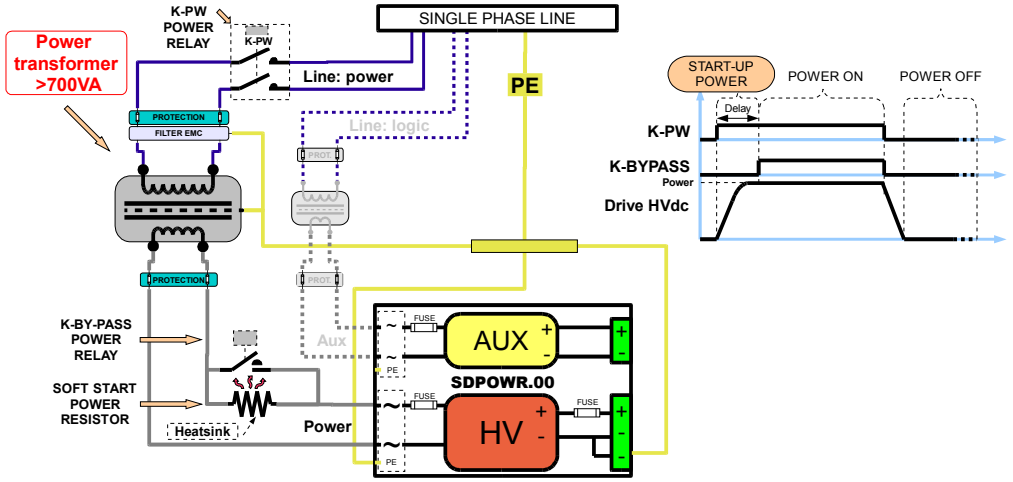
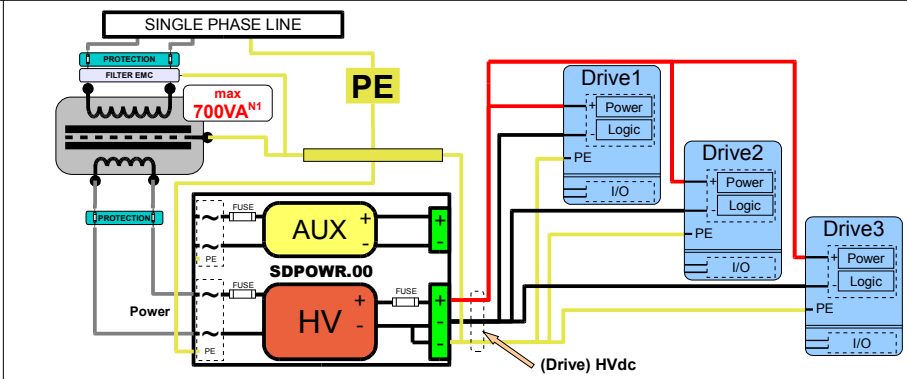
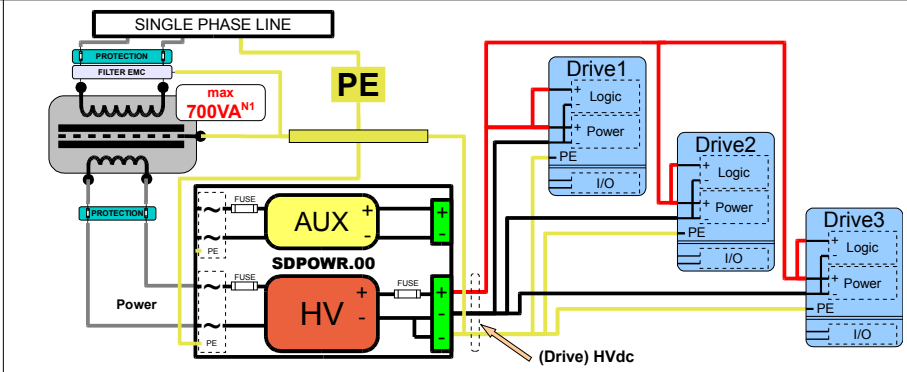
