SD 700

Kompakt Series

VARIABLE SPEED DRIVE

Variable Speed Drive

Hardware and Installation Manual

POWER ELECTRONICS®

SD700

KOMPAKT Series

VARIABLE SPEED DRIVE

Variable Speed Drive

Hardware and Installation Manual

Edition: March 2013

SD7KMTHW01BI Rev. B

SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.

 **WARNING**	This symbol means improper operation may results in serious personal injury or death.
 **CAUTION**	Identifies shock hazards under certain conditions. Particular attention should be given because dangerous voltage may be present. Maintenance operation should be done by qualified personnel.
	Identifies potential hazards under certain conditions. Read the message and follow the instructions carefully.
	Identifies shock hazards under certain conditions. Particular attention should be given because dangerous voltage may be present.

E N G L I S H

Edition of March 2013

This publication could present technical imprecision or misprints. The information here included will be periodically modified and updated, and all those modifications will be incorporated in later editions.
To consult the most updated information of this product you might access through our website www.power-electronics.com where the latest version of this manual can be downloaded.

Revisions

Date	Revision	Description
08 / 06 / 2010	A	First edition
11 / 03 / 2013	B	Transportation. EMC installation requirements. Installation recommendations. STO board safety function. ATEX. Multipulse drive connection. CE marking. Control cooling.

INDEX

ENGLISH

SAFETY INSTRUCTIONS

IMPORTANT!

- Read this manual carefully to maximise the performance of this product and to ensure its safe use and installation.
- Power Electronics accepts no responsibility or liability for any damage resulting from inappropriate use of the equipment.
- In this manual, safety messages are classified as follows:

WARNING

Do not remove the metal cover while the power is applied or the unit is in operation.
Otherwise electric shock could occur.

Do not run the drive with the front cover removed.
Otherwise, you may get an electric shock due to the high voltage terminals or exposure of charged capacitors.

Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.
Otherwise, you may access the charged circuits and get an electric shock.

Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power. To remove the front cover check that the DC Link red LED is off, then remove the terminals metallic cover and check with a multimeter the following measures:

- **Measure between the output power busbars U, V, W and the cabinet and check that the voltage is around 0V.**
- **Measure that the DC link terminals +, - and chassis voltage are below 30VDC.**

Otherwise, you may get an electric shock.

Operate the switches with dry hands. Otherwise, you may get an electric shock.

Do not use cables with damaged insulation. Otherwise, you may get an electric shock.

Do not subject the cables to abrasions, excessive stress, heavy loads or pinching. Otherwise, you may get an electric shock.

Do not make any insulation or voltage withstand tests on the motor with the drive connected.

ENGLISH

CAUTION

Install the drive on a non-flammable surface. Do not place flammable material nearby. Otherwise fire could occur.

Disconnect the input power if the drive is damaged. Otherwise, it could result in a secondary accident or fire.

After stopping the drive, it will remain hot for a couple of minutes. Touching hot parts may result in skin burns.

Do not apply power to a damaged drive or to a drive with parts missing even if the installation is complete. Otherwise, you may get an electric shock.

It is not permitted to weld the cabinet; this can damage the electronic sensitive equipment inside.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the drive. Otherwise fire or accident could occur.

WARNINGS

RECEPTION

- The SD700 are carefully tested and perfectly packed before delivering.
- In the event of transport damage, please ensure that you notify the transport agency and POWER ELECTRONICS: 902 40 20 70 (International +34 96 136 65 57) or your nearest agent, within 24hrs from receipt of the goods.

UNPACKING

- Make sure model and serial number of the variable speed drive are the same on the box, delivery note and unit.
- Each variable speed drive is delivered with Hardware and Software technical manuals.

RECYCLING

- Packing of the equipments should be recycled. For this, it is necessary to separate different materials included (plastic, paper, cardboard, wood ...) and deposit them on proper banks.
- Waste products of electric and electronic devices should be selectively collected for your correct recycling company.

ELECTROMAGNETIC COMPATIBILITY (EMC)

- The drive is intended to be used in industrial environment (Second Environment), it achieve compliance with C3 category defined in IEC/EN 61800-3 standard following the installation recommendation within this manual.
- Select communication and control system according to the drive EMC environment. Otherwise, systems could suffer from interferences due to a low EMS level.

SAFETY

- Before operating the drive, read this manual thoroughly to gain and understanding of the unit. If any doubt exists then please contact POWER ELECTRONICS, (902 40 20 70 / +34 96 136 65 57) or your nearest agent.
- Wear safety glasses when operating the drive with power applied or the front cover is removed.
- Handle and transport the drive following the recommendations within this manual.
- Install the drive according to the instructions within this manual and the local regulations.
- Do not place heavy objects on the drive.
- Ensure that the drive is mounted vertically and keeping the minimum clearances distances.
- Do not drop the drive or subject it to impact.
- The SD700 Kompakt drives contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.
- Avoid installing the drive in conditions that differ from those described in the *Environmental Ratings* section.

CONNECTION PRECAUTIONS

- To ensure correct operation of the drive it is recommended to use a SCREENED CABLE for the control wiring.
- The motor cable should comply with the requirements within this manual. Due to increased leakage capacitance between conductors, external ground fault protection threshold value should be adjusted ad hoc.
- Do not disconnect motor cables if input power supply remains connected.
- The internal circuits of the SD700 Kompakt Series will be damaged if the incoming power is connected and applied to output terminals (U, V, W).
- Do not use power factor correction capacitors banks, surge suppressors, or RFI filters on the output side of the drive. Doing so may damage these components.
- Always check whether the DC Link red LED is OFF before wiring terminals. The capacitors may hold high-voltage even after the input power is disconnected.

TRIAL RUN

- Verify all parameters before operating the drive. Alteration of parameters may be required depending on application and load.
- Always apply voltage and current signals to each terminal that are within levels indicated within this manual.

OPERATION PRECAUTIONS

- When the Auto Restart function is enabled, keep clear of driven equipment, as the motor will restart suddenly after the fault reset.
- The “STOP / RESET” key on the keypad is active only if the appropriate function setting has been made. Pushing this button the drive will NOT perform a safe stop. It is available STO optional board, which installed with a separate EMERGENCY pushbutton, will disconnect the power and will be unable to generate torque in the motor with high reliability.
- If a fault is reset with the reference signal still active, the drive will unexpectedly restart. Verify that it is permissible for this to happen. Otherwise, it may lead to injury to people.
- Do not modify or alter internal wiring and spare parts without Power Electronics supervision.
- Before programming or operating the SD700 Kompakt Series, initialise all parameters back to factory default values.

EARTH CONNECTION

- Ground the drive and adjoining cabinets to ensure a safety operation and to reduce electromagnetic emission.
- Connect the input PE terminal only to the dedicated PE terminal of the drive. Do not use the case or the chassis screw for grounding.
- Ground the drive chassis through the dedicated and labelled terminals. Use appropriate conductors to comply with the local regulations. The ground conductor should be connected first and removed last.
- Motor ground cable must be connected to the PE output terminal of the drive and not to the installation's ground. We recommend that the section of the ground conductor (PE) should be equal or greater than the active conductor (U, V, W).
- If the user decides to use shielded motor cable, ensure a correct 360º shield bonding in both the drive cabinet and the motor terminal box.

HOW TO USE THIS MANUAL

Quick Guide

1- Make sure model and serial number of the drive are the same on the delivery note and unit. **See Chapter 2.**

2- Read carefully the safety instructions before installation, commissioning, operation and maintenance of the drive. **See safety instructions section.**

3- For reception, handling and transportation **see Chapter 4.**

4- Before the mechanical installation, check the environmental ratings, drive configuration mounting and clearances. **See chapter 5.**

5- Follow the mechanical installation instructions. **See Chapter 5.**

6- Before the electrical installations, check basic configuration and wiring recommendations, **see Chapter 6 and Chapter 7.**

7- Follow the electrical installation instructions in **Chapter 6 and Chapter 7.**

8- For Modbus Communication hardware, **see Chapter 8.**

9- Follow the commissioning instructions in **Chapter 9.**

10- For preventive maintenance instructions, follow the recommendations in **Chapter 12.**

1. INTRODUCTION

SD700 low voltage drives by Power Electronics is the most extensive product family with a power range from 1.5kW to 2000kW. It has been designed focused on maximum motor care, components durability and easy maintenance. SD700 portfolio is divided in 3 products series that comply with specific demands and standards in worldwide installations thanks to its own specific features: SD700, SD700KOMPAKT, SD700FREEMAQ (SD700FR & SD700FL).

The SD700 Kompakt series with a power density up to 800kW/m³ is the suitable solution when space saving is necessary. The drive keeps the advanced family features reducing up to 2.5 times the size. This series is available from 63kW to 800kW with a voltage range from 230VAC to 690VAC and is available for 6 and 12 pulses. It is delivered in two IP00 pieces, the drive unit and separately the input chokes, and can be easily adapted to IP20. The customer, following Power Electronics' recommendations, will easily install the components in a dedicated cabinet or technical room.

The whole family integrates unique features such as low dV/dt, smart mechanical design and accurate control.

Figure 1.1 SD700 Kompakt Series

SD700 products provide high efficiency, maximum control, functional safety, durability, easy commissioning and easy maintenance for the whole range. Power Electronics delivers flexible integrated solutions, fully tested under the most demanding environmental and electrical conditions.

2. CONFIGURATION TABLE AND STANDARD RATINGS

2.1. Configuration Table

EXAMPLE

CODE: SD7K037050121T

SD7K	0370		5		0		12		1		T		-	
SD700 KOMPAKT Series	Output Current [1]		Input Voltage		Protection Degree		Pulse Number		Filter		Floating Earth		Input Frequency	
	0370	370A	2	230VAC	0	IP00	-	6 Pulse	-	2nd Environment	-	Without floating earth	-	50Hz
	0460	460A	5	380-500VAC	2	IP20	12	12 Pulse	F	1st Environment [2]	T	With floating earth	6	60Hz [3]
	...	...	7	525VAC										
			6	690VAC										

GENERAL CONSIDERATIONS:

[1] Verify the rated current of the motor nameplate to guarantee the compatibility with the selected drive.
[2] Floating earth drive not available with first environment filter.
[3] Consult availability.

Examples: SD7K037052 - SD700 Kompakt, 370A, 400VAC, Protection Degree IP20, 6 pulses, Environment 2
SD7K092550 - SD700 Kompakt, 925A, 400VAC, Protection Degree IP00, 6 pulses, Environment 2
SD70720201 - SD700 Kompakt, 720A, 230VAC, Protection Degree IP00, 6 pulses, Environment 1

2.2. Standard Ratings – 230Vac

6 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 230VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 230VAC	120% Overload (A)
1	SD7K0210 2X Y	210	63	315	263	75	315
	SD7K0250 2X Y	250	75	375	313	75	375
	SD7K0275 2X Y	275	75	413	344	100	413
2	SD7K0330 2X Y	330	100	495	413	110	495
	SD7K0370 2X Y	370	110	555	463	140	555
	SD7K0460 2X Y	460	140	690	575	185	690
3	SD7K0580 2X Y	580	185	870	725	200	870
	SD7K0650 2X Y	650	200	975	813	220	975
	SD7K0720 2X Y	720	220	1080	900	250	1080

2.3. Standard Ratings – 400Vac

6 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 400VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 400VAC	120% Overload (A)
1	SD7K0210 5X Y	210	110	315	263	132	315
	SD7K0250 5X Y	250	132	375	313	160	375
	SD7K0275 5X Y	275	150	413	344	200	413
2	SD7K0330 5X Y	330	160	495	413	220	495
	SD7K0370 5X Y	370	200	555	463	250	555
	SD7K0460 5X Y	460	250	690	575	315	690
3	SD7K0580 5X Y	580	315	870	725	400	870
	SD7K0650 5X Y	650	355	975	813	450	975
	SD7K0720 5X Y	720	400	1080	900	500	1080
4	SD7K0840 5X Y	840	450	1260	1050	560	1260
	SD7K0925 5X Y	925	500	1388	1156	630	1388
	SD7K0990 5X Y	990	560	1485	1238	710	1485

12 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 400VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 400VAC	120% Overload (A)
4	SD7K0840 5X 12 Y	840	450	1260	1050	560	1260
	SD7K0925 5X 12 Y	925	500	1388	1156	630	1388
	SD7K0990 5X 12 Y	990	560	1485	1238	710	1485

2.4. Standard Ratings – 440Vac

6 PULSES									
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY				Operation Temperature 40ºC NORMAL DUTY			
		I(A) Rated	Motor Power (kW) at 440VAC		150% Overload (A)	I(A) Rated	Motor Power (kW) at 440VAC		120% Overload (A)
			kW	HP			kW	HP	
1	SD7K0210 5X Y	191	110	150	286,5	238,7	132	180	286,5
	SD7K0250 5X Y	227	132	180	340,5	283,7	160	240	340,5
	SD7K0275 5X Y	250	150	200	375	312,5	200	275	375
2	SD7K0330 5X Y	300	160	240	450	375	220	300	450
	SD7K0370 5X Y	336	200	275	504	420	250	340	504
	SD7K0460 5X Y	418	250	340	627	522,5	315	400	627
3	SD7K0580 5X Y	527	315	400	790,5	658,7	400	500	790,5
	SD7K0650 5X Y	591	355	450	886,5	738,7	450	600	886,5
	SD7K0720 5X Y	654,5	400	500	981,7	818,1	500	650	981,7
4	SD7K0840 5X Y	764	450	600	1146	955	560	750	1146
	SD7K0925 5X Y	841	500	650	1261,5	1051,2	630	850	1261,5
	SD7K0990 5X Y	900	560	750	1350	1125	710	900	1350

ENGLISH

12 PULSES									
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY				Operation Temperature 40ºC NORMAL DUTY			
		I(A) Rated	Motor Power (kW) at 440VAC		150% Overload (A)	I(A) Rated	Motor Power (kW) at 440VAC		120% Overload (A)
			kW	HP			kW	HP	
4	SD7K0840 5X 12 Y	764	450	600	1146	955	560	750	1146
	SD7K0925 5X 12 Y	841	500	650	1261,5	1051,2	630	850	1261,5
	SD7K0990 5X 12 Y	900	560	750	1350	1125	710	900	1350

2.5. Standard Ratings – 500Vac

6 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 500VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 500VAC	120% Overload (A)
1	SD7K0210 5X Y	168	110	252	210	132	252
	SD7K0250 5X Y	200	132	300	250	150	300
	SD7K0275 5X Y	212	150	318	265	160	318
2	SD7K0330 5X Y	264	160	396	330	200	396
	SD7K0370 5X Y	296	200	444	370	250	444
	SD7K0460 5X Y	368	250	552	460	315	552
3	SD7K0580 5X Y	464	315	696	580	355	696
	SD7K0650 5X Y	520	355	780	650	400	780
	SD7K0720 5X Y	576	400	864	720	450	864
4	SD7K0840 5X Y	672	450	1008	840	500	1008
	SD7K0925 5X Y	740	500	1110	925	560	1110
	SD7K0990 5X Y	767	560	1151	959	630	1151

12 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 500VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 500VAC	120% Overload (A)
4	SD7K0840 5X 12 Y	672	450	1008	840	500	1008
	SD7K0925 5X 12 Y	740	500	1110	925	560	1110
	SD7K0990 5X 12 Y	767	560	1151	959	630	1151

2.6. Standard Ratings – 525Vac

6 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 525VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 525VAC	120% Overload (A)
1	SD7K0180 7X Y	180	132	270	222	150	270
	SD7K0205 7X Y	205	150	308	254	185	308
2	SD7K0270 7X Y	270	200	405	334	250	405
	SD7K0295 7X Y	295	220	443	360	280	443
	SD7K0340 7X Y	340	250	510	417	315	510
3	SD7K0425 7X Y	425	315	638	526	400	638
	SD7K0470 7X Y	470	355	705	586	450	705
	SD7K0535 7X Y	535	400	803	666	500	803
4	SD7K0660 7X Y	660	500	990	824	600	990
	SD7K0750 7X Y	750	560	1125	936	700	1125

12 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 525VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 525VAC	120% Overload (A)
4	SD7K0660 7X 12 Y	660	500	990	824	600	990
	SD7K0750 7X 12 Y	750	560	1125	936	700	1125

2.7. Standard Ratings – 690Vac

6 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 690VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 690VAC	120% Overload (A)
1	SD7K0130 6X Y	130	110	195	163	132	195
	SD7K0150 6X Y	150	132	225	188	160	225
	SD7K0170 6X Y	170	160	255	213	200	255
2	SD7K0210 6X Y	210	200	315	263	250	315
	SD7K0260 6X Y	260	250	390	325	315	390
	SD7K0320 6X Y	320	315	480	400	355	480
3	SD7K0385 6X Y	385	355	578	481	450	578
	SD7K0460 6X Y	460	450	690	575	500	690
4	SD7K0550 6X Y	550	500	825	688	630	825
	SD7K0660 6X Y	660	630	990	825	800	990

12 PULSES							
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY			Operation Temperature 40ºC NORMAL DUTY		
		I(A) Rated	Motor Power (kW) at 690VAC	150% Overload (A)	I(A) Rated	Motor Power (kW) at 690VAC	120% Overload (A)
4	SD7K0550 6X 12 Y	550	500	825	688	630	825
	SD7K0660 6X 12 Y	660	630	990	825	800	990

ENGLISH

3. TECHNICAL CHARACTERISTICS

SD700 Kompakt			
INPUT	POWER RANGE [1]		63kW - 800 kW
	VOLTAGE POWER		230Vac, 380-500Vac, 525Vac, 690Vac, 3 phases (±10%)
	MULTIPULSE		6, 12
	INPUT FREQUENCY		50Hz/60Hz ±6%
	INPUT RECTIFIER TECHNOLOGY		Thyristor-Diode
	DISPLACEMENT POWER FACTOR (DPF = cos Φ)		≥ 0.98
	POWER FACTOR (PF= I_1/I_{rms}· cos Φ)		≥ 0.91
	MOMENTARY POWER LOSS		> 2sec (depending on the load inertia)
	EMC INPUT FILTER		Second environment (Industrial): (C3 Standard) First environment (Domestic): C2 (Optional). C1 consult with Power Electronics Optional IT filter
	HARMONICS FILTER		Choke coils 3% impedance
	CURRENT THD (%)		≤ 40%
	REGENERATIVE		NO
OUTPUT	OUTPUT FREQUENCY [2]		0... 200% of the nominal motor frequency (Hz)
	OVERLOAD CAPACITY		Constant torque/heavy duty: 150% during 60 sec at 50ºC Variable torque/normal duty: 120% during 60 sec at 40ºC.
	EFFICIENCY (At rated current and voltage)		≥98%
	CONTROL METHOD		V/Hz
			VECTOR CONTROL Open Loop: PMC: speed (OLSP)/torque control (OLTQ), AVC: speed (OLSP)/torque control (OLTQ). Close Loop (Encoder): speed (CLSP)/torque control (CLTQ), AVC: speed (CLSP)/torque control (CLTQ).
	SWITCHING FREQUENCY		4 to 8kHz – PEWave
	OUTPUT DV/DT FILTER		500 to 800V/µs
	OUTPUT CABLE LENGTH [3]		USC150m SC 75m
	DYNAMIC BRAKE		External B150 Dynamic Brake
ENVIRONMENTAL CONDITIONS	OPERATION AMBIENT TEMPERATURE		Minimum: -20°C Maximum: +50°C
	STORAGE TEMPERATURE		Minimum: -40°C Maximum: +70°C
	ALTITUDE		1000m
	POWER ALTITUDE DERATING [1]		>1000m, 1% P_N(kW) per 100m; 3000m max
	AMBIENT HUMIDITY		<95%, non-condensing
	DEGREE OF PROTECTION		IP00, IP20
	VIBRATION	DEFLECTION	0.075mm at 10Hz-57Hz
		ACCELERATION	9.8m/s² at 57Hz-150Hz
	HEATING RESISTORS		Optional
PROTECTIONS	MOTOR PROTECTIONS		Rotor locked, Motor Overload (thermal model), Output current limit, Phase current imbalance, Phase voltage imbalance, Motor over-temperature (PTC signal), Speed limit, Torque limit.
	DRIVE PROTECTIONS		IGBT's overload, Input phase loss, Low input voltage, High input voltage, DC Bus voltage limit, Low DC Bus voltage, High input frequency, Low input frequency, IGBT temperature, Heat-sink over-temperature, Power supply fault, Drive thermal model, Ground fault, Software and Hardware fault, Analogue input signal loss (speed reference loss), Safe stop / Emergency stop.