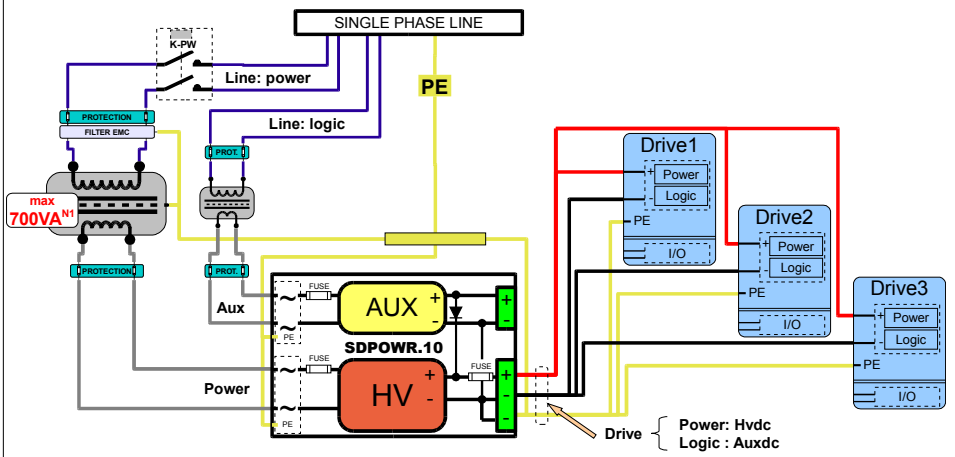
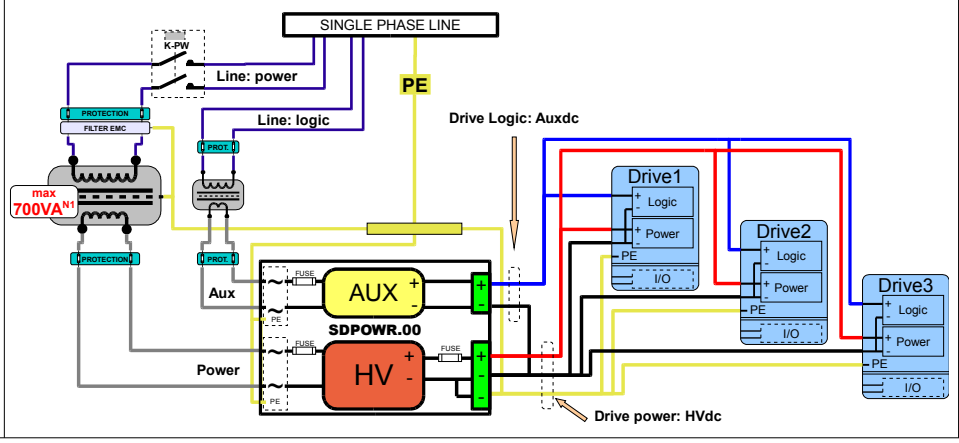