[1] Other configuration, consult Power Electronics.
[2] For operation frequencies higher than 100Hz consult Power Electronics.
[3] SC: Shielded cable, USC: Unshielded Cable. Follow Power Electronics installation recommendations. For greater cable lengths consult with Power Electronics.

SD700 Kompakt		
HARDWARE	DIGITAL INPUTS	6 programmable
		Active high (24Vdc), 1 PTC input, Isolated power supply
	DIGITAL OUTPUTS	3 Programmable changeover relays (250Vac, 8A or 30Vdc, 8A)
	ANALOGUE INPUTS	2 Programmable differential inputs: 0 – 20mA, 4 – 20mA, 0 – 10Vdc and ±10Vdc. Optically isolated.
	ANALOGUE OUTPUTS	2 Isolated programmable outputs: 0 – 20mA, 4 – 20mA, 0 – 10Vdc and ±10Vdc
	ENCODER INPUTS (Optional)	Two differential encoders input. Voltages inputs from 5 to 24Vdc
	USER POWER SUPPLY	+24Vdc user power supply (Max 180mA) regulated and short-circuit protected +10Vdc user power supply (Max 2 potentiometers R= 1kΩ) regulated and short-circuit protected
	I/O EXTENSION BOARD (Optional)	4 Digital Inputs: Programmable inputs and active high (24Vdc). Optically isolated. 1 Analogue Input: Programmable and differential input. 5 Digital Outputs: Programmable multi-function relays. 1 Analogue Output: Programmable outputs in voltage / current.
	EXTERNAL POWER SUPPLY (Optional)	24V External Power Supply, Fault Relay integrated
COMMUNICATION	STANDARD HARDWARE	USB port
		RS232 port
		RS485 port
	OPTIONAL HARDWARE	Optical fiber
		Ethernet
	STANDARD PROTOCOL	Modbus-RTU
	OPTIONAL PROTOCOL	Profibus-DP
		DeviceNet
		Ethernet (Modbus TCP)
		Ethernet IP
		CAN Open
		N2 Metasys Gateway
CONTROL PANEL	TYPE	Removable
	LENGTH	3 meters and 5 meters (optional)
	CONNECTION	RJ45
	VISUALIZATION LEDS	LED ON: Control board is energized
		LED RUN: Motor receiving power supply
		LED FAULT: Flashing displays that a fault has occurred
	ALPHANUMERIC DISPLAY	4 lines x 16 characters
		Keypad with 6 keys to control and configure the drive, start and stop/reset
		Independent memory
	COLOUR TOUCH-SCREEN DISPLAY (Optional)	3.5'' Touch Screen (240x320 pixels) with pen
		4Gb MicroSD card | Faults and events log and notification
		Quad Band GSM modem integrated to remote start, stop and notification by SMS
		Ethernet Switch with two RJ45 connections
		Optional 5Vdc external power supply or batteries
	DISPLAY INFORMATION	Average current and 3-phase motor current
		Average voltage and 3-phase motor voltage
		Average input voltage and 3-phase input voltage
		3-phase input and output frequency
		DC Bus Voltage
		Drive Status
		Speed, Torque, Power, Power factor of motor
		Register of total and partial drive running time with reset function. (hours)
		Register of total and partial drive energy consumption with reset function (kWh)
		Relay status
		Digital inputs / PTC status
		Output comparator status
		Analogue inputs and sensor values
		Analogue output value
		Motor overload and equipment status
		Drive and rectifier temperature
		Fault history (last 6 faults)
	OTHERS	Real time clock
		Perpetual calendar

ENGLISH

SD700 Kompakt		
REGULATIONS	**CERTIFICATIONS**	CE, cTick, UL [4], cUL [4]
	ELECTROMAGNETIC COMPATIBILITY	EMC Directive (2004/108/CE)
		IEC/EN 61800-3
	DESIGN AND CONSTRUCTION	LVD Directive (2006/95/CE)
		IEC/EN 61800-2 General requirements
		IEC/EN 61800-5-1 Safety
		IEC/EN 60146-1-1 Semiconductor converters
		IEC 60068-2-6 Vibration
	FUNCTIONAL SAFETY	IEC/EN 61800-5-2 (STO) certified by Tüv Rheinland

[4] On certification process.

4. RECEPTION, HANDLING AND TRANSPORTATION

CAUTION

Read carefully the following installation instructions for a correct handling.
Otherwise, the equipment can be damaged and lead to injury to people**.**

4.1. Reception and Storage

The SD700 Kompakt are carefully tested and perfectly packed before delivering. In the event of transport damage, please ensure that you notify the transport agency and Power Electronics: 902 40 20 70 (International +34 96 136 65 57) or your nearest agent, within 24hrs from receipt of the goods.

Make sure model and serial number of the drive are the same on the delivery note and unit.

Drive's storage should be sun and moisture protected and with an ambient temperature between -40°C and +70°C, < 95 RH without condensation. It is recommended not pile more than two units.

4.2. Handling and Transportation

Only the transport methods described in this document or in the delivery notes are permissible. Any other transport method or system could damage the unit.

SD700 Kompakt is delivered horizontally. The drives are delivered fastened to a wooden pallet, covered with a cardboard box in frame 1 or with a wooden box in frames 2 on. Depending on the transport method, the drive could be moisture protected with a vacuum plastic bag. Move the complete pallet as close as possible to its final installation place before unpacking, to avoid any damage during transportation.

It is mandatory to transport it with a pallet truck, forklift or crane fork, taking care about the load distribution and center of gravity. Check the size and weight of VFD components to choose proper lifting equipment with a capacity greater than the drive weight.

Unpack the drive carefully. Do not use edge tool to protect the product from damage. After open the package, please check the goods contained. Verify the item numbers contained within the package with the packing inventory list. Please set aside and reserve, if contained, the case of spare parts shipped with the product. There should be no evident damage caused by vibration, dropping or moisture.

CAUTION

If the maximum tonnage of cranes cannot meet the requirement, it could cause damage to the equipment and lead to injury to people.

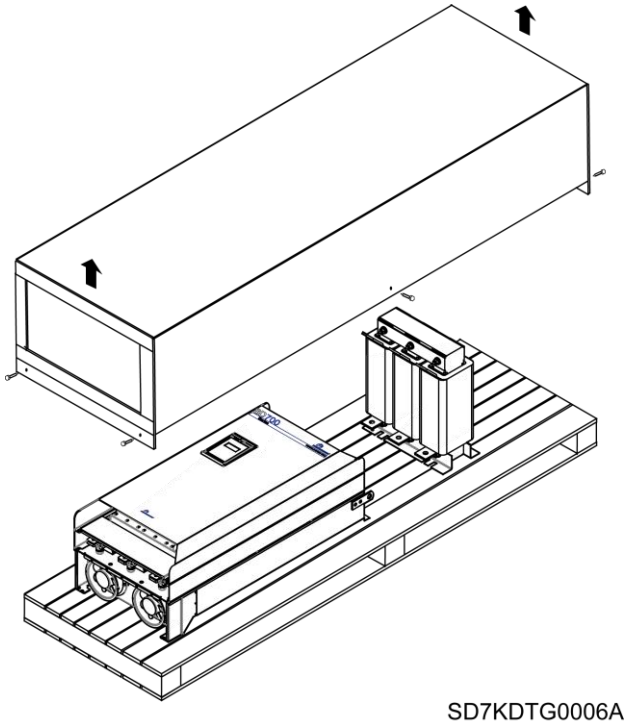


Figure 4.1 SD700 Kompakt unpacking

To unpack, if necessary, unscrew the bolts that fix the cardboard or wooden box with the pallet. Then, the drive and the inductance are fixed to the pallet through the screws placed in its four corners, unscrew all the fixation screws, otherwise if the cabinet is lifted the pallet could cause damage.

To rise to an upright position use only a crane or forklift equipped with belts or slings. Lift it carefully pulling from the top eyebolts. Avoid brusque movements and shocks during transportation. At the time of placing the drive on the floor, stop lowering it just before reaching the floor and then slowly lower it on the floor to avoid any shock.

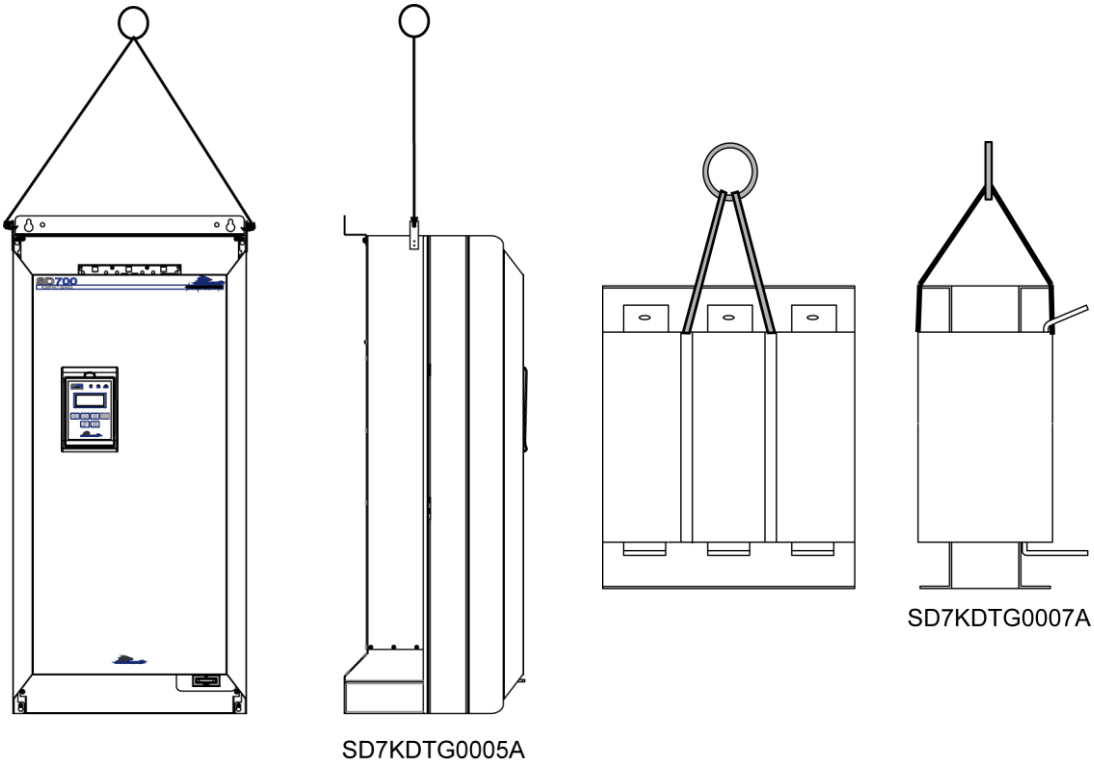


Figure 4.2 Lifting of the equipment

During handling and transportation, the goods should not be exposed to moisture, overturned, inverted, tilted or impacted. The tilting angle should be no more than 30º.

5. MECHANICAL INSTALLATION

CAUTION

The installation must be done by qualified personal.
Otherwise, the equipment can be damaged and lead to injury to people.

5.1. Environmental Ratings

It is recommended to follow the instructions of this manual to ensure the correct operation of the drive. The installer has the responsibility of a properly indoor installation to ensure the ambient conditions of the VFD. Additionally, the installer is ultimate responsible of the local regulation fulfilment. The environmental ratings are the following ones:

- Environmental category: Indoor
- Wet locations: No
- Pollution degree: PD3
- Ingress protection rating: IP00 for SD700 Kompakt cabinet and inductances
IP20 with SD700 Kompakt housing
- Operation Ambient temperature: -20ºC to 50ºC
- Storage Ambient temperature: -40ºC to 70ºC
- Humidity: < 95 % (non condensing)
- Heating resistors: Optionals
- Maximum altitude and power derating: 1000m 1% PN(kW) per 100m; 3000m maximum
- Vibration (IEC60068-2-6): Amplitude 0.075 (10Hz-57Hz)
Acceleration 9.8m/s² (57Hz-150Hz)
- Audible Noise: < 79dB
- Overvoltage category: III
- Protection class: Class 1
- Painting: Standard colour RAL 7047, other under request

ENGLISH

5.2. Drive Mounting

This section provides guidelines to select the best mounting location to ensure the optimum performance, cautions and warnings that you should follow to avoid injury and/or equipment damage.

The variable speed drives of the SD700 Kompakt series are wall-mounting drives, specially designed to be mounted in a technical room or inside a cabinet.

The installation method and mounting location must be suitable for the weight and dimensions of the drive. Power electronics recommend hanging the SD700 Kompakt cabinet on a solid wall or structure through the anchorages placed on the rear part of the drive, which supports the VFD's weight and the possible forces generated by the wiring.

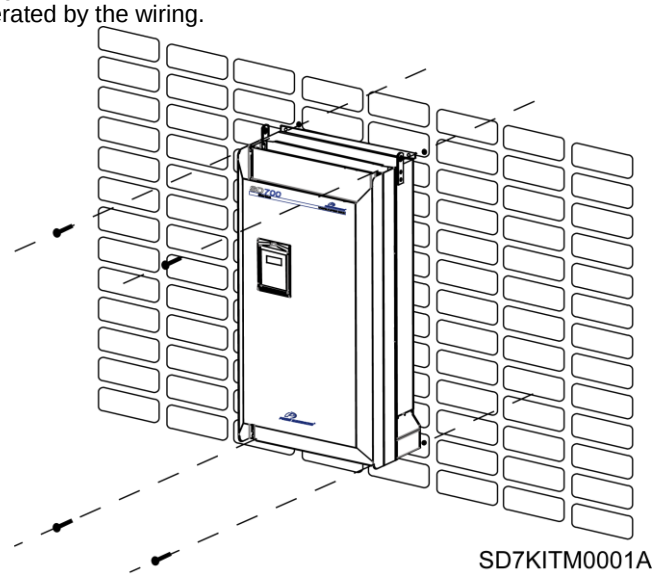


Figure 5.1 SD700 Kompakt wall mounted

5.2.1. Installation inside a cabinet

For cabinet installation, the drive will be mounted without extension box (IP20). Otherwise the drive could have refrigeration problems. The drive should be mounted vertically. It should be well fastened through the anchorages designed for this to avoid any movement. The input inductances (CHOKE) delivered with the drive must be mounted vertically aside the drive in front of the inlet fan to ensure a correct operation. They will never be installed aligned under or above the drive. This restriction will avoid crossing the power cables or a cooling defect. The maximum length of the cables between the chokes and the drive must be 3 m. It is recommended to install the Display outside the cabinet and integrated on the door. This configuration will permit a safety drive operation and configuration.

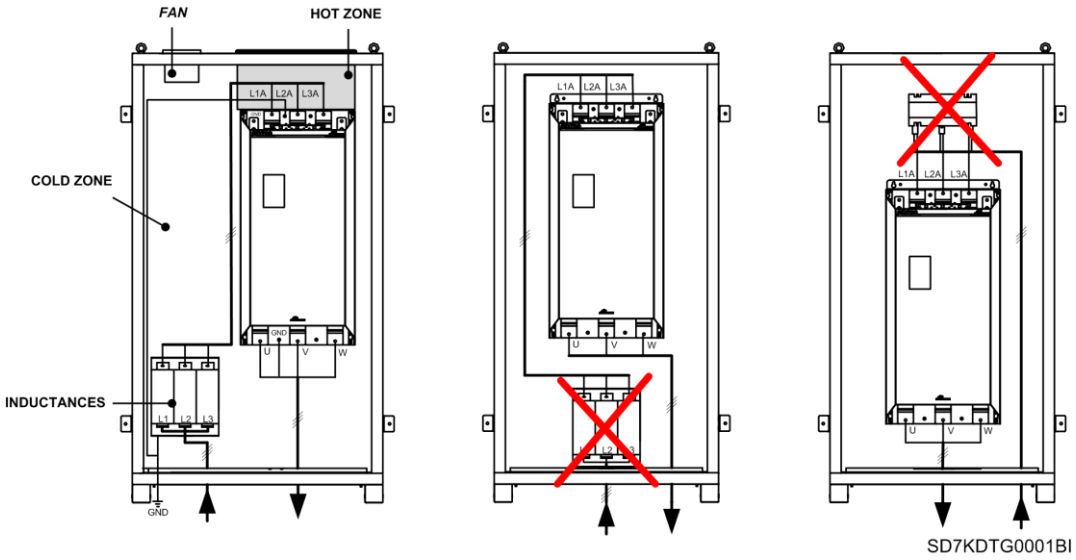


Figure 5.2 Inductances position

The cabinet must have two isolated zones, which permit independent cooling systems:

- The Hot Zone consists of the back and top part of the drive, the air must be expelled out of the cabinet and should avoid the internal or external recirculation. The hot zone inlet grating must be aligned with the fan inlets of the drive. The inlet and outlet gratings for IP20, and the additional fans for IP54 cabinet must be designed according to the following tables.
- The cold zone consists of the Choke inductances, the electronics and connection terminals. The cold zone inlet fan must be in front of the inductances and the exhaust fan on the upper part of the cabinet. The inlet and outlet fans for IP20 or IP54 cabinet must be designed according to the following tables.

Minimum flow rates IP20 & IP54			
SD700 KOMPAKT Frame	Hot Zone Air Flow (m^3/h)	Cold Zone Air Flow (m^3/h)	
		Inlet fan	Exhaust fan
1	800	150	300
2	1600	150	300
3	2400	250	500
4	3200	250	500

Minimum gratings area IP20 & IP54				
SD700 KOMPAKT Frame	Hot Zone		Cold Zone	
	Inlet grating (mm^2)	Outlet grating (mm^2)	Inlet grating (mm^2)	Outlet grating (mm^2)
1	25.500	92.500	12.000	18.000
2	40.000	172.500	20.000	28.000
3	63.000	252.500	30.000	45.000
4	90.000	332.500	42.000	62.500

The following figures describe the SD700 Kompakt IP20 cabinet component distribution. The IP54 cabinet must be equipped with the additional features:

- Additional dust filters in all the inlet and outlet gratings.
- Additional IP54 exhaust fan for the hot zone.

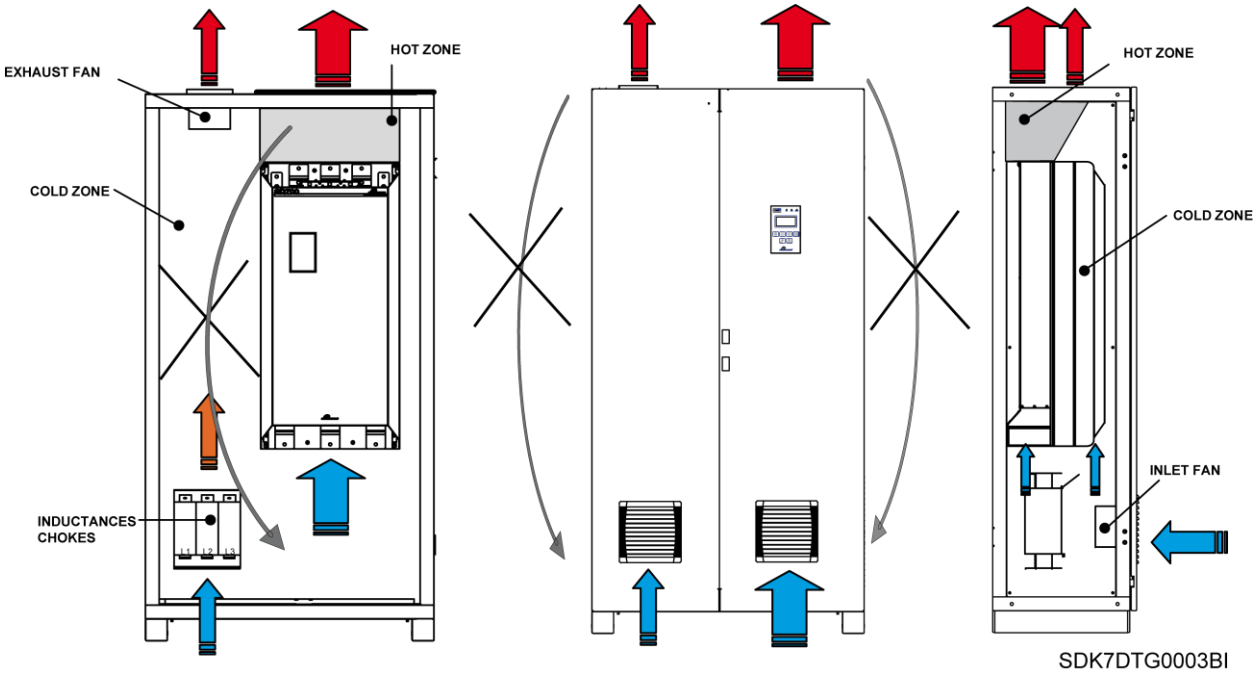


Figure 5.3 Cooling air flow frames 1 and 2

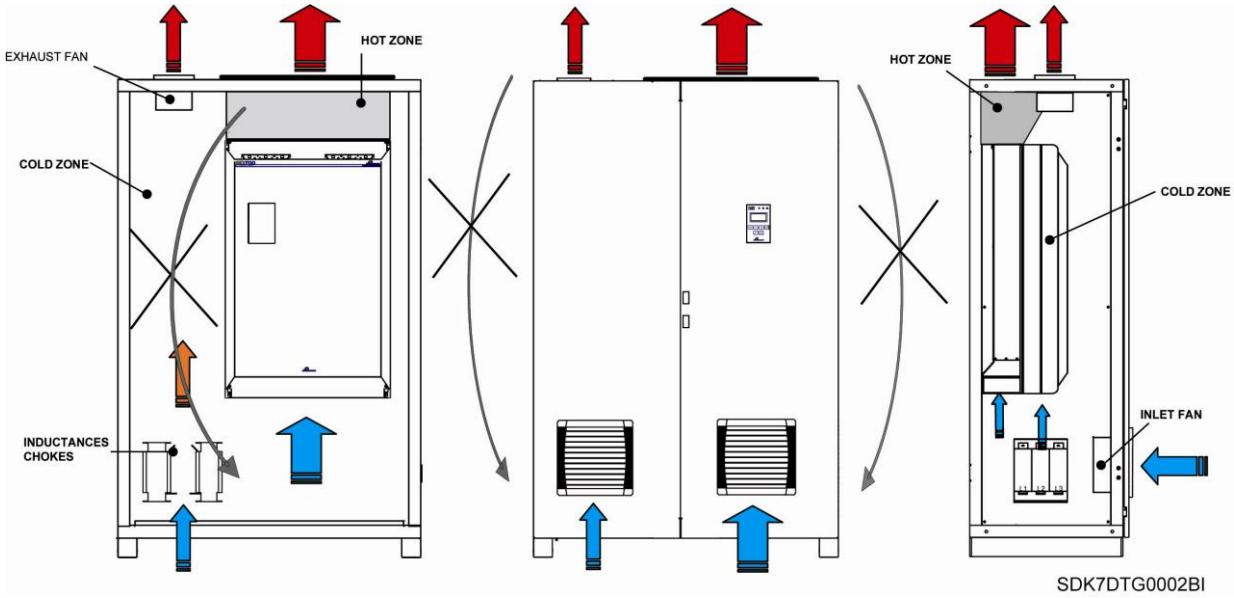
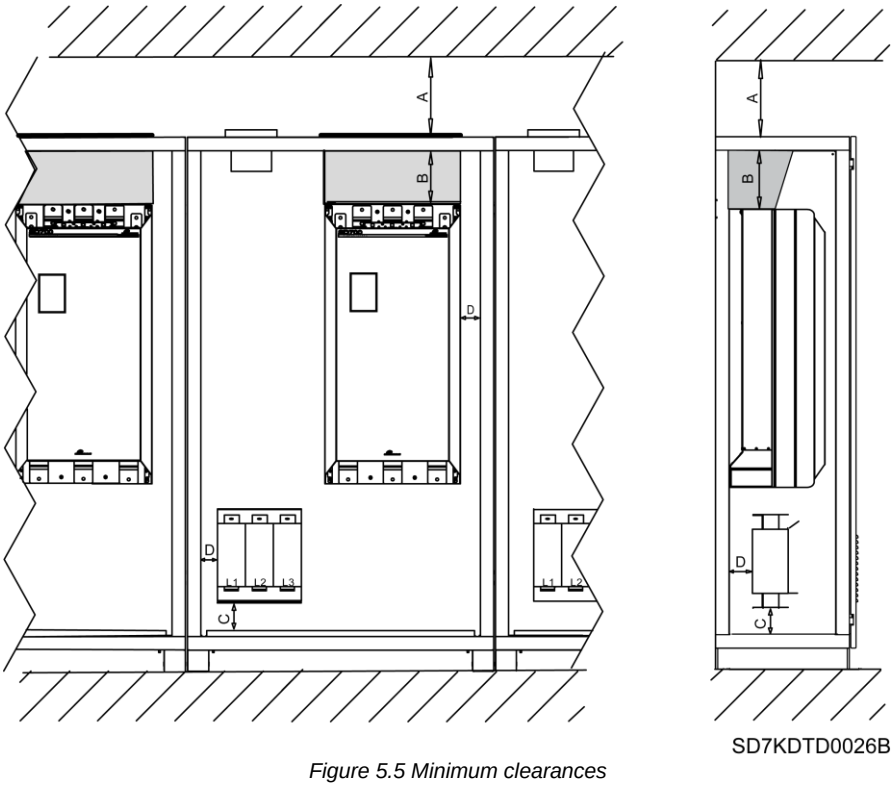


Figure 5.4 Cooling air flow frames 3 and 4

For a correct maintenance and cooling the cabinet must be selected according to the following requirements:

- Minimum cabinet dimensions according to the following table.
- Minimum clearances between the inductances, the drive and de adjacent equipment. See following drawings.

SD700 KOMPAKT Frame	Minimum cabinet size (H / W / D)(mm)
1	2000x1000x500
2	2000x1000x500
3	2000x1500x600
4	2000x1800x600



Minimum clearances (mm)			
A	**B**	**C**	**D**
400	**350**	**150**	**100**

Figure 5.5 Minimum clearances

5.2.2. Installation in technical room

For technical room installation, the drive can be mounted with extension box (IP20). The drive should be mounted vertically. It should be well fastened through the anchorages designed for this to avoid any movement. The input inductances (CHOKE) delivered with the drive must be mounted vertically aside the drive to ensure a correct operation. They will never be installed aligned under or above the drive. This restriction will avoid crossing the power cables or a cooling defect. The maximum length of the cables between the chokes and the drive must be 3 m.

The inductance connection must be done with aluminium plates, with nickel-plated copper plates, or plain copper plates but using contact paste in order to prevent galvanic corrosion between copper and aluminium. The screw attachment of the connection plates and the inductance aluminium terminal must be protected from humidity by applying petroleum jelly on the screw thread, the washer and nut.

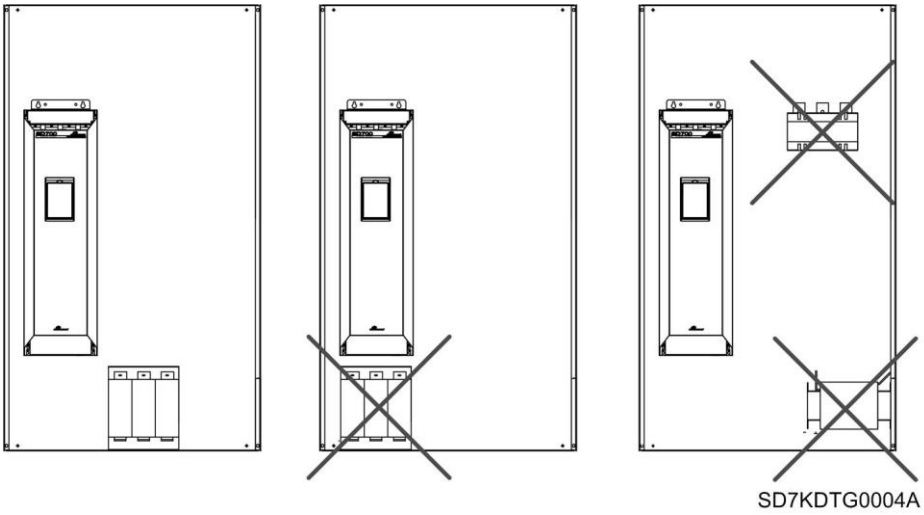


Figure 5.6 Inductances position

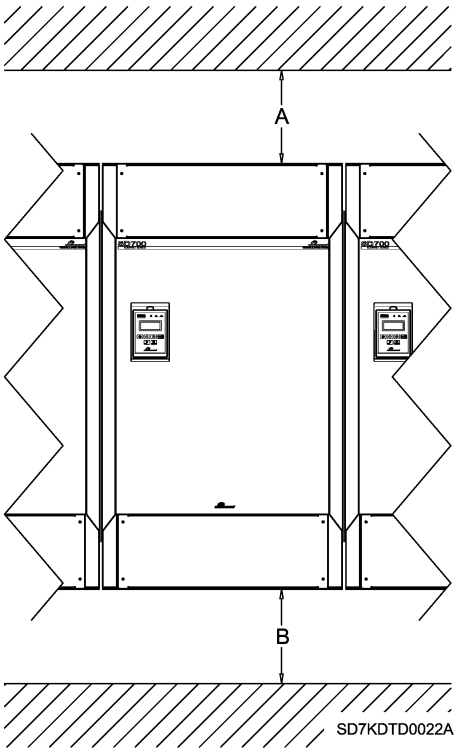


Figure 5.7 Vertical clearances

FRAME	POWER RANGE (kW)	CLEARANCE (mm)	
		A	B
230VAC			
1	63-75	100	100
2	100-140	145	145
3	185-220	190	145
380-690VAC			
1	110-150	145	145
2	160-250	190	145
3	315-400	290	240
4	450-630	390	240

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5.3. Tables of Heat Dissipation

Heat dissipation values have been obtained with a carrier frequency of 4kHz. The heat sources inside the equipment correspond with the inverter bridge (IGBTs), rectifier bridge, the input filter and the output dV/dt filter. SD700 Kompakt series present an overall efficiency higher than 98% at rated power, so the heat dissipation approximately corresponds to 2% of the input power.

The cooling system of the drive depends on the degree of protection and the frame size.

400Vac									
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY				Operation Temperature 40ºC NORMAL DUTY			
		I(A) Rated	Motor Power (kW) at 400VAC	150% Overload (A)	Dissipated Heat (W)	I(A) Rated	Motor Power (kW) at 400VAC	120% Overload (A)	Dissipated Heat (W)
1	SD7K0210 5X	210	110	315	2494,8	263	132	315	2993,8
	SD7K0250 5X	250	132	375	3564	313	160	375	4320
	SD7K0275 5X	275	150	413	4080	344	200	413	5440
2	SD7K0330 5X	330	160	495	4160	413	220	495	5720
	SD7K0370 5X	370	200	555	5300	463	250	555	6625
	SD7K0460 5X	460	250	690	6725	575	315	690	8473,5
3	SD7K0580 5X	580	315	870	8127	725	400	870	10320
	SD7K0650 5X	650	355	975	9230	813	450	975	11700
	SD7K0720 5X	720	400	1080	10560	900	500	1080	13200
4	SD7K0840 5X	840	450	1260	11655	1050	560	1260	14504
	SD7K0925 5X	925	500	1388	13050	1156	630	1388	16443
	SD7K0990 5X	990	560	1485	13970	1238	710	1485	17600

690Vac									
FRAME	CODE	Operation Temperature 50ºC HEAVY DUTY				Operation Temperature 40ºC NORMAL DUTY			
		I(A) Rated	Motor Power (kW) at 690VAC	150% Overload (A)	Dissipated Heat (W)	I(A) Rated	Motor Power (kW) at 690VAC	120% Overload (A)	Dissipated Heat (W)
1	SD7K0130 6X	130	110	195	2970	163	132	195	3564
	SD7K0150 6X	150	132	225	3616,8	188	160	225	4384
	SD7K0170 6X	170	160	255	4448	213	200	255	5560
2	SD7K0210 6X	210	200	315	5160	263	250	315	6450
	SD7K0260 6X	260	250	390	6500	325	315	390	8190
	SD7K0320 6X	320	315	480	7938	400	355	480	8946
3	SD7K0385 6X	385	355	578	9017	481	450	578	11430
	SD7K0460 6X	460	450	690	11610	575	500	690	12900
4	SD7K0550 6X	550	500	825	12900	688	630	825	16254
	SD7K0660 6X	660	630	990	16380	825	800	990	20800

6. POWER CONNECTION

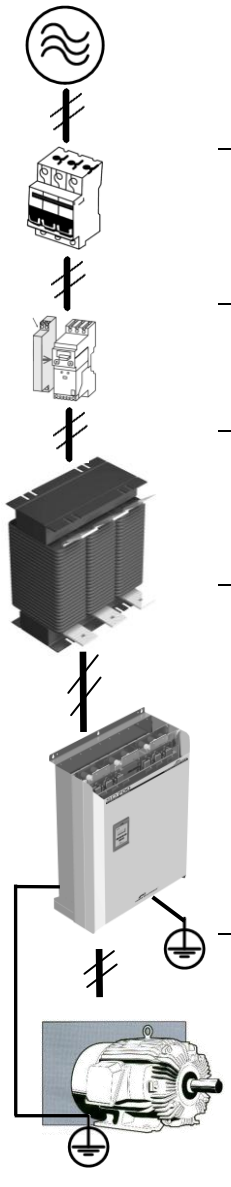
CAUTION

Read carefully the following installation instructions for a correct electrical installation.
Otherwise, it could cause damage to the equipment and lead to injury to people.

The access to the SD700 KOMPAKT power terminals can be only done removing the front cover. The front cover can be removed unscrewing the 4 screws located in the four cover corners. The SD700 KOMPAKT cover integrates cooling fans and a display. Ensure disconnect these fans and the display before removing the cover. Otherwise, the drive could be damaged.

6.1. Basic configuration

Proper safety equipment must be selected and correct connections must be done to ensure proper operation. An incorrectly applied or installed drive can result in system malfunction or reduction in product lifetime as well as component damage. You must read and understand this manual thoroughly before proceeding.



AC Power Supply	Use a power source with a voltage within the permissible range of drive input power rating. Equipment is provided to operate with the neutral connected to the ground.
Earth leakage circuit breaker (ELB)	Select circuit breakers or fuses in accordance with applicable national and local codes. We recommend using specified circuit breakers or fuses to operate with drive.
Inline Magnetic Contactor	Install if necessary. When installed, do not use it for the purpose of starting or stopping the drive.
Input inductance	The input inductance (CHOKE) reduces the current and voltage harmonic distortion, protects the drive from main disturbances decreasing the risk of damage due to over-voltages.
Installation and wiring	To operate the drive reliably, install the drive in the proper orientation and with proper clearances. Incorrect terminal wiring could result in the equipment damage.
Motor	Do not connect power factor capacitors, surge arrestors or radio noise filters to the output side of the drive.

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6.2. Topology

SD700 Kompakt drive operates according to the principle of pulse-width modulation (PWM). Varying the power supply voltage and the grid frequency, it is possible to control the speed and torque of the connected induction three-phase motors by means of its main components: rectifier bridge, the DC bus, inverter bridge, and power and control board.

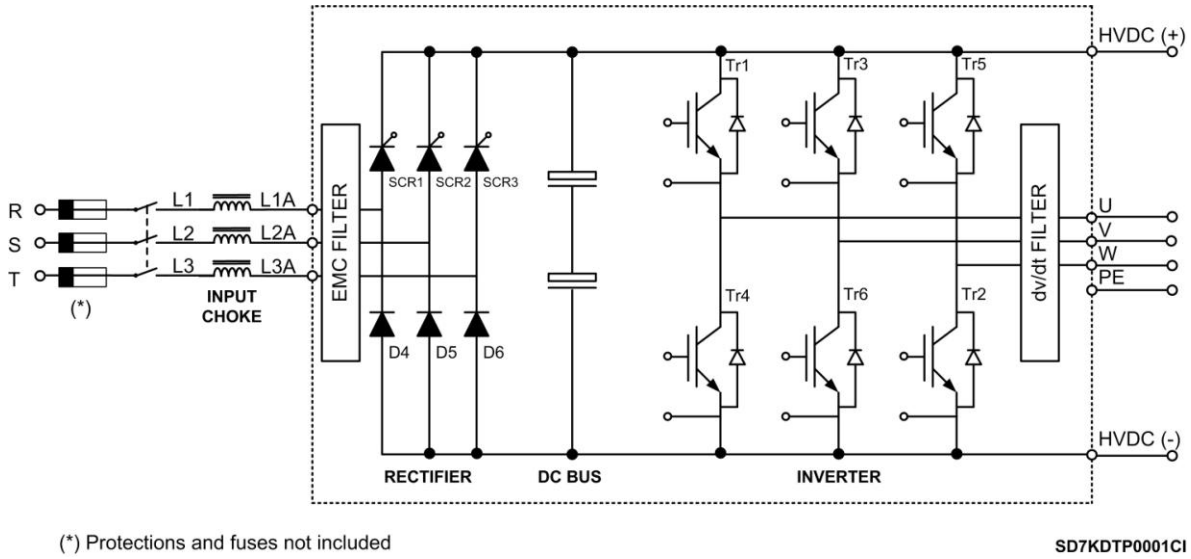

Figure 6.1 General Block Scheme for frames 1 and 2

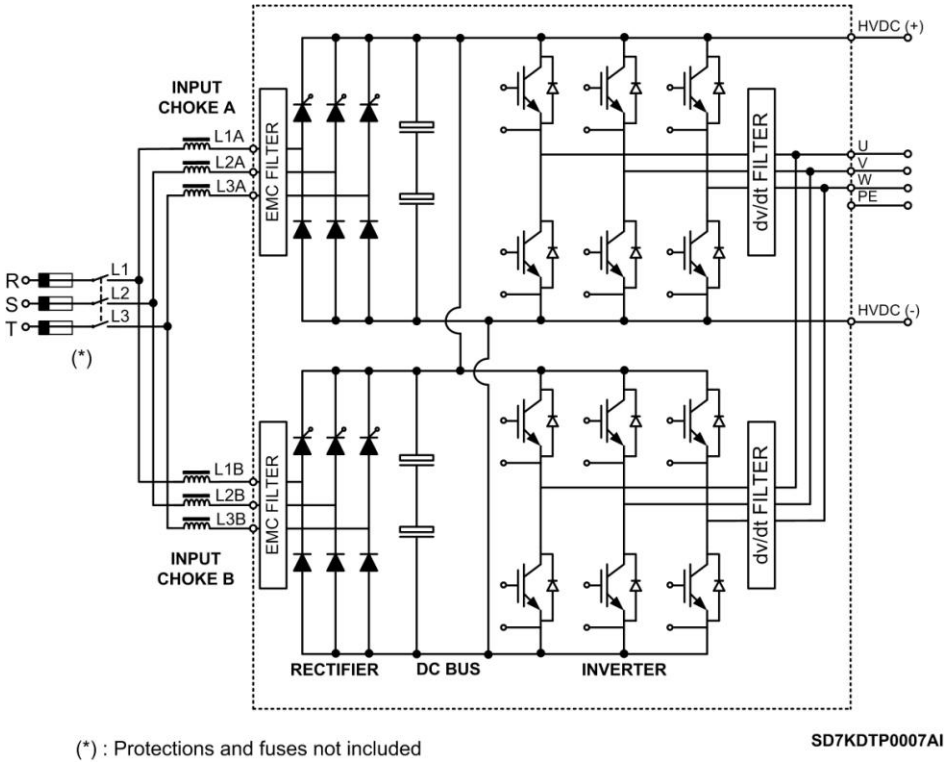

Figure 6.2 General Block Scheme for frames 3 and 4

SD700 Kompakt integrates external input chokes filters. These filters significantly reduce the THDi values, and increase the impedance line protecting the drive against electrical distortions. The input choke filter must be installed in the input side, for more information see section 5.2.