Figure 3: Indirect connection of SDPOWR through soft-start power resistor

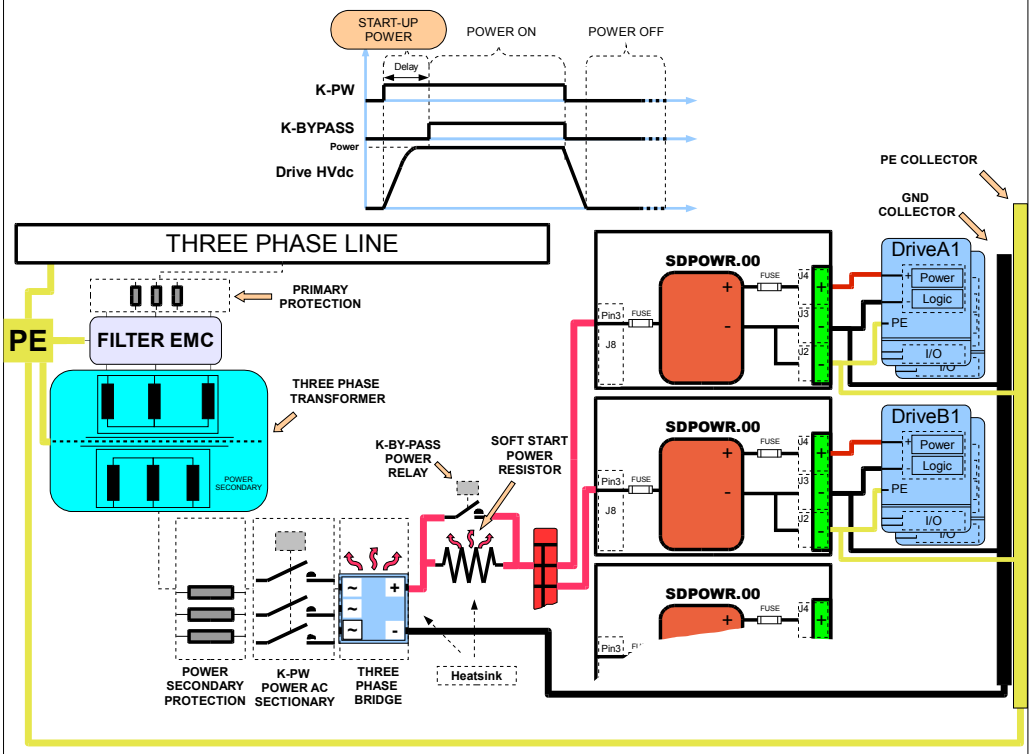
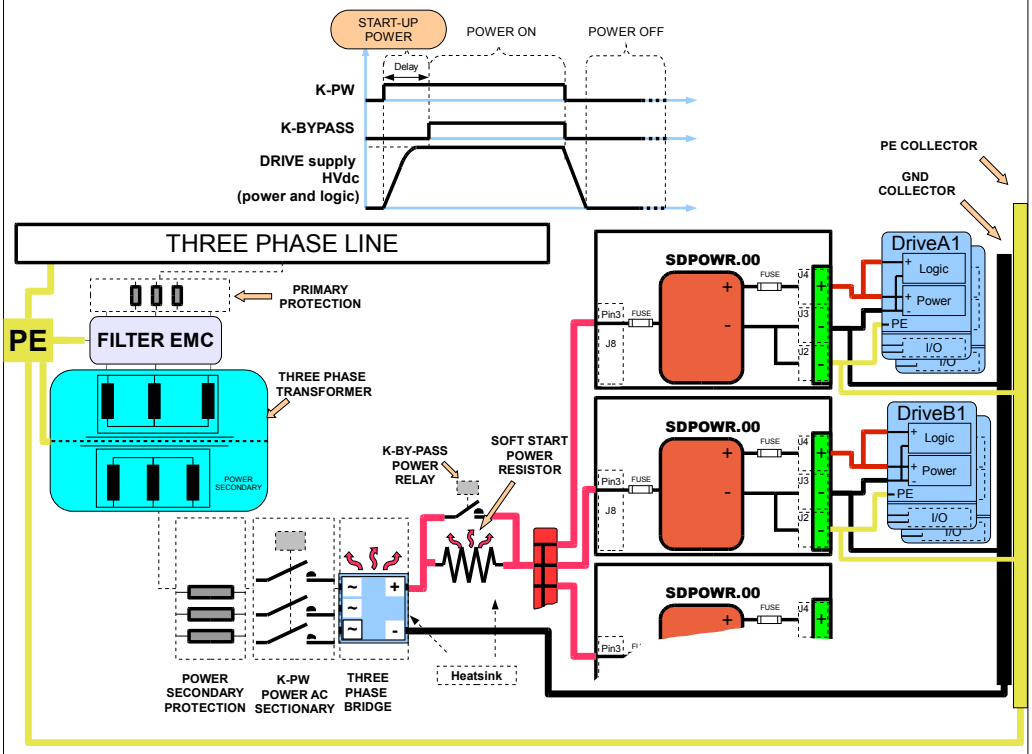
For better efficiency is advisable to make a bypass of the Soft Start Power Resistor after about 300ms from power on.