The SD700 Kompakt includes a power and a control board to control the rectifier thyristor diode's bridge shooting, the inverter IGBT's bridge shooting, the soft charge, the DC bus voltage and the motor performance. In addition, control board integrates the interface terminals such as communication ports, the digital and analogue inputs and outputs, colour touch-screen display and alphanumeric display, etc.

The inverter bridge generates the PWM wave that controls the motor performance (voltage, current, torque, etc...). SD700 Kompakt Series by Power Electronics, integrate as standard output dV/dt filters that reduces significantly the dV/dt rise time below 500V/µs - 800V/µs, therefore, it reduces the voltages peaks at the motor windings, the common mode currents and the EMC emissions.

It is recommended to install ultra fast fuses that protect the drive against downstream overcurrents. SD700 Kompakt integrates multiple electrical protections that protect the drive and the motor as a motor relay does.

6.3. Power Connection and Wiring

CAUTION

The following installation recommendations are suitable for TN and TT grids. For IT grids check the dedicated section. Otherwise, it could cause damage to the equipment and lead to injury to people.

Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power. To remove the front cover check that the DC Link red LED is off, then remove the metallic cover and check with a multimeter the following measures:

- Measure between the output power busbars U, V, W and the cabinet and check that the voltage is around 0V.
- Measure that the DC link terminals +, - and chassis voltage are below 30VDC.
  Otherwise, you may get an electric shock.

SD700 KOMPAKT is designed for working with 3-phase supply with the neutral connected to the earth.

Input terminals (drive supply) are accessible from the top and output terminals (motor supply) from the the bottom of SD700 KOMPAKT.

We recommend installing the drive according to the following diagram:

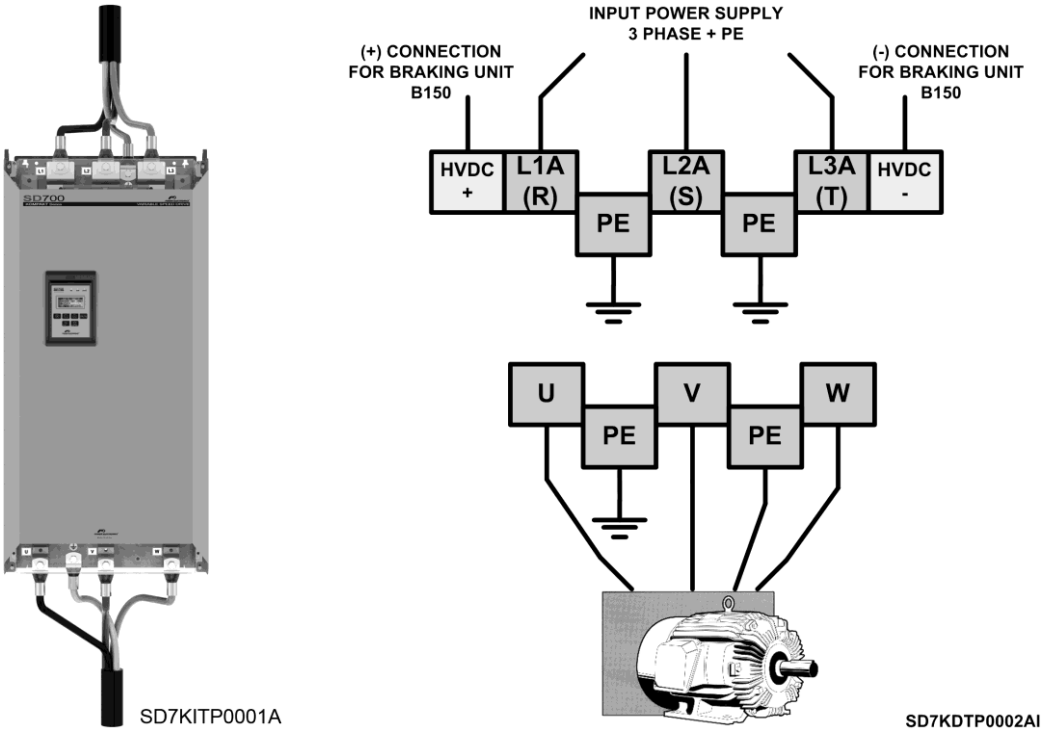

Figure 6.3 Power wiring connections detail for SD700 Kompakt

Note: It is recommended to use an earth cross section equal or higher than active wires cross section.

CAUTION

Line voltage (input supply) must never be connected to U, V and W terminals. Otherwise, the drive will be damaged.

Line voltage L1, L2 and L3 terminals, and earth will be connected to the terminals assigned for this function.

Motor should be connected to the terminals indicated as U, V and W.

Terminals HVDC+ and HVDC- are used to connect a dynamic braking unit if the application requires it.

As standard, the input and output terminals are made of tin plated copper. If they are oxidized prior to its installation, the connections will be poorly executed and will cause overheating. To avoid this effect it is recommended to follow the next steps.

- It is recommended to use Ø11 tin plated copper terminal lugs.
- Use M10 zinc bolts and nuts and apply a torque of 40Nm. Check after the first week of operation that the torque applied is maintained.
- The number of available terminals depends on the frame size. Check the power terminal section.
- Before connecting the cables, clean the contact surfaces with a clean cloth and ethanol cleaner.
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.
- Use copper or aluminium 600Vac conductors for up to 500Vac rated voltage. For 525Vac and 690Vac phase to phase rated equipment use 1kV conductors.

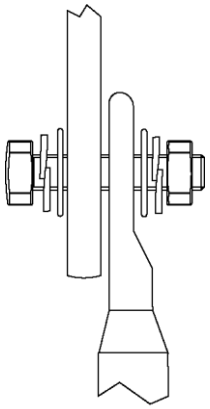

Figure 6.4 Terminal lug connection

The recommended cable types and lengths between the drive (at factory settings) and the motor are:

- **Unshielded cable:** 150m. Asymmetrical 4-wire including PE conductor. It is recommended to use a motor ground cable (PE) cross section equal or higher than active motor wires cross section (U, V, W). When single-wire cables are used in three-phase systems, the three phase conductors must be bundled symmetrically.
- **Shielded cable:** 75m. Ideal symmetrical 3-wire cable plus symmetrically arranged PE conductor- with concentric shield. To implement an effective shield bonding it could be used an EMC gland in both motor terminal box and drive cabinet to ensure effective 360º ground connection and a low high frequency impedance path. Check the EMC recommendations section.

CAUTION

The number of three phase cable hose (U,V,W, PE) to the motor should be equal to the number of IGBT's in the drive, being one cable hose by each IGBT's Block.

The following figures show the recommended cable type and bundling.

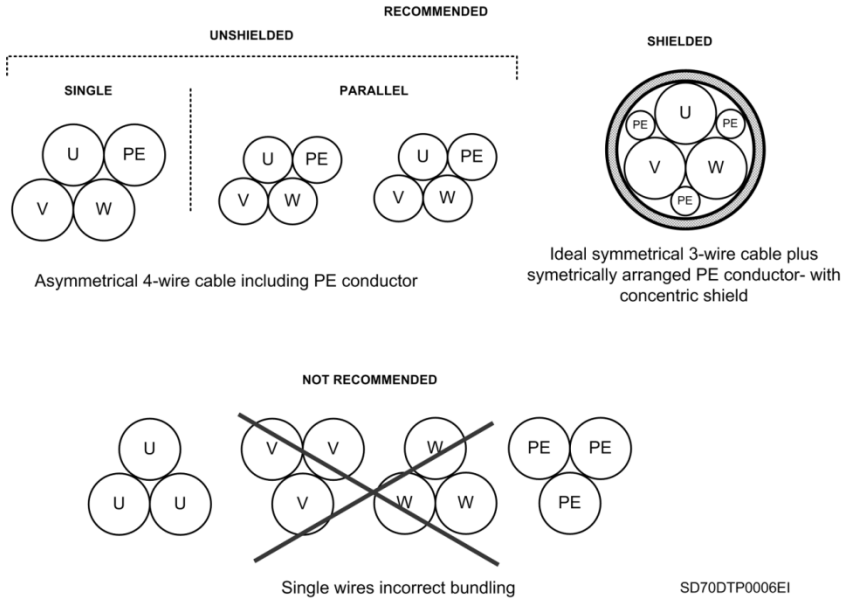

Figure 6.5 Recommended cable type and bundling

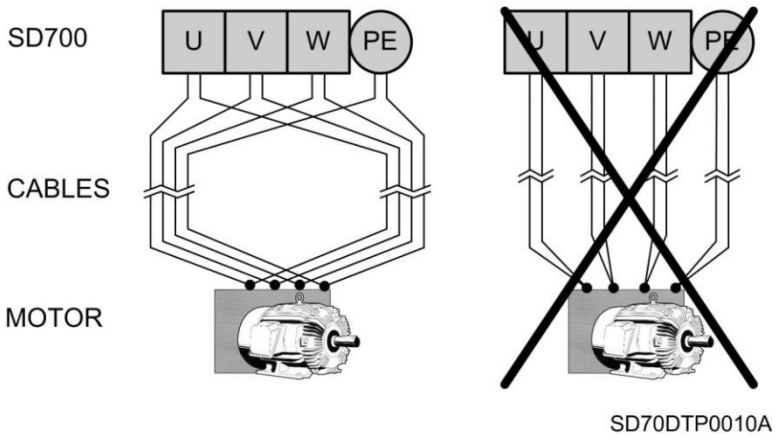

Figure 6.6 Recommended cable bundling scheme

CAUTION

Line voltage (input supply) must never be connected to U, V and W terminals.
Otherwise, the drive will be damaged.

It is necessary that installer guarantee the correct observance of the law and the regulations that are in force in those countries or areas where this device is going to be installed.

Do not use capacitors for power factor correction, surge suppressors, or RFI filters on the output side of the drive. Doing so may damage these components.

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All power conductors, such as input power cables, output motor cables, DC link cables must be routed separately from the control, signal, PTC, encoder or data cables. The recommended distances between the cables are shown in the next figure:

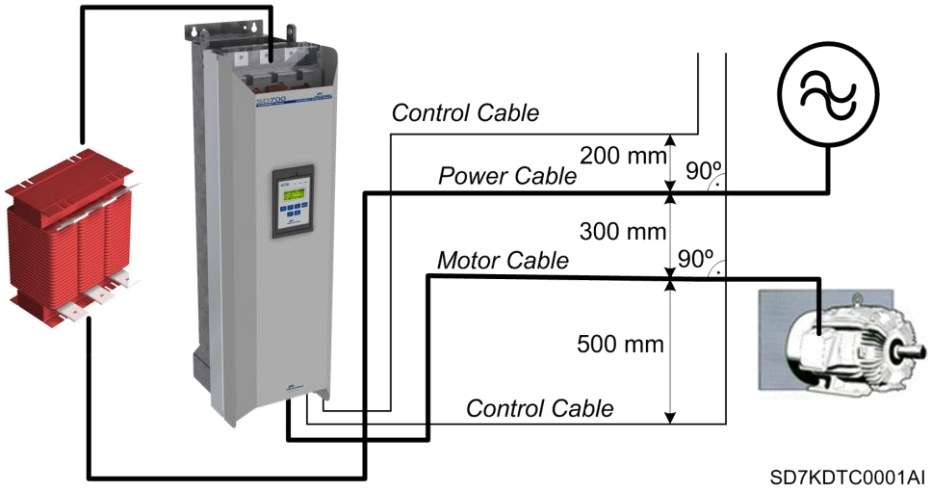

Figure 6.7 Cable routing distances

It is recommended to route in separately cable racks, trays or ducts, the following cable types:

- Single-wire signal or data cables with V< 60V
- Single wire cable with 60V<V< 230V
- Input power cables with low level of interferences 230V<V<1000V
- Output motor power cables and Dynamic brake DC cables with high level of interferences 230V<V<1000V.
- Medium voltage cables with V<1000V

The power cables must have sufficient current rating to prevent important wiring overheating and voltage drops. The installer must consider the cable cross-section, cable type, routing method and the ambient conditions to select the appropriate cable. It is only permitted the use of cooper or aluminium cables. The maximum cable section and the available holes per phase could be found in the “Power connection terminals” section.

6.3.1. Recommended Cable Section for 400VAC

FRAME	CODE	I(A) RATED	Power (kW) at 400VAC	Recommended Cable Section per Phase		Recommended Cable Section for Earth Wire	
				AWG / kcmil	mm²	AWG / kcmil	mm²
1	SD7K0210 5X	210	110	300 – 500	120 – 240	300 – 500	120 – 240
	SD7K0250 5X	250	132	350 – 500	185 – 240	350 – 500	185 – 240
	SD7K0275 5X	275	150	2 x 300	2 x 150	2 x 300	2 x 150
2	SD7K0330 5X	330	160	2 x 350	2 x 185	2 x 350	2 x 185
	SD7K0370 5X	370	200	2 x 500	2 x 240	2 x 500	2 x 240
	SD7K0460 5X	460	250	2 x 500	2 x 240	2 x 500	2 x 240
3	SD7K0580 5X	580	315	3 x 500	2 x 240	3 x 500	2 x 240
	SD7K0650 5X	650	355	3 x 500	3 x 240	3 x 500	3 x 240
	SD7K0720 5X	720	400	4 x 500	3 x 240	4 x 500	3 x 240
4	SD7K0840 5X	840	450	4 x 500	4 x 240	4 x 500	4 x 240
	SD7K0925 5X	925	500	4 x 500	4 x 240	4 x 500	4 x 240
	SD7K0990 5X	990	560	6 x 500	6 x 240	6 x 500	6 x 240

Note: Cable must be suitable for a permanent Tª >75ºC. Use 600V cables for up to 500Vac rated voltage. For 525Vac and 690Vac phase to phase rated equipment use 1kV cables. **However this is only a recommendation. You must follow the local regulation.**

6.3.2. Recommended Cable Section for 690VAC

FRAME	CODE	I(A) Rated	Power (kW) at 690VAC	Recommended Cable Section per Phase		Recommended Cable Section for Earth Wire	
				AWG / kcmil	mm²	AWG / kcmil	mm²
1	SD7K0130 6X	130	110	3/0 – 300	70 – 120	3/0 – 300	70 – 120
	SD7K0150 6X	150	132	3/0 – 300	70 – 120	3/0 – 300	70 – 120
	SD7K0170 6X	170	160	3/0 – 300	95 – 150	3/0 – 300	95 – 150
2	SD7K0210 6X	210	200	300 – 500	120 – 240	300 – 500	120 – 240
	SD7K0260 6X	260	250	2 x 300	2 x 150	2 x 300	2 x 150
	SD7K0320 6X	320	315	2 x 500	2 x 185	2 x 500	2 x 185
3	SD7K0385 6X	385	355	2 x 500	2 x 240	2 x 500	2 x 240
	SD7K0460 6X	460	450	2 x 500	2 x 240	2 x 500	2 x 240
4	SD7K0550 6X	550	500	2 x 500	2 x 240	2 x 500	2 x 240
	SD7K0660 6X	660	630	3 x 500	3 x 240	3 x 500	3 x 240

Note: Cable must be suitable for a permanent Tª >75ºC. Use 600V cables for up to 500Vac rated voltage. For 525Vac and 690Vac phase to phase rated equipment use 1kV cables. **However, this is only a recommendation. You must follow the local regulation.**

6.4. Ground connection

Before connecting the power conductors, be sure that the chassis of the drive and the adjoining cabinets are connected to ground through the dedicated (PE) terminals. They are situated at both sides of the bottom metallic walls of the drive and they are labelled with the appropriate ground connection. Check section “6.8 Power Terminals”.

Motor’s chassis grounding must be connected to the drive. In other words, connect the motor’s ground conductor to the PE output terminal of the drive and not to the installation’s ground. We recommend that the cross section of the motor’s ground conductor (PE) should have at least the cross section of the active conductor (U, V, W). Additionally, it should be installed following the recommendations indicated in section “6.3 Power Connection and wiring”.

When connecting the earth, ensure that all connected terminal lugs are securely tight and protected from mechanical forces. The tightening torque in case of M10 PE terminals is 40Nm.

CAUTION

For safety reasons it is determinant to measure the grounding resistance of the plant itself. This must be established before the first start up of the plant and with the drive disconnected.

It is responsibility of the installer to provide the adequate number, type and cross section grounding conductor alongside with the characteristics of the drive used and of the Plant in order to minimize the grounding resistance, that comply with the local and national regulation.

ENGLISH

6.5. EMC Installation Requirements

6.5.1. Introduction

The European EMC Directive defines electromagnetic compatibility as follows: the capability of an apparatus, an industrial plant, or a system to work satisfactorily in the electromagnetic environment without at the same time causing electromagnetic disturbance, which would be unacceptable to apparatus, industrial plant, or systems present in this environment.

The Electromagnetic compatibility (EMC) depends of two mains characteristics of the equipment: the Electromagnetic Interference (EMI) and Electromagnetic Susceptibility (EMS). The EMC standards aims to ensure that all the electrical equipment that could operate simultaneously in the same environment are compatible. That means the interference immunity of all the devices is greater than the interference emission of all the devices within the same environment.

The EMC requirements for Power Drive System (PDS) are defined in IEC/EN 61800-3 standard that is included in the Declaration of conformity CE enclosed. In European Union, EN61800-3 standard takes precedence over all generic or previously applicable product family EMC standards. The PDS in the context of this standard comprises the drive converter, the motor cables and the motor. Therefore, the installer as the ultimate responsible must follow the installation instructions given within this manual.

Depending on the location of the drive, the standards define four categories distributed in two environments.

- *First Environment:* First Environment includes domestic premises. It also includes establishments directly connected without an intermediate transformer to a low-voltage power supply network, which supplies buildings used for domestic purposes such as shopping malls, cinemas, hospitals…
- *Second Environment*: Industrial use. Second Environment includes all establishments other than those directly connected to a low-voltage power supply network, which supplies buildings used for domestic purposes. E.g. factories and those other premises supplied by their own dedicated transformer.

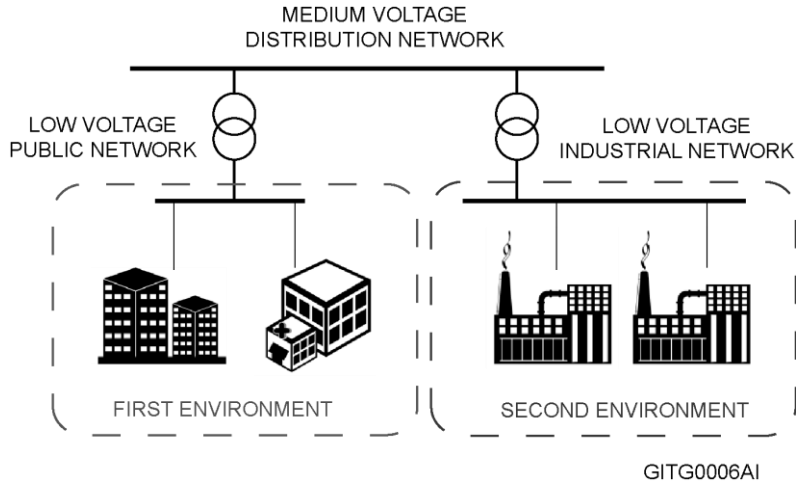

Figure 6.8 Environments definition

The two environments are divided in four categories C1 to C4 that are summarized in the following table.

	FIRST ENVIRONMENT		SECOND ENVIRONMENT	
	C1	C2	C3	C4
Restricted Installation [1]	NO	YES	YES	YES [2]

Notes

[1]. “Restricted Installation” means that the installation and commissioning must be carried out by specialist personnel.

[2]. C4 category applies only for complex systems or when ratings are equal or above to 1,000 V or 400 A. C4 category could be reached if the equipment in hoc complies with the EMC recommendations.

6.5.2. SD700 Kompakt compliance

SD700 Kompakt variable speed drives are designed for industrial (second environment) use. The use of radio frequency interference filters (RFI filters) and dV/dt filters as standard, and the correct installation following the recommendations within this manual, permits to achieve compliance with C3 category defined in IEC/EN 61800-3.

Optionally the SD700 Kompakt non-floating earth variable speed drive could be installed in residential areas (first environment) by employing optional RFI filters that permits to achieve compliance with C2 category.

SD700 Kompakt is not a retail unit, which is neither a plug in device nor a movable device and it is intended to be installed and commissioned by qualified personnel. Therefore, C1 category will not be required.