✯ CONNECTION EXAMPLES OF A SINGLE SDPOWR WITH ONE OR MORE DRIVES

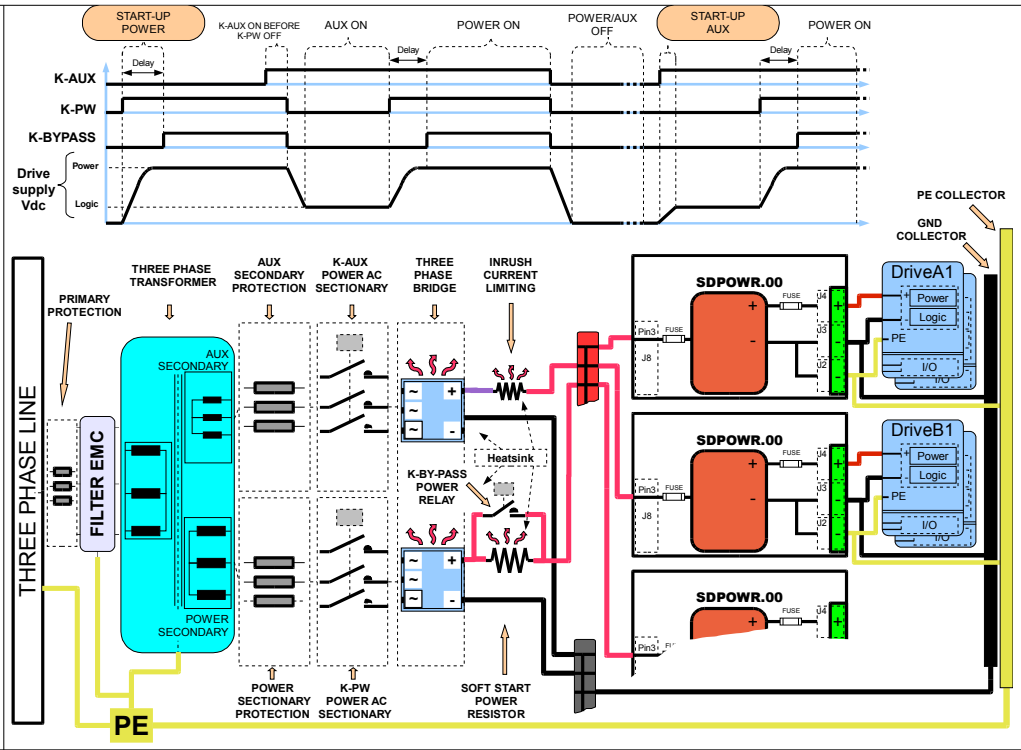
Case	SCHEME	Description
1		SINGLE SUPPLY DRIVE (One level voltage) Connection of a SDPOWR.00 with one or more DRIVES that have a single supply (logic voltage internally obtained from the power) Objective: Supply of DRIVES at nominal voltage without the possibility to keep supplied the logic voltage in case of interruption of the power HVdc.
2		DUAL SUPPLY DRIVE (One level voltage) Connection of a SDPOWR.00 with one or more DRIVES that have a double supply (supply separated between power and logic). Objective: Supply of DRIVES at nominal voltage without the possibility to keep supplied the logic section in case of interruption of the power HVdc. In order to do this, both the sections (power and logic) have to be supplied with HVdc. Note! The connected drives must have compatibility about voltage levels between logic and power.
3		SINGLE SUPPLY DRIVE (Two level voltage) Connection of a SDPOWR.10 with one or more DRIVES that have a single supply (logic voltage internally obtained from the power). Objective: Supply of DRIVES with two voltage levels in order to keep supplied the logic section in case of interruption of the power HVdc. In order to do this, the voltage levels of the drive are used:=Power (HVdc), Logic (Auxdc).
4		DUAL SUPPLY DRIVE (Two level voltage) Connection of a SDPOWR.00 with one or more DRIVES that have a double supply (supply separated between power and logic). Objective: Supply of DRIVES at nominal voltage HVdc (for power section) and with Auxdc (for logic section) with the possibility to keep supplied the logic section in case of interruption of the power HVdc.

N1 See SDPOWR CONNECTION TO TRANSFORMER section (Fig.3) if you use a transformer with a higher power

✯ CONNECTION EXAMPLES OF TWO OR MORE SDPOWR

Case	SCHEME	Description
1		SINGLE SUPPLY DRIVE (One level voltage) Connection of more SDPOWR with DRIVES that have a single supply (logic voltage internally obtained from the power) Objective: Supply of DRIVES at nominal voltage without the possibility to keep supplied the logic voltage in case of interruption of the power HVdc.
2		DUAL SUPPLY DRIVE (One level voltage) Connection of more SDPOWR with DRIVES that have a double supply (supply separated between power and logic). Objective: Supply of DRIVES at nominal voltage without the possibility to keep supplied the logic section in case of interruption of the power HVdc. In order to do this, both the sections (power and logic) have to be supplied with Hvdc. Note! The connected drives must have compatibility about voltage levels between logic and power.

3

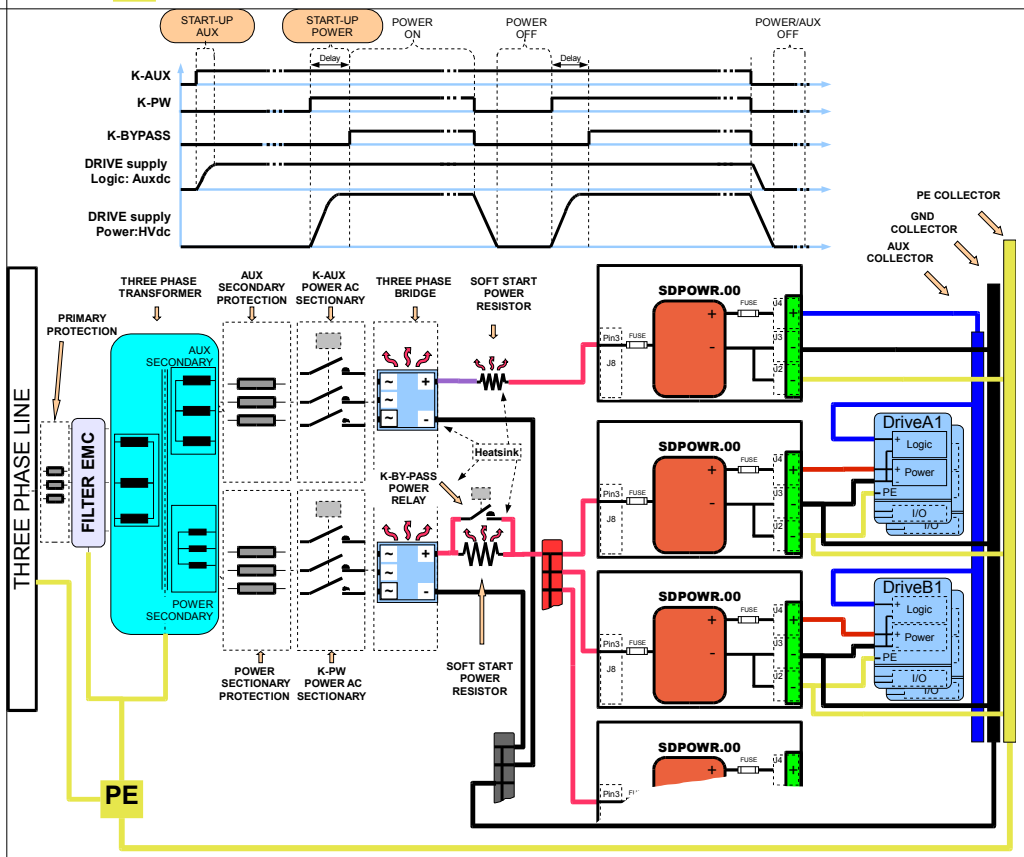


SINGLE SUPPLY DRIVE (Two level voltage)

Connection of more SDPOWR with DRIVES that have a single supply (logic voltage internally obtained from the power).

Objective: Supply of DRIVES with two voltage levels in order to keep supplied the logic section in case of interruption of the power HVdc. In order to do this, the voltage levels of the drive are used:=Power (HVdc), Logic (Auxdc).

4



DUAL SUPPLY DRIVE (Two level voltage)

Connection of more SDPOWR with DRIVES that have a double supply (supply separated between power and logic).

Objective: Supply of DRIVES at nominal voltage HVdc (for power section) and with Auxdc (for logic section) with the possibility to keep supplied the logic section in case of interruption of the power HVdc

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The following figure shows how the drives have to be connected from the output of SDPOWR.