SD700 Kompakt with floating earth configuration can be installed in industrial (Second Environment) IT grids. Although the RFI filters are less effective, following the installation recommendation within this manual and its dV/dt filter as standard permits to achieve compliance with C3 category defined in IEC/EN61800-3.

6.5.3. Connection

SD700 Kompakt does not require the use of shielded motor cable to achieve compliance with C3 category, when a correct installation is made. Wiring and Installation recommendations are included in sections “6.3 Power Connection and wiring” and “6.4 Ground connection”.

It is recommended to implement a 360º contact that creates an effective shield bonding in both the SD700 cabinet and the motor terminal box. As an example, it could be installed EMC cable glands as shown in the next figure.

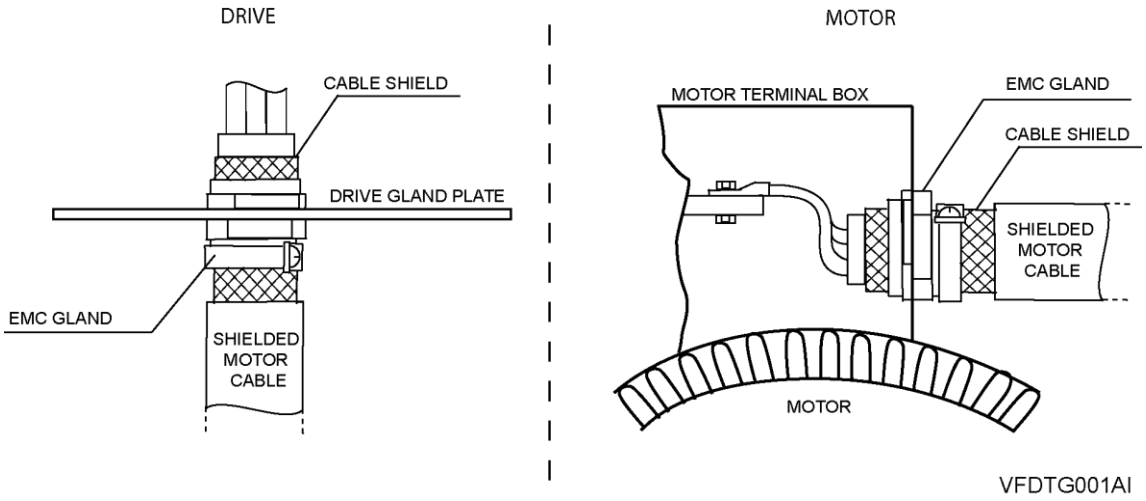

Figure 6.9 Correct output motor cables shield bonding

It is recommended for control signals to use shielded cable and to follow recommendations included in section ”7.1 Wiring recommendations”.

CAUTION

Select communication and control system according to the drive EMC environment. Otherwise, systems could suffer from interferences due to a low EMS level.

6.6. Protections

6.6.1. Ground fault protection

The drive is equipped with an internal software ground fault protective function to protect the drive against input and output unbalanced currents. The response threshold can be set from 0% to 30% of the rated current (G.11.3). For further information, see Programming and Software Manual.

This function is not intended to work as a personnel safety or fire protection, so an external protection must be provided to ensure that a substantial ground fault current is promptly interrupted. The SD700 Kompakt drives are suitable to operate with RCD components Type B, if it is required. The EMC filters and long motor cables increase the ground leakage currents so the threshold response of the protection should be adjusted according to the relevant plant conditions. For additional information, contact with Power Electronics.

6.6.2. Motor thermal protection

The drive includes a motor thermal protection that, based on the motor performance parameters, mathematically calculates the thermal reservoir of the motor. When this reservoir is reduced below the limits, the drive automatically stops the motor. The thermal model sensitivity could be configured in parameter G2.7, for further information consult Software and programming manual.

The drive includes as standard a PTC connection that permits to monitor the motor temperature. Once connected and configured the drive could either stop the motor or generate a warning signal.

6.6.3. Others

The drive implements additional motor and drive protections such as power-loss ride through, automatic fly restart, high and low input and output voltage, pump overload and underload... For further information, consult Software and Programming manual.

6.6.4. Safety Stop Function

Safe Torque Off (STO) allows the drive output to be disabled so that the drive cannot provide power or generate torque in the motor. The STO safety function has been certified by Tüv Rheinland according to IEC/EN 61800-5-2. For further information, see section 7.3.

6.7. IT grids - floating earth drives

When planning an IT grid electrical installation select the drive for floating earth operation. Check the drive reference to ensure the correct drive selection.

IT grids must be equipped with an insulation monitoring system. To set the parameter settings, consider that the drive has inherent very high impedance, even when a large number of drives are working in parallel on the same IT system.

It is recommended the installation of surge arrester to ground to protect against transient overvoltages. The surge arrester must have rated voltage greater than the drive voltage range to prevent its operation during normal conditions.

6.8. Power Terminals

6.8.1. Connections for Frame 1

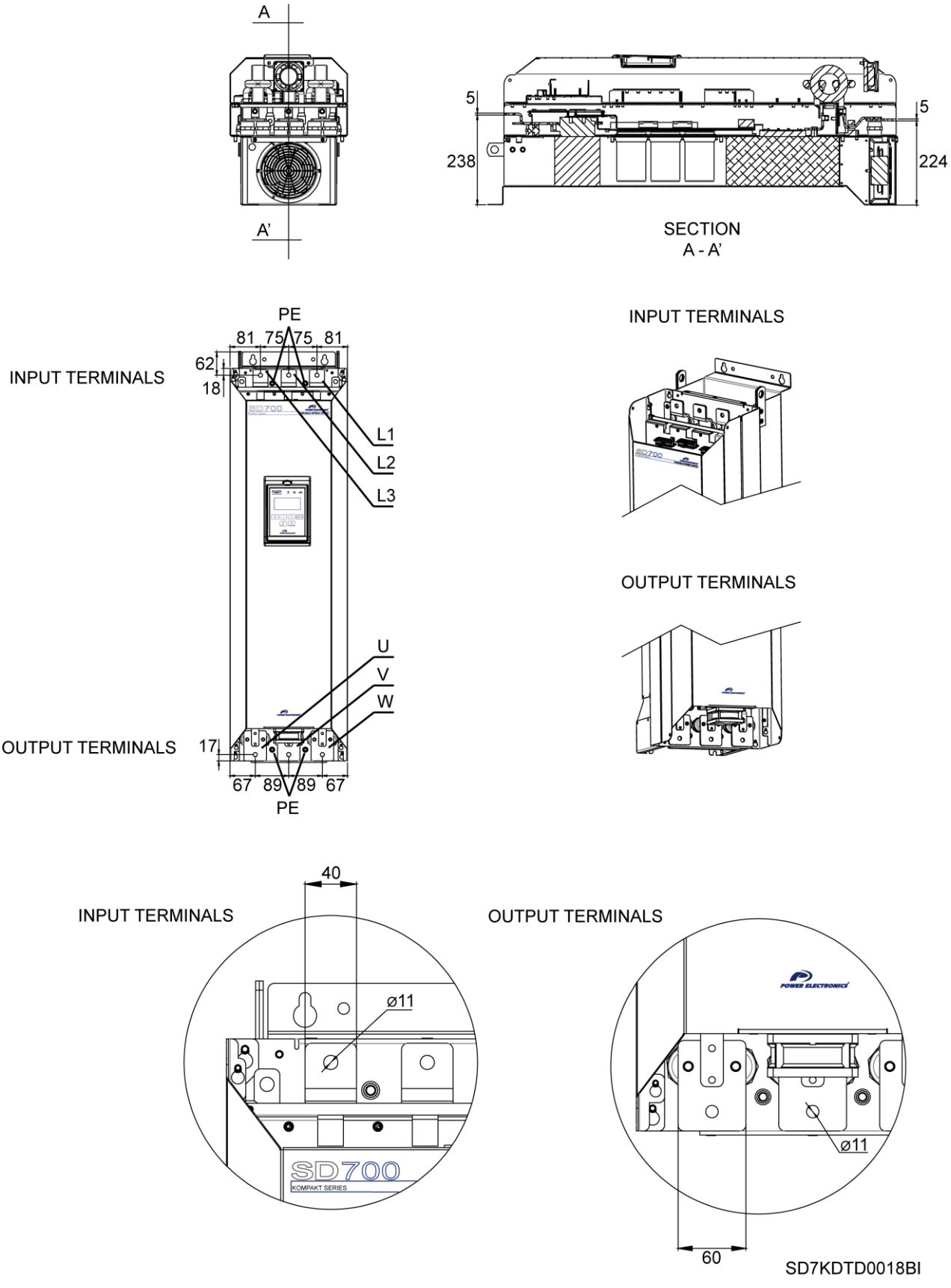

Figure 6.10 Location of power connections for equipments of Frame 1

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6.8.2. Connections for Frame 2

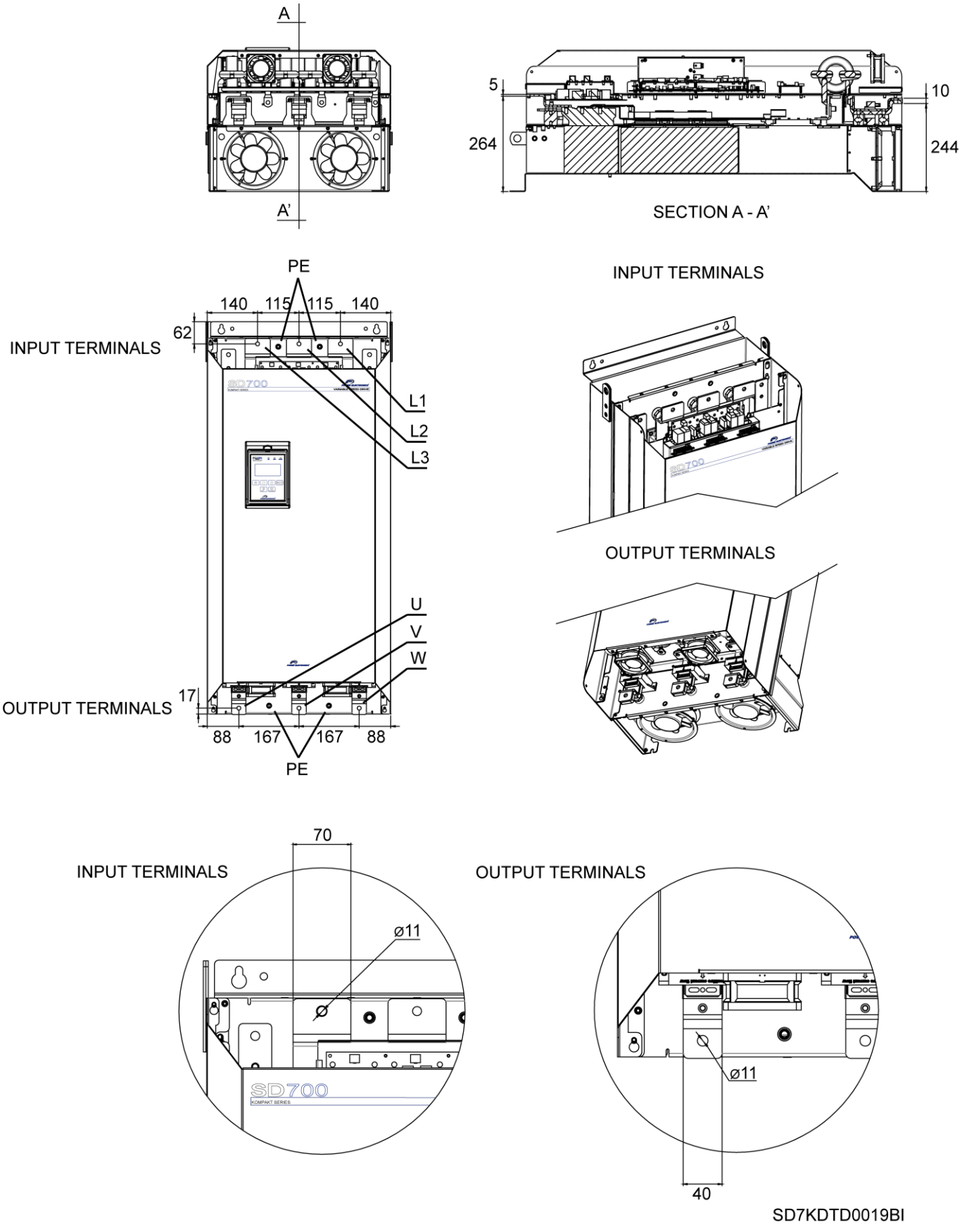

Figure 6.11 Location of power connections for equipments of Frame 2

6.8.3. Connections for Frame 3

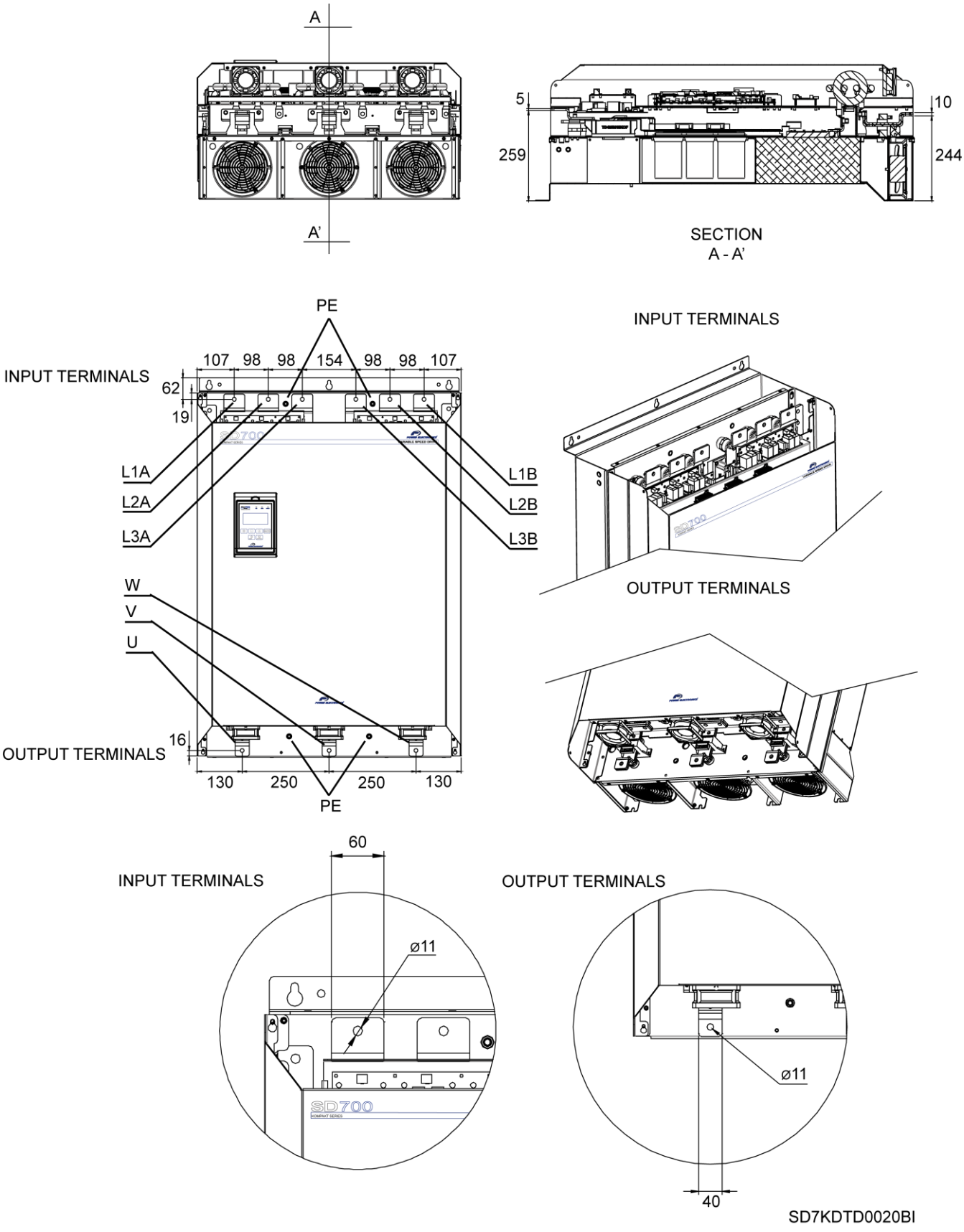

Figure 6.12 Location of power connections for equipments of Frame 3

6.8.4. Connections for Frame 4

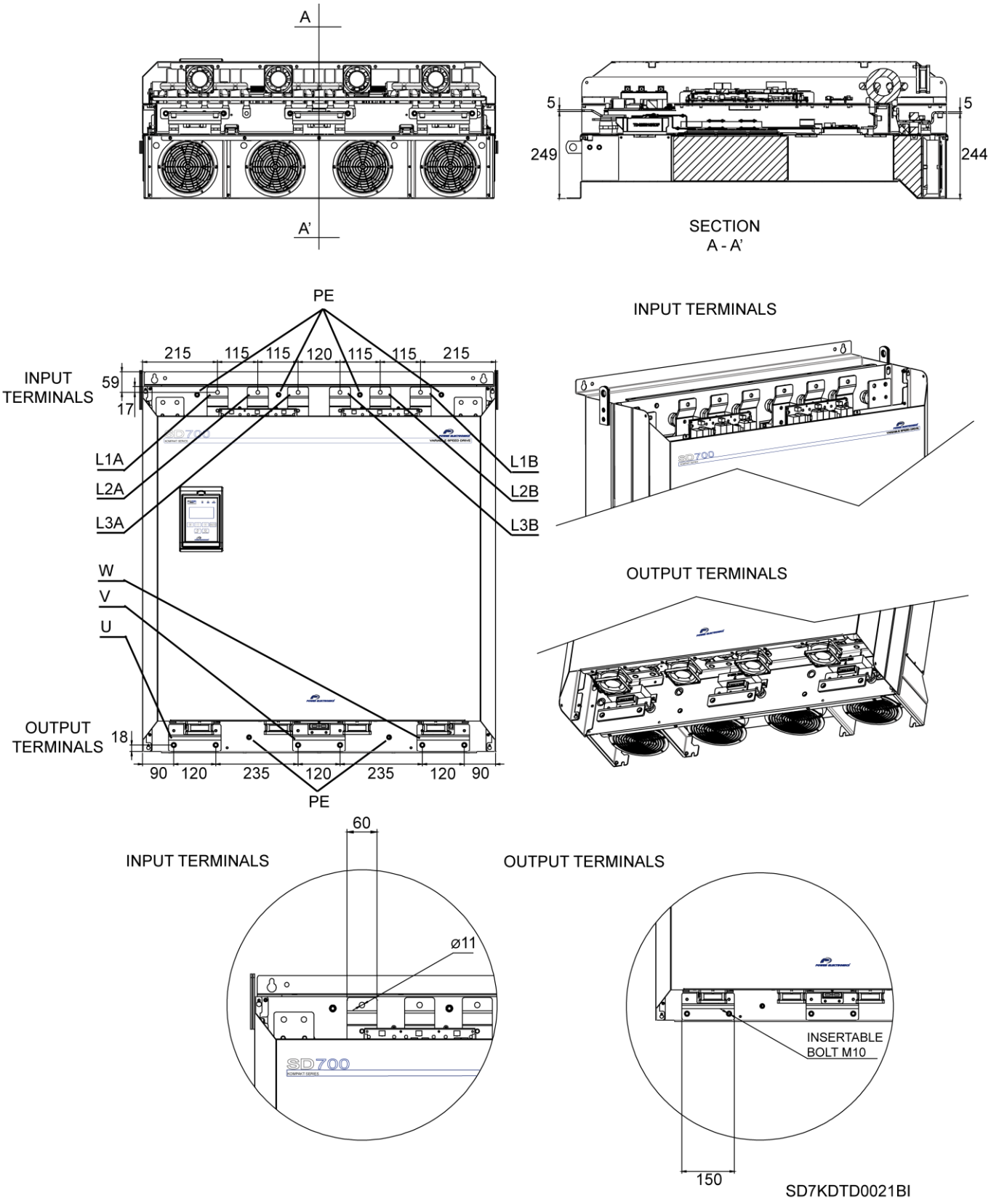

Figure 6.13 Location of power connections for equipments of Frame 4

7. CONTROL CONNECTION

CAUTION

The access to the SD700 KOMPAKT control board can be only done removing the front cover. The front cover can be removed unscrewing the 4 screws located in the four cover corners. The SD700 KOMPAKT cover integrates cooling fans and a display. Ensure disconnect these fans and the display before removing the cover. Otherwise, the drive could be damaged.