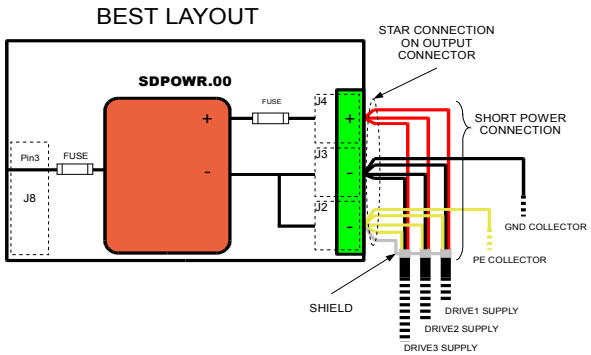


Figura 4: DRIVES connection from the output of SDPOWR

The Fig. 5 forbids the direct connection in parallel of two or more SDPOWR because the ground currents do not follow the desired path: for example, it can happen that the total current absorbed by the drives is supplied by only one SDPOWR (so it is NOT guaranteed the distribution of the current of the drives A1,A2,... and drives B1, B2,... on the different SDPOWR in parallel).

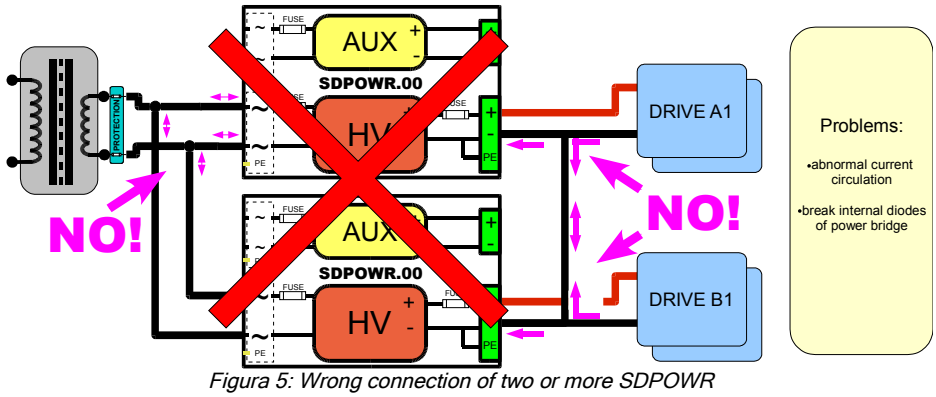
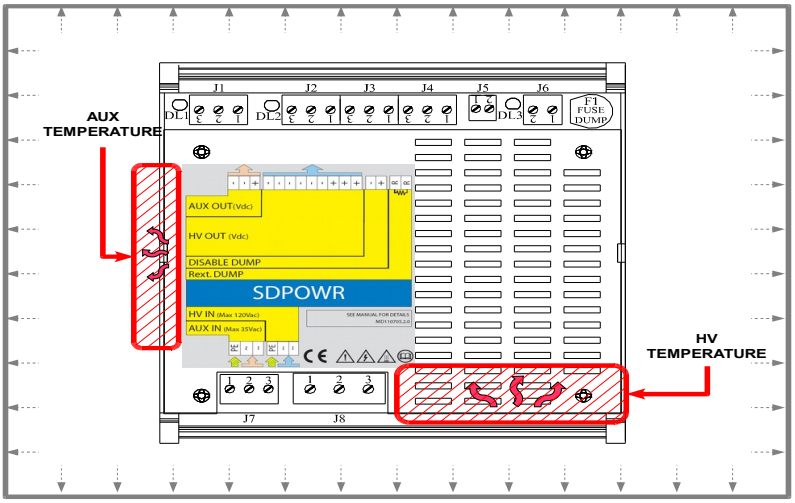