7.1. Wiring recommendations

Before planning the installation, follow the next recommendations. The parallel cable routing should be minimized and the distance between the control wiring and the power wiring should be maximized. It is recommended to route control cables with different voltages in separately cable racks, trays or ducts.

It is recommended to use shielded twisted cable for all the data, signal or control cables that came out from the variable speed drive, with the properly shield bonding to ground. To ensure an effective shield bonding, it is recommended to include in the SD700 Kompakt front metal panel of the control board, EMC shield clamps that ensure a 360º effective shield bonding.

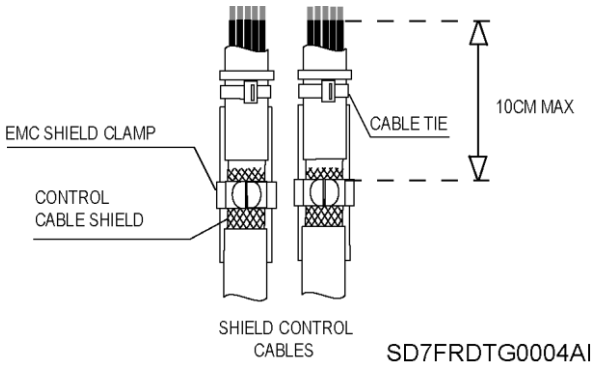

Figure 7.1 Shield bonding

Digital signal cables must be grounded at both ends of the cable. It is recommended to use independent shielded cables for digital and analogue signals. When using multiple analogue signals do not use common return for them. If a low-interference is experienced (hum loops) using analogue signals disconnect the shield grounding from one of the ends. The maximum section for the control cables is 2.5mm² and the recommended tightening torque is 0.4Nm.

Although the control board is insulated galvanically, for safety reasons it is recommended not to modify the wiring while the equipment is connected to the input power supply.

CAUTION

Changes of control wiring or bridges should be performed following the safety instructions indicated before. Otherwise, it could cause damage to the equipment and lead to injury to people.

ENGLISH

7.2. Control board terminals description

CAUTION

Changes of control wiring or bridges should be performed at least 10 minutes after disconnecting the input power and after checking the DC Link voltage is discharged with a meter (below 30VDC). Otherwise, you may get an electric shock.

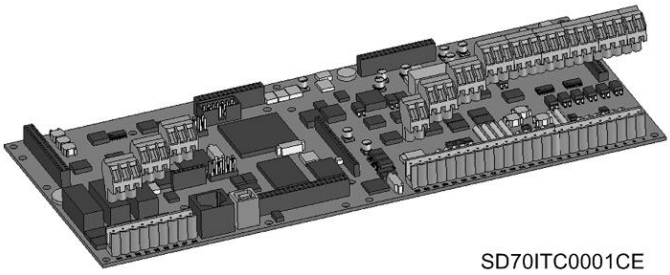

Figure 7.2 Control board of SD700 Kompakt

The user will have only access to the inverter control board that is equipped with the user interface ports and connectors. It integrate as standard PTC connection, analogue inputs and outputs, digital inputs and outputs, DC external input power supplies, RS485, RS232 and USB communication and display ports. Moreover, the board is ready for the connection of optional boards such as I/O expansion board, encoder board, communication boards, fiber optic board, etc.

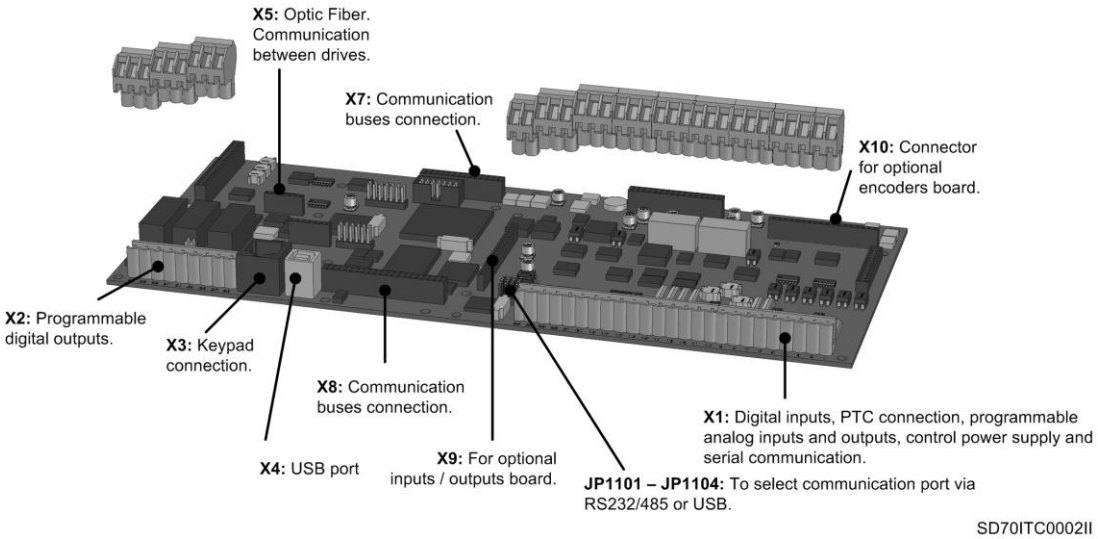

Figure 7.3 Location and description of user connectors

The following figure provides an overview of the standard wiring of control terminals through the X1 and X2 user connectors.

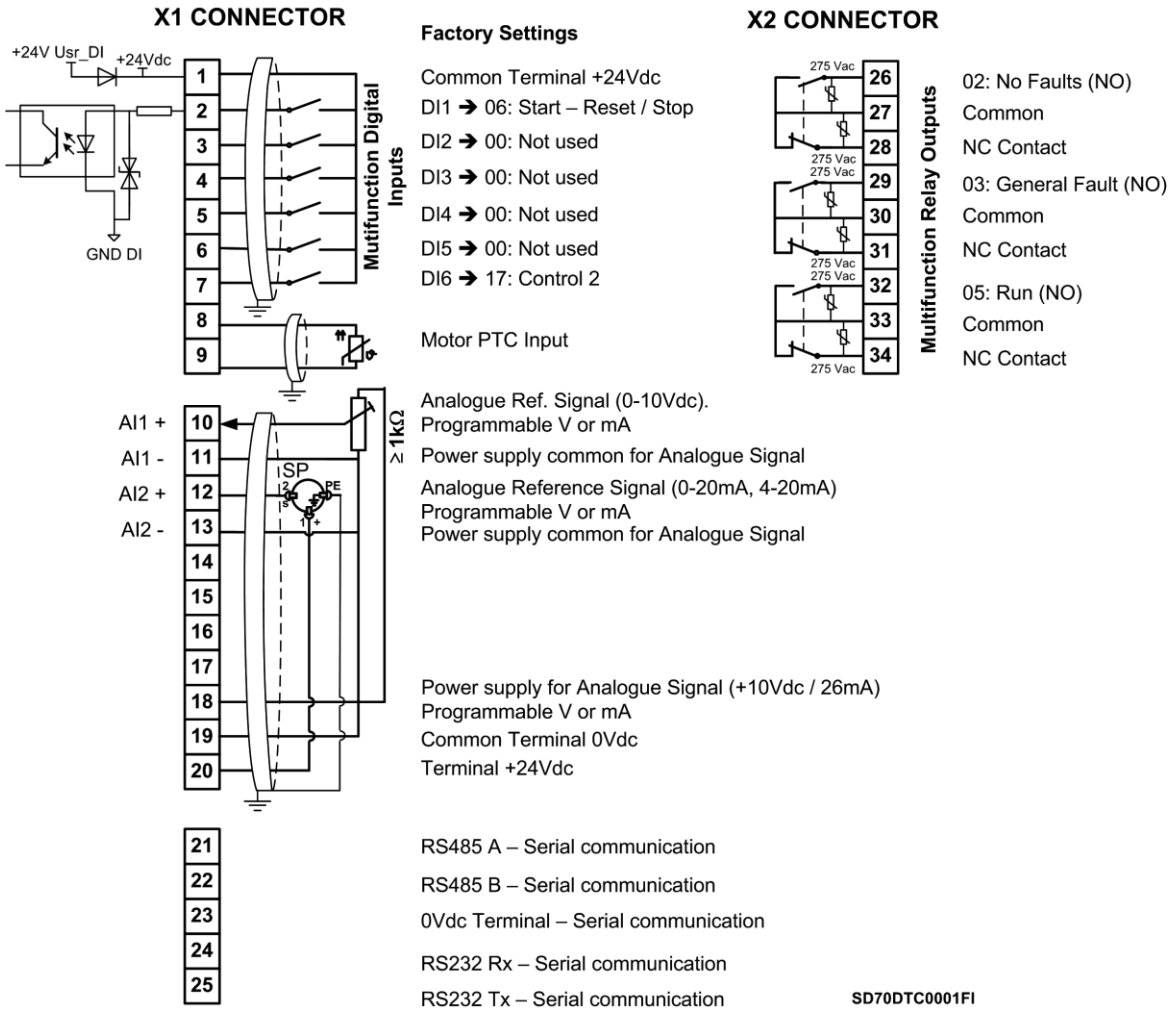

Figure 7.4 Example of control terminals standard wiring

Digital inputs can be configured individually or collectively. Analogue inputs can be configured as comparators. Details on varying standard configurations are available in the Software manual to assist the user. The following figure shows typical wiring configuration for a 3-wire start / stop push button system.

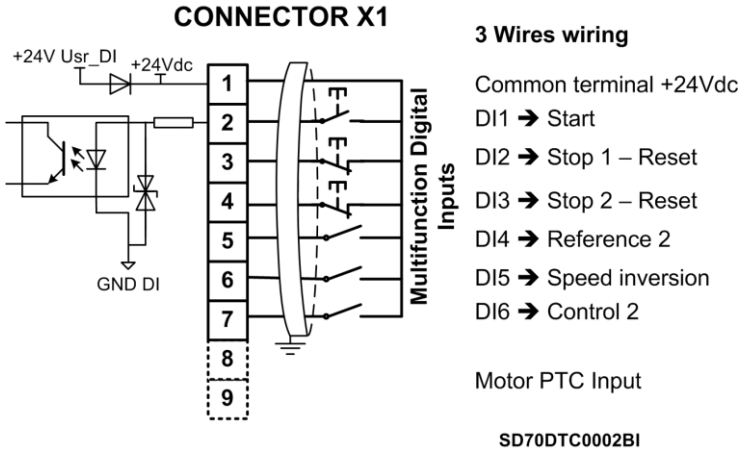

Figure 7.5 Wire control terminals wiring

		PIN	SIGNAL	DESCRIPTION
X1 CONNECTOR	DIGITAL INPUTS	1	+24V_USER	Power supply for digital inputs. Short circuit and overload protected. (Maximum +24VDC, 180mA)
		2	DI1	Programmable **D**igital **I**nput **1**. Digital inputs are configured in the Input group. Their status can be displayed in the visualisation group. It is powered from terminal 1 or an external power 24VDC supply. If an external power supply is used, the common should be connected to the terminal 19 (user GND).
		3	DI2	Programmable **D**igital **I**nput **2**. See DI1 description.
		4	DI3	Programmable **D**igital **I**nput **3**. See DI1 description.
		5	DI4	Programmable **D**igital **I**nput **4**. See DI1 description.
		6	DI5	Programmable **D**igital **I**nput **5**. See DI1 description.
		7	DI6	Programmable **D**igital **I**nput **6**. See DI1 description.
		8	PTC +	Control signal of the motor temperature through the connection of a PTC.
		9	PTC -	
	ANALOGUE INPUTS	10	AI1 +	Voltage or current programmable **A**nalogue **I**nput **1** (V or mA). Configurable for 0-10VDC, ±10VDC, 0-20mA or 4-20mA. Input resistance value in voltage mode is Ri=20kΩ. Input resistance value in current mode is Ri=250Ω.
		11	AI1 -	Common for Analogue Input 1.
		12	AI2 +	Voltage or current programmable **A**nalogue **I**nput **2** (V or mA). See AI1 description.
		13	AI2 -	Common for Analogue Input 2.
	ANALOGUE OUTPUTS	14	AO1 +	Voltage or current programmable **A**nalogue **O**utput **1** (V or mA). Configurable for 0-10VDC, ±10VDC, 0-20mA or 4-20mA.
		15	AO1 -	Common for Analogue Output 1.
		16	AO2 +	Voltage or current programmable **A**nalogue **O**utput **2** (V or mA). Configurable for 0-10VDC, ±10VDC, 0-20mA or 4-20mA.
		17	AO2 -	Common for Analogue Output 2.
	USER POWER SUPPLY	18	+10V_POT	10VDC power supply for analogue inputs. Input power for maximum 2 potentiometers (R≥1kΩ).
		19	GND_USER	Common for analogue inputs (0VDC).
		20	+24V_USER	User power supply. It provides a DC supply to an external sensor. (Maximum: +24VDC, 180mA).
	SERIAL COMMUNICATION	21	RS485 A	RS485 serial communication interface for Modbus.
		22	RS485 B	
		23	RS Common	Common for RS485 / RS232 serial communication signals.
		24	RS232 Rx	RS232 serial communication interface for Modbus.
		25	RS232 Tx	
X2 CONNECTOR	DIGITAL OUTPUTS	26	RLY1 NO	Digital Output 1. Programmable change over relay (NO / NC). Potential free (Maximum: 250VAC, 8A; 30VDC, 8A).
		27	RLY1 C	
		28	RLY1 NC	
		29	RLY2 NO	Digital Output 2. Programmable change over relay (NO / NC). Potential free (Maximum: 250VAC, 8A; 30VDC, 8A).
		30	RLY2 C	
		31	RLY2 NC	
		32	RLY3 NO	Digital Output 3. Programmable change over relay (NO / NC). Potential free (Maximum: 250VAC, 8A; 30VDC, 8A).
		33	RLY3 C	
		34	RLY3 NC	

7.3. STO - Safe Torque Off

The STO function is defined as follows:

Power, that can cause rotation, is not applied to the motor. The frequency converter will not provide energy to the motor, which can generate torque.

For three-phase asynchronous motor, that means to stop supplying alternating three-phase power to the stator.

This function corresponds with an Emergency Stop Category 0 according to IEC 60204-1. When the drive is running and the STO function is applied, the motor will freely stop by its own inertia.

The SD700 Kompakt's STO optional board permits to achieve two Safety Levels for the STO function. The safety integrity level SIL3 (PLe) requires the use of an external SELV/PELV $24V_{DC}$ source, emergency push button, and a safety relay SIL3 certified with feedback. For safety integrity, level SIL1 (PLc) it is only required an external push button. Maximun reaction time of STO function is less than 50ms. See section 7.3.1 and 7.3.2 for additional information.

By using this function, cleaning, emergencies or maintenance work on non-electrical parts of the machinery can be performed without switching off the input power supply to the drive.
Based on the study of each application and a risk assessment, the designer should define the safety function required and each safety level.

The STO safety function has been certified by Tüv Rheinland according to IEC/EN 61800-5-2.

CAUTION

The STO safety function does not disconnect the main input power and auxiliary power supply. The drive disconnects the output motor power supply. Therefore, active conductors may be present inside so do not carry out electric maintenance tasks without isolating the drive. Otherwise, it could cause damage to the equipment and lead to injury and death to people.

Do not use the STO function as a normal drive stop.

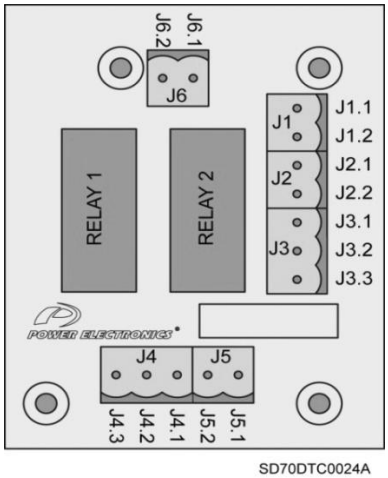

Figure 7.6 Optional STO board terminals

It is recommended to use double-shielded twisted pair cable for external 24Vdc and safety channels. Shielded must be connect to ground as it is indicated in the examples.

CON.	Terminal	Description
J1	J1.1 (STO O1)	STO output channel 1
	J1.2 (STO O2)	STO output channel 2
J2	J2.1 (GND)	GND
	J2.2 (STO I1)	STO input channel 1
J3	J3.1 (STO I2)	STO input channel 2
	J3.2 (FB1)	Feedback 1 contact
	J3.3 (FB2)	Feedback 2 contact
J6	J6.1 (+24Vdc)	$24V_{DC}$ power supply. (24 V_{DC}, Max:2W)
	J6.2 (GND)	0 V_{DC} power supply

[1] This safety integrity level replaces the older Category 3 according to EN954-1.

ENGLISH

7.3.1. Safety Integrity Level SIL3- PLe

This assembly provide a highly reliable safety function. When the sensor (E-Push Button) is activated, the STO function interrupts providing energy to the motor. Therefore, it will stop the motor by its own inertia or will avoid any possible unexpected start.

The use of an external safety relay permits to monitor all the safety elements and feedbacks signals, therefore in case a relay failure or elements malfunction the motor will safely stop and a restart will be prevented. The external safety relay must be SIL3 or PLe certified, and compatible with the following features: 24Vdc power supply, 2 safety input terminals, at least 2 NO and 1 NC outputs contacts and a reset function (Ej: PILZ PNOZ X2.P8). The sensors (emergency push buttons, interlock switches, etc) must be certified as safety elements.

The total probability of a dangerous random hardware failure per hour (PFH) value of all elements, which are applied for the realization of the safety function, shall not exceed the limit of the corresponding SIL level. The installation must be performed by trained personal with experience in functional safety.

Example 1: Emergency stop (SIL3, PLe) safety function with automatic restart. The STO's board power terminals will be connected to an external auxiliary SELV/PELV 24Vdc power supply. Both input safety channels will be connected to NO contacts of safety relay, and the monitoring channel (J3.2 and J3.3) will be connected to the terminals of the safety relay restart. It is mandatory to use a push button equipped with two normally close contacts that will be connected to the relay's safety inputs.

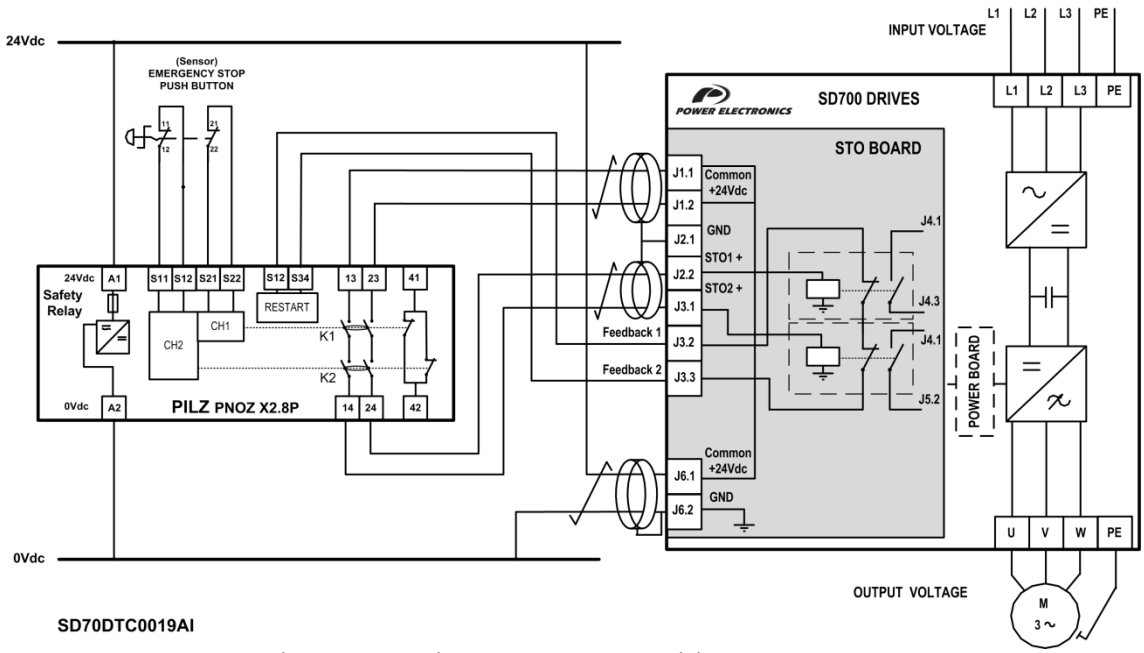

Figure 7.7 Example 1- Emergency stop push button

CAUTION

According to EN 60204-1 automatic restart is not allowed after an emergency stop. For this reason the machine control must prevent an automatic start after emergency stop.
For SIL 3 applications the safety function has to be tested regularly (approximately once per month) in order to detect certain failures.

Example 2: SIL3 (PLe) Safety door opening stop for maintenance tasks with manual restart. This function is used to prevent an unexpected restart when a maintenance task is being carried out in a risk area. In this case, the relay's safety inputs will be connected to a safety interlock switch placed in the door. Additionally a push button is installed to force a manual restart of the safety relay and a lamp connected to the NC output contact of the external safety relay will indicate the restart.

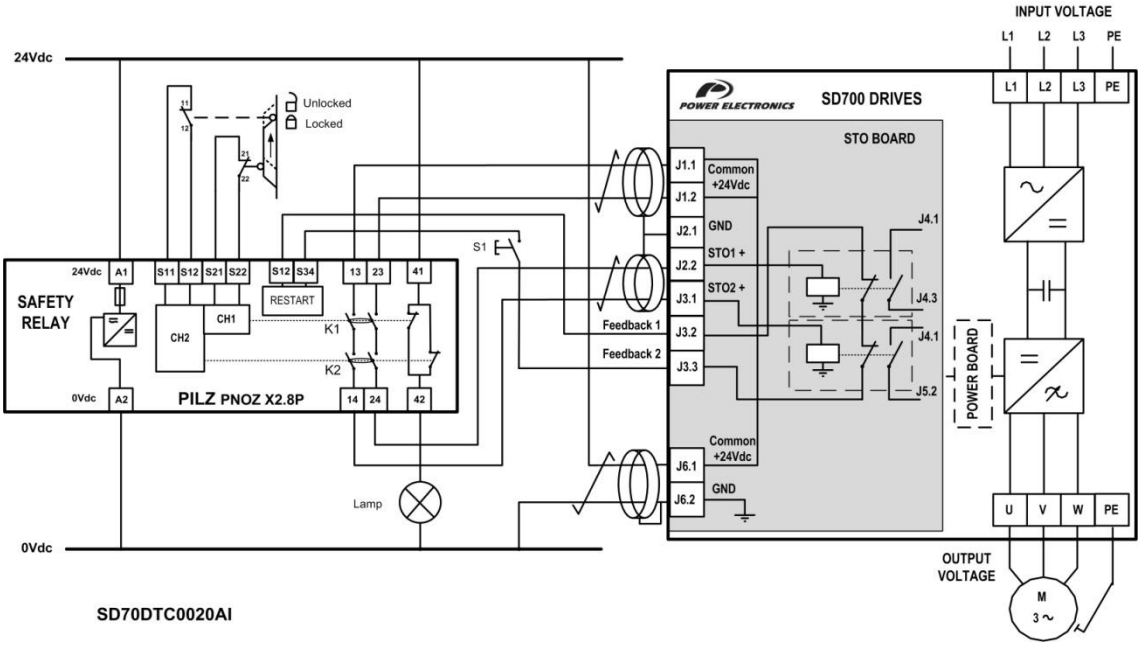

Figure 7.8 Example 2- Safety door opening

CAUTION

For SIL 3 applications the safety function has to be tested regularly (approximately once per month) in order to detect certain failures.

ENGLISH

7.3.2. Safety Integrity Level SIL1- PLc

This connection scheme provides an easy and cost effective solution for installations that not require the highest safety level requirements. In this case, the two NC contacts from the external push button are directly connected to the optional STO board. As the previous solutions, the operator pressing sensor will deactivates the IGBT switching of the inverter bridge through two independent channels, disconnecting the motor power supply and avoiding any possible unexpected restart. The monitoring terminals will not be connected.

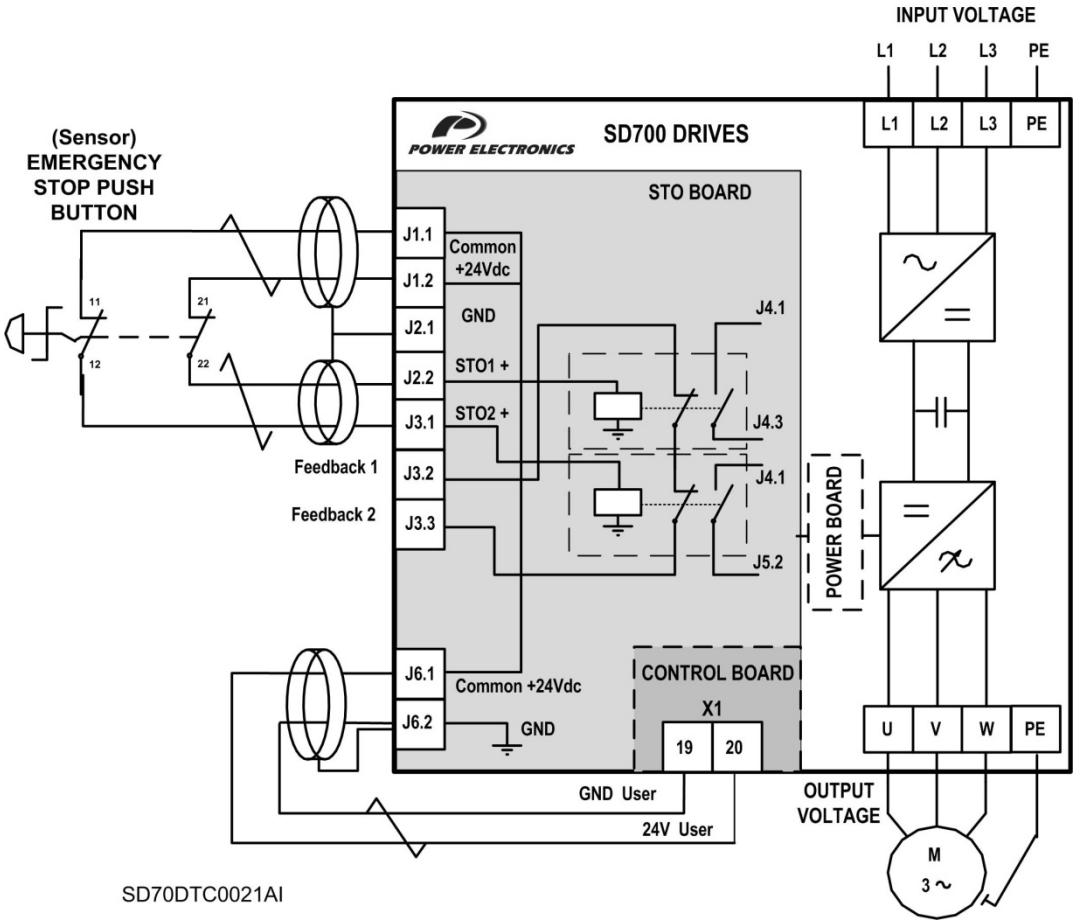

Figure 7.9 Emergency Stop Push button connection scheme – SIL 1 -PLe

X1.19 and X1.20 terminals can be used for other purpose depending on the inverter applications (frequency reference performed by an external potentiometer, analogue feedback etc…). In order to avoid the multiple cable connection in a single terminal (X1.19, X1.20), it is recommended to add additional external terminals to distribute the power supply.

CAUTION

According to EN 60204-1 automatic restart is not allowed after an emergency stop. For this reason the machine control must prevent an automatic start after emergency stop.

7.4. Connection with ATEX motors

ATEX regulations and guidelines are related to the regulations governing the use of machinery, installations or equipment within potentially explosive atmospheres. In the European Union, the use of equipment within these areas becomes a legal requirement described in two complementary directives: Directive 1999/92/EC for the installation environment and workers protection, and Directive 94/9/EC for the ATEX equipment. These guidelines and directives are based on two basic concepts: the classification of potentially explosive areas or zones, and the branding of products that are able to be installed within a zone.

Power Electronics provides a solution for driving ATEX motors such as “Ex nA”, “Ex d” and “Ex p”, under the ATEX zone areas illustrated below. For different ATEX motor and zone combination, consult Power Electronics.

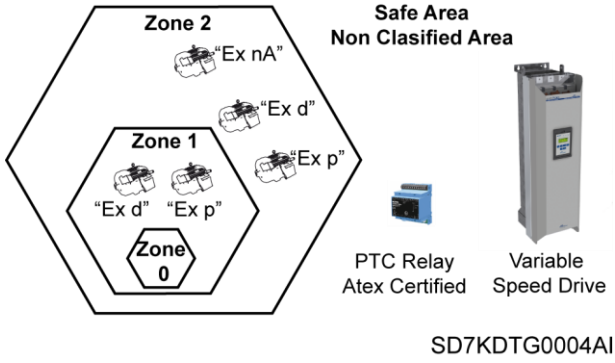

Figure 7.10 Atex motors and Zones combination

The solution is valid for motors with type of protection "Ex d" or “Ex p” installed in ATEX zone 1 and 2, or motors with type of protection "EX nA" located in zone 2. The external PTC relay must be ATEX certified, and compatible with the following features: 24Vdc power supply, 2 safety input terminals, at least 2 NO and a reset function. As illustrated below, the SD700 Kompakt drive and ATEX relay must be place in a safe area, outside the ATEX zone. (Example: *ZIEHL -PTC MSR 220 Vi*)

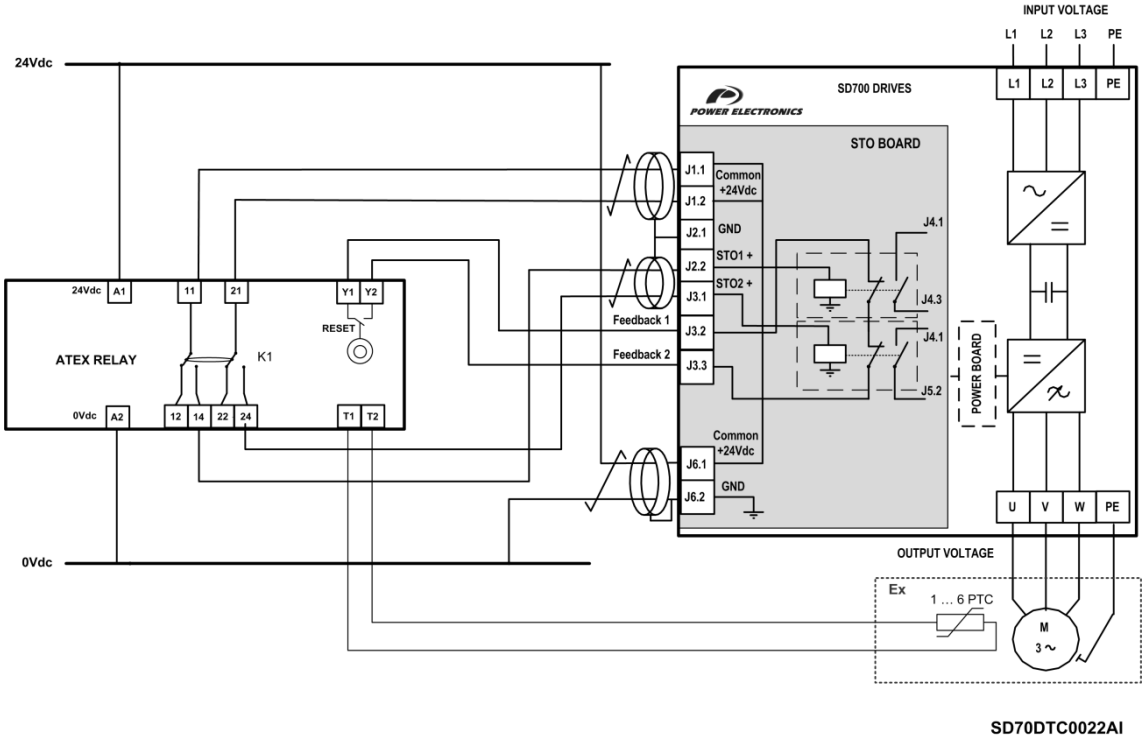

Figure 7.11 Connection scheme (Example with ZIEHL -PTC Thermistor Relay Type MSR 220 Vi)

SD700 Kompakt series are built-in as standard with dV/dt filter that reduces the dV/dt and voltage peaks at the motor windings. Therefore, it reduces the risk of winding sparks, motor overheating and bearing currents.

Additionally, the motor thermal mode protection could be adjusted to increase the protection against motor overheating. In case of self-ventilated motors, it could be required to apply a derating to the drive according to the motor manufacturer derating curves.

8. MODBUS COMMUNICATION

8.1. Introduction

To guarantee a correct operation of the drive, peripheral elements should be selected correctly and should be connected properly. A wrong installation and/or application could cause a wrong operation of the system or a reduction of the long life of the equipment, and its parts may get damaged. This manual should be read carefully and understood before proceeding.

The purpose of the Serial Communication Network of the SD700 KOMPAKT is to integrate the drive itself into a network compatible with the Modbus communications protocol. This is possible using RS232 or RS485 physical communications port or USB port. For this, it is necessary modify the position of the jumper of the control board JP1101 – JP1104. Communications ports are clearly indicated in that connector. Put the jumper in the desired position according to your needs.

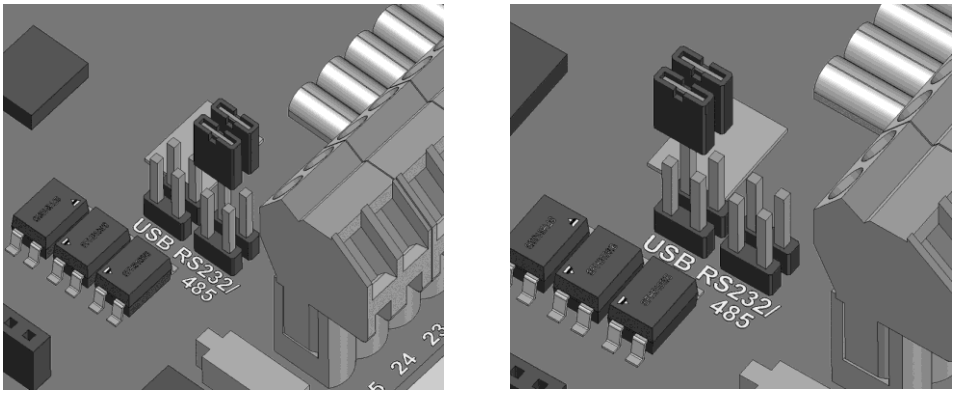

Figure 8.1 Jumper for communications port selection

Modbus communication system allows SD700 KOMPAKT drive to be controlled and/or monitored as a slave by a Modbus master from a remote location.

RS485 network allows connecting up to 240 equipments in the same network. Nevertheless, RS232 network only allows connecting one unit (slave) into the network.

SD700 KOMPAKT drive operates as a peripheral slave when connected to Modbus system. This means that the drive do not start the communication task, master will be the one that starts this task.

Practically all of the operating modes, parameters and drive characteristics are accessible through serial communications. For example, master can give start and stop order to the drive, control SD700 KOMPAKT status, read the current used by the motor etc., in short, master can access all of the possibilities of the drive.

8.2. Hardware

RS232	Physical level	3 cables, optically insulated, half duplex, RS232 single ending
	Terminals	23 ➔ RS Common (0VDC)
		24 ➔ RS232 Rx (receiving line)
		25 ➔ RS232 Tx (transmitting line)
	Output signal level	'1' logical ≤ 6.5V regarding to 0V
		'0' logical ≥ 6.5V regarding to 0V
	Input signal level	'1' logical < +0.8V
		'0' logical > +2.4V
	Maximum line impedance	2500pF, 3kΩ
	Insulation	± 50VDC regarding to the earth
	Programmable inputs via Modbus	7 digital inputs
		2 programmable analogue inputs (0 – 10V, ±10V, 0 – 20mA, 4 – 20mA)
	Programmable outputs via Modbus	3 relay outputs
		2 programmable analogue outputs (0 – 10V, ±10V, 0 – 20mA, 4 – 20mA)
	Max. number of SD700 KOMPAKT in network	1
	Maximum cable length	15m
RS485	Physical level	2 cables, optically insulated, half duplex, RS485 differential mode
	Terminals	21 ➔ RS485 A (negative)
		22 ➔ RS485 B (positive)
		23 ➔ RS Common (0VDC)
	Output signal level	'1' logical = +5V differential
		'0' logical = -5V differential
	Input signal level	'1' logical = +5V differential
		'0' logical = -5V differential
	Insulation	± 50VDC regarding to the earth
	Programmable inputs via Modbus	7 digital inputs
		2 programmable analogue inputs (0 – 10V, ±10V, 0 – 20mA, 4 – 20mA)
	Programmable outputs via Modbus	3 relay outputs
		2 programmable analogue outputs (0 – 10V, ±10V, 0 – 20mA, 4 – 20mA)
	Max. number of SD700 KOMPAKT in network	240
	Maximum cable length	1000m
USB	Connector : USB 1.1 and 2.0 type B Controller FTDI chip Model FT232BM	For the correct operation of the USB connection, you should install the proper drivers. For this, you only need to access to the information of the proper model in: http://www.ftdichip.com/Drivers/VCP.htm From here, you can download the required files and complete their correct installation.

Note: USB connection of SD700 KOMPAKT, in the USB connection of the SD700 KOMPAKT a RS232 internal conversion is executed. For this reason, the transmission speed is the indicated one in the section RS232 (9600 Bauds). USB connector type is USB 1.1 B (Slave).

Note: Installation in the driver Host of the SD700 USB, USB device of the SD700 KOMPAKT will be detected by operating systems XP and 2000, it is only necessary to indicate the driver at the moment of the installation. In case of operating systems before W98 / Me, execute a search of new Hardware in the device administrator, and complete the installation by indicating the drivers when the computer requires them.