Figura 5: Wrong connection of two or more SDPOWR

Analysis points	Description
INPUT VOLTAGE	Verify that the input voltage to SDPOWR is within the limits allowed. Make attention of electrical characteristics that can change the input voltage such as manufacturing tolerances of the transformer (feature void-load, transformation ratio) and tolerance of mains power supply (typ variation. +/-10%). You should maintain a safety margin compared to the maximum operating of SDPOWR. Please check the above even where SDPOWR is installed and on worst demanding operating conditions: void and void-load transition (the voltage can rise beyond allowable limits). An example of voltages for the transformer are shown in Tab.3.
OUTPUT VOLTAGE	The rectified voltage VDC varies depending on the variations of the alternating power supply on primary of the transformer. It may therefore be possible, under unfavorable conditions occur exceeding the maximum allowable voltage for devices connected on HV_OUT and AUX_OUT (eg drives, etc.). In this case, you should decrease the value of the secondary voltage of the transformer. An example of voltages for the transformer are shown inTab.3.
OUTPUT CURRENT AND HV- AUX TEMPERATURE	The output sections HV and AUX are able to provide a higher current than the rated maximum current (up to Imax), but this must be done for a short time as not to overheat the internal electronics. Please check the above directly into the worst demanding operating conditions and test temperature as shown in Fig.6 (maximum temperature: 80 °C). The temperature varies with the variation of environment temperature and SDPOWR position (best results are obtained with a vertical arrangement as shown in Fig.6). The power supply SDPOWR is designed so that the heat is dissipated by air convection. If the power supply is installed in a cabinet make sure the internal temperature does not exceed the maximum environment temperatures expected. To ensure adequate heat dissipation must vacate the slots on the mechanical and maintain free space for airflow above and below the power supply. It is recommended to maintain a free space around the power supply at least 50 mm. So keep these distances between power supply and a cabinet or other devices.  *Figura 6: Temperature control of HV and AUX sections*  Don't touch the power supply while it is powered: its surface may be hot. This is true even after switching off: the box and/or the heatsink may still be hot: to cool before touching.
START-UP	If you use a transformer with power higher than 700VA please take connection of Fig3. In case of connection of a single SDPOWR with SINGLE SUPPLY DRIVE (Two level voltage) or DUAL SUPPLY DRIVE (Two level voltage) configuration, follow the notes described in Pag. 7. If it is used a single transformer with two isolated secondary, one for the power section and one for the logic section, the power must be turned off by interruption of transformer secondary (power section) (the primary is always active). In this case it may happen that there is a lowering of tension AUX_OUT during the start-up transient of the HV (closure of K-PW). This is resulting in the inability of the transformer current to provide instantaneous the charge of the capacitors inside the power supply. Then verify that is not a problem for devices connected on AUX_OUT. In case it is not necessary to deactivate the power section, it is possible to use an unique transformer (max 700VA) with two isolated secondaries.

DUMP	As reported in Tab. 2 this condition occurs in case of overvoltage or discharge from the residual voltage on HV_OUT. More specifically, the overvoltage condition is established when HV_OUT exceed HV_INR about 6V. If there was a need you may verify HV_OUT during the DUMP analyzing the transient overvoltage: the variation of voltage HV_OUT before and during the surge must not be greater than the overvoltage condition. If this voltage difference is higher means that the internal dump of SDPOWR is ineffective, so you must connect a DUMP resistor on J6 (≥56Ω) in order to increase the energy discharge. Note! Properly dissipate DUMP resistance externally added. The effectiveness of the dump can be roughly estimated by looking the switch-on time of DL3. The shorter this time is, the more effective the dump is.
ELECTRICAL GROUNDING	It is important for electromagnetic interference and for CMZ devices connect GND_HV to ground as shown in the GND_HV connection examples described above. In particular to do that connect to ground a pin of J2(GND_HV). In order to reduce the interference to power supply input should be grounded also pin1-J7 and pin1-J8. Note! In general on each section can **NOT** connect to the ground while the secondary of transformer and the negative supply as this would create a short circuit in the negative half-wave voltage input.

Example: choice of voltage transformer

Transformer		Output voltage from SDPOWR[10]	
nominal primary voltage	secondary voltage (void condition): to be connected on HV_IN	HV_OUT Vtyp.	Vmax@ void condition
230Vac	55Vac	75Vdc	87Vdc
230Vac	80Vac	110Vdc	127Vdc
230Vac	110Vac	150Vdc	175Vdc
	secondary voltage (void condition): to be connected on AUX_IN	AUX_OUT Vtyp.	Vmax@ void condition
230Vac	20Vac	26Vdc	30Vdc
230Vac	27Vac	36Vdc	42Vdc
230Vac	32Vac	43Vdc	50Vdc

Tabella 3: voltage transformer example

[10] Variation includes the following: mains power supply + / -10%; transformer: + / -3% Vrated

4. ORDER CODES

Order codes are as follows:

SDPOWR.00: power supply AC/DC with auxiliary isolated voltage

SDPOWR.10: power supply AC/DC with auxiliary not isolated voltage that is connected to the main voltage through a diode