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8.3. RS232 Connections

The following diagram shows a common wiring for a RS232 connection:

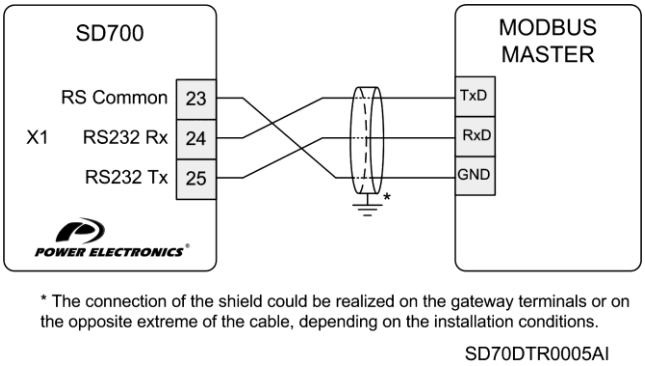


Figure 8.2 RS232 connection

8.4. RS485 Connections

The following diagram shows a common wiring for a RS232 connection RS485:

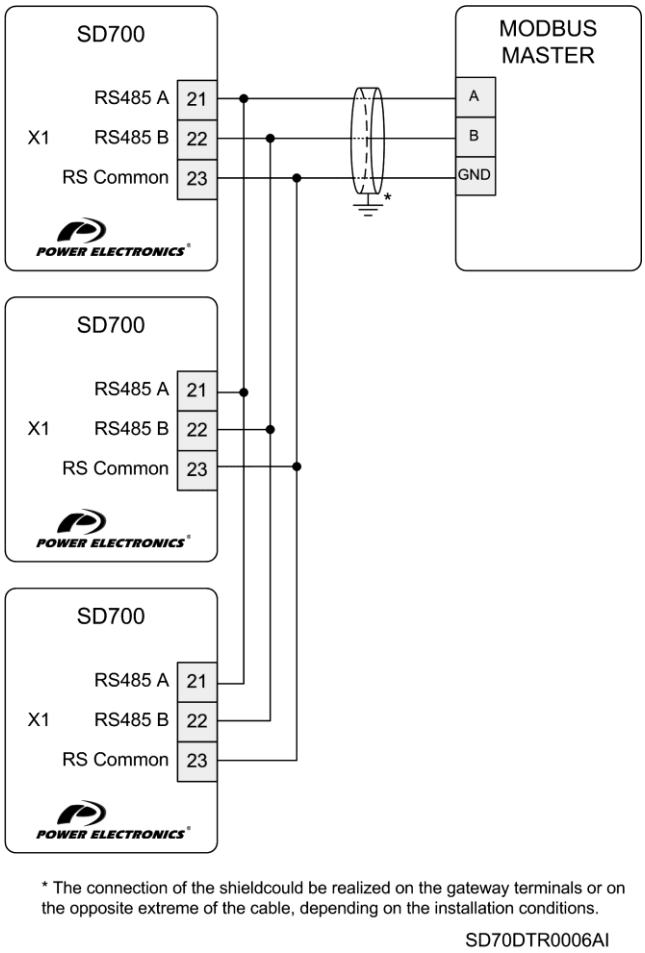


Figure 8.3 RS485 connection

9. COMMISSIONING

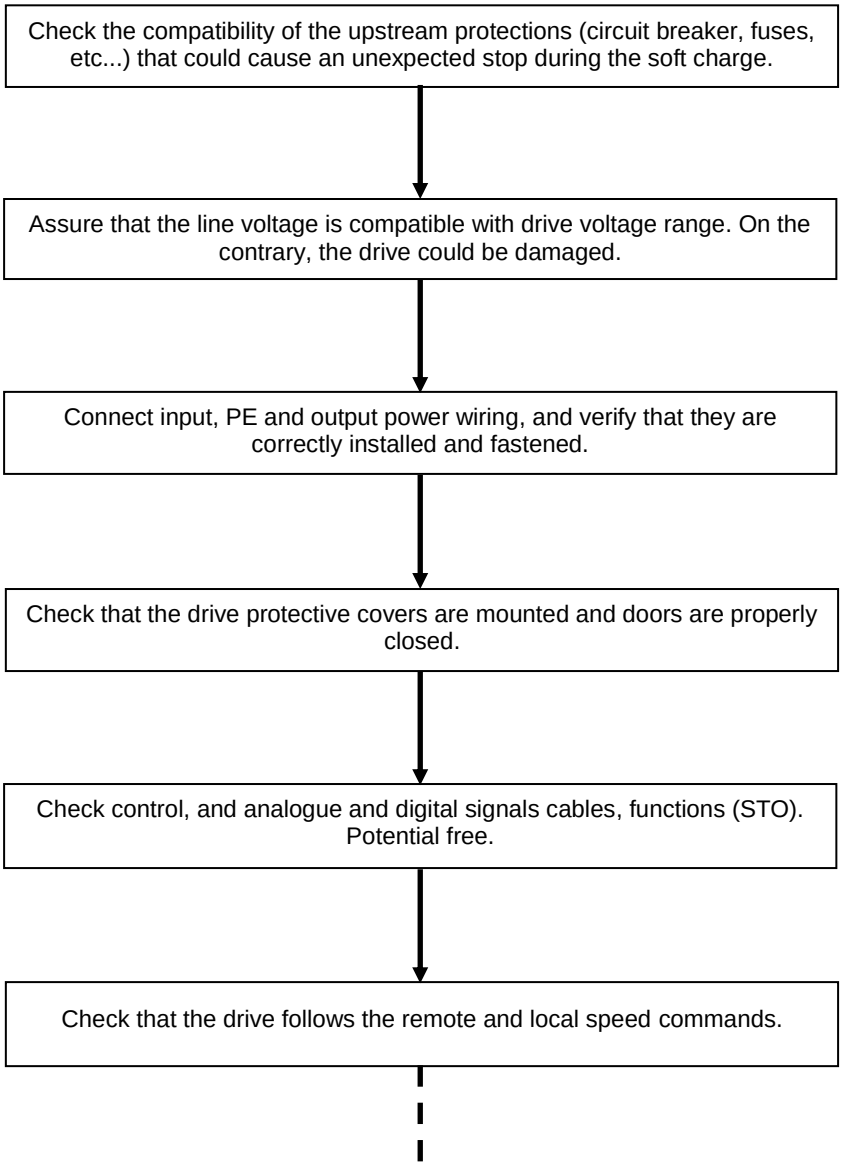
CAUTION

Only qualified personnel are allowed to commission the drive. Read and follow the safety instructions on the first pages of this manual. Neglecting the safety instructions can cause injury or death.

Ensure that there is no voltage present in the input power terminals and no voltage can be connected to the drive inadvertently.

This chapter do not include all the tasks to be performed during commissioning, follow local and national regulations.

For a properly commissioning, we recommend checking the following steps:



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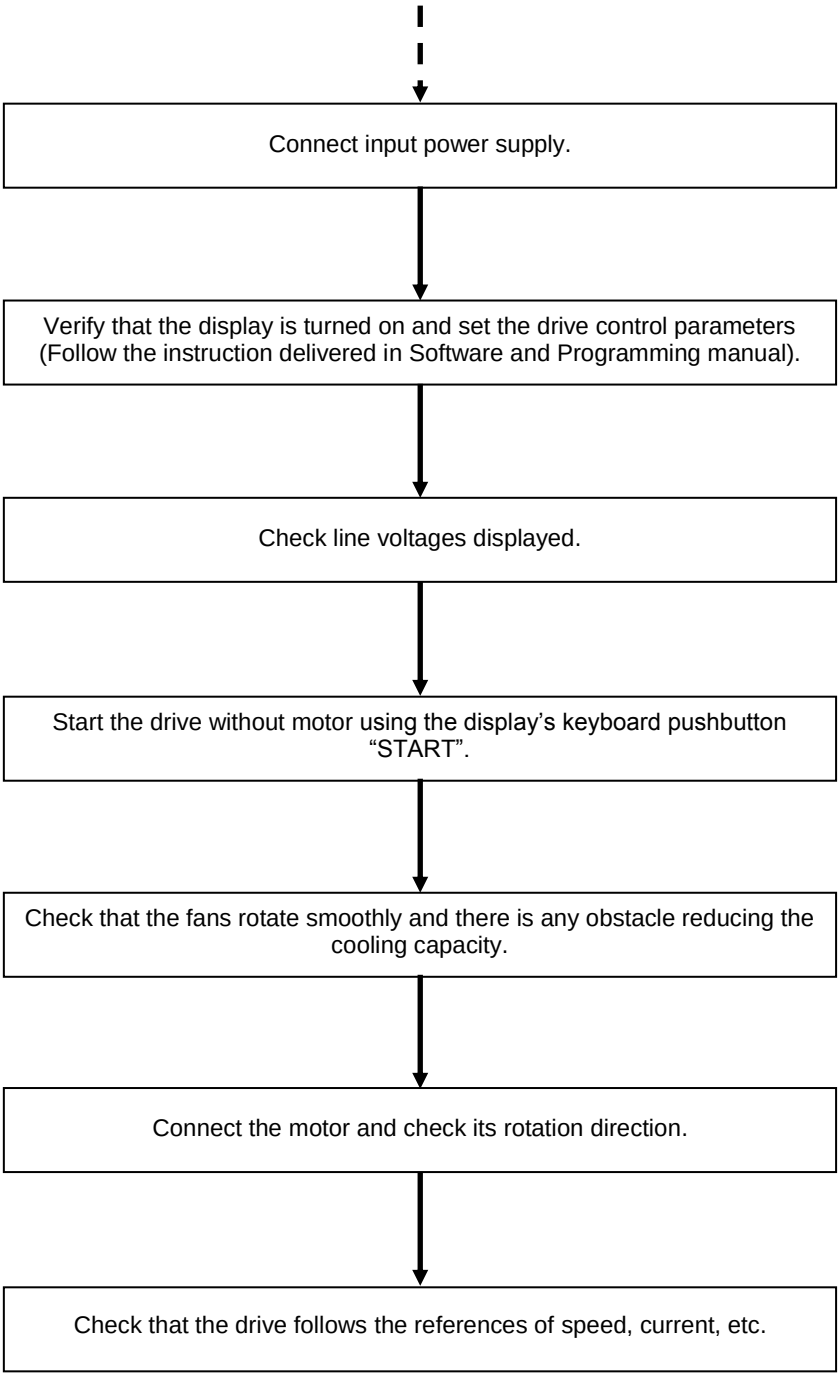
Connect input power supply.
Verify that the display is turned on and set the drive control parameters (Follow the instruction delivered in Software and Programming manual).
Check line voltages displayed.
Start the drive without motor using the display's keyboard pushbutton "START".
Check that the fans rotate smoothly and there is any obstacle reducing the cooling capacity.
Connect the motor and check its rotation direction.
Check that the drive follows the references of speed, current, etc.

10.DIMENSIONS

10.1. Dimensions IP00

10.1.1. Dimensions of Frame 1 and Frame 2

FRAME	INPUT VOLTAGE				WEIGHT kg
	230VAC (±20%)	380-500VAC (-20% to +10%)	525VAC (-20% to +10%)	690VAC (-15% to +10%)	
1	SD7K0210 20 Y SD7K0250 20 Y SD7K0275 20 Y	SD7K0210 50 Y SD7K0250 50 Y SD7K0275 50 Y	SD7K0180 70 Y SD7K0205 70 Y	SD7K0130 60 Y SD7K0150 60 Y SD7K0170 60 Y	78,2
2	SD7K0330 20 Y SD7K0370 20 Y SD7K0460 20 Y	SD7K0330 50 Y SD7K0370 50 Y SD7K0460 50 Y	SD7K0270 70 Y SD7K0295 70 Y SD7K0340 70 Y	SD7K0210 60 Y SD7K0260 60 Y SD7K0320 60 Y	148

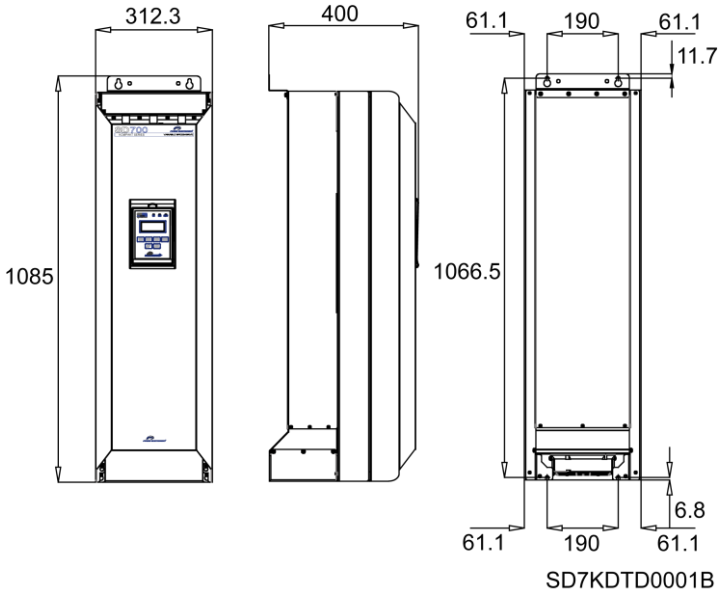

Figure 10.1 Dimensions of Frame 1 (mm)

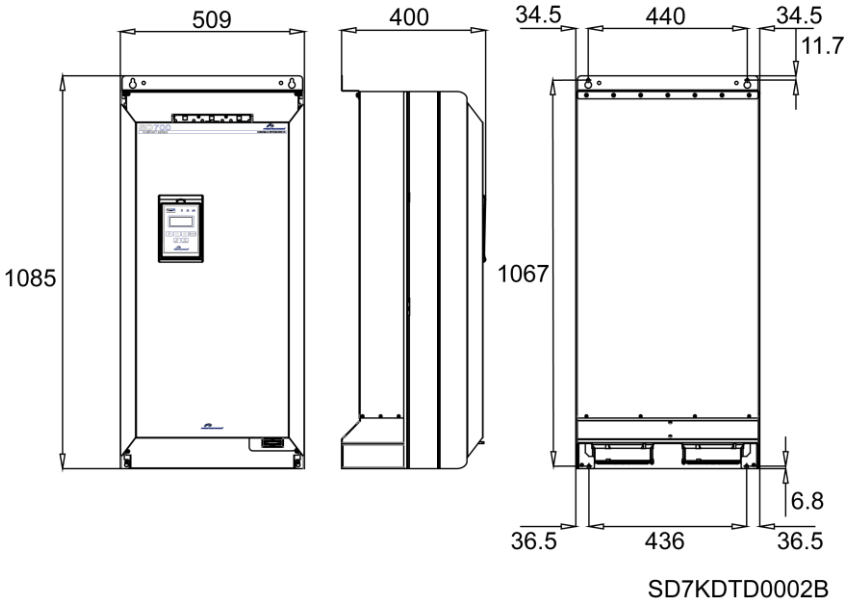

Figure 10.2 Dimensions of Frame 2 (mm)

10.1.2. Dimensions of Frame 3 and Frame 4

FRAME	INPUT VOLTAGE				WEIGHT kg
	230VAC (±20%)	380-500VAC (-20% to +10%)	525VAC (-20% to +10%)	690VAC (-15% to +10%)	
3	SD7K0580 20 Y SD7K0650 20 Y SD7K0720 20 Y	SD7K0580 50 Y SD7K0650 50 Y SD7K0720 50 Y	SD7K0425 70 Y SD7K0470 70 Y SD7K0535 70 Y	SD7K0385 60 Y SD7K0460 60 Y	200
4	-	SD7K0840 50 Y SD7K0925 50 Y SD7K0990 50 Y SD7K0840 50 12 Y SD7K0925 50 12 Y SD7K0990 50 12 Y	SD7K0660 70 Y SD7K0750 70 Y SD7K0660 70 12 Y SD7K0750 70 12 Y	SD7K0550 60 Y SD7K0660 60 Y SD7K0550 60 12 Y SD7K0660 60 12 Y	280

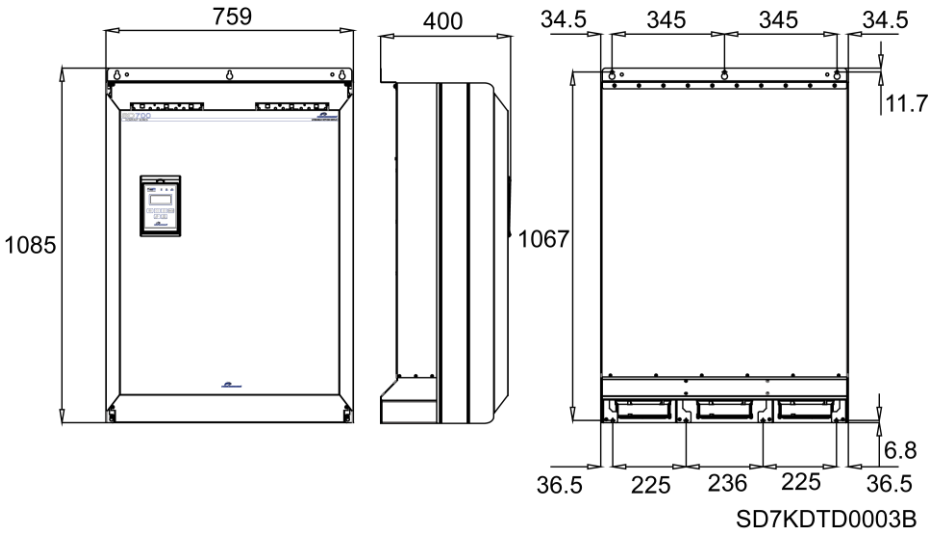

Figure 10.3 Dimensions of Frame 3 (mm)

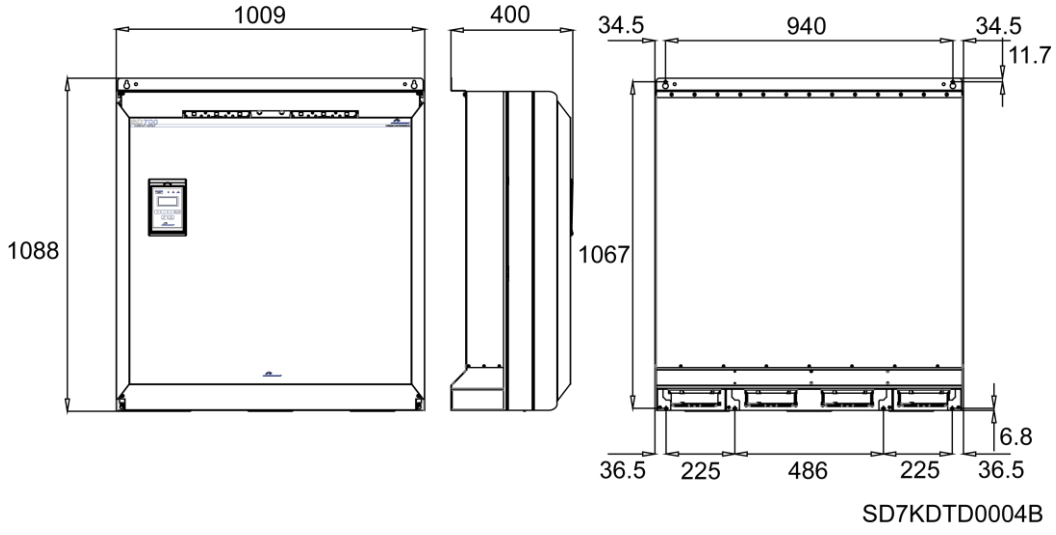

Figure 10.4 Dimensions of Frame 4 (mm)

10.2. Dimensions IP20

10.2.1. Dimensions of Frame 1 and Frame 2

FRAME	INPUT VOLTAGE				WEIGHT kg
	230VAC (±20%)	380-500VAC (-20% to +10%)	525VAC (-20% to +10%)	690VAC (-15% to +10%)	
1	SD7K0210 22 Y SD7K0250 22 Y SD7K0275 22 Y	SD7K0210 52 Y SD7K0250 52 Y SD7K0275 52 Y	SD7K0180 72 Y SD7K0205 72 Y	SD7K0130 62 Y SD7K0150 62 Y SD7K0170 62 Y	85,5
2	SD7K0330 22 Y SD7K0370 22 Y SD7K0460 22 Y	SD7K0330 52 Y SD7K0370 52 Y SD7K0460 52 Y	SD7K0270 72 Y SD7K0295 72 Y SD7K0340 72 Y	SD7K0210 62 Y SD7K0260 62 Y SD7K0320 62 Y	159

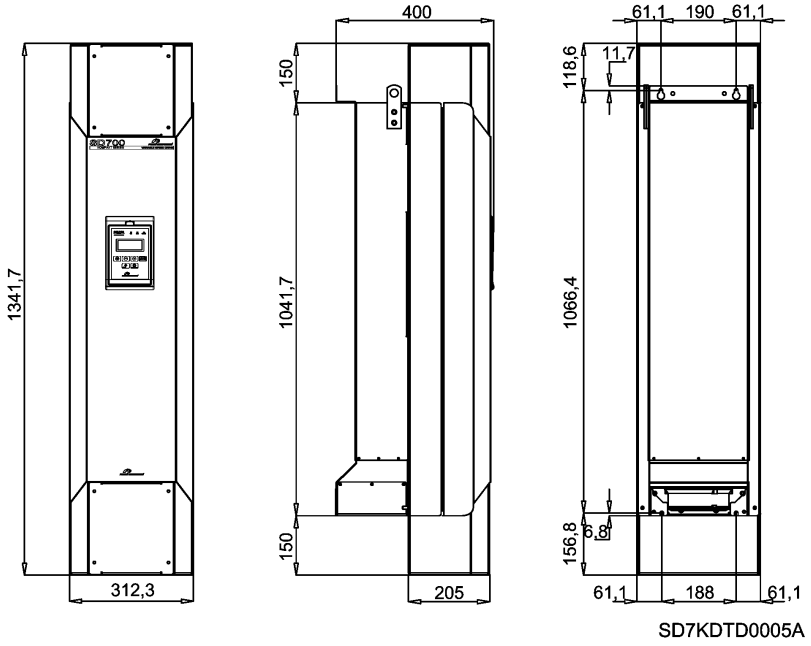

Figure 10.5 Dimensions of Frame 1 (mm)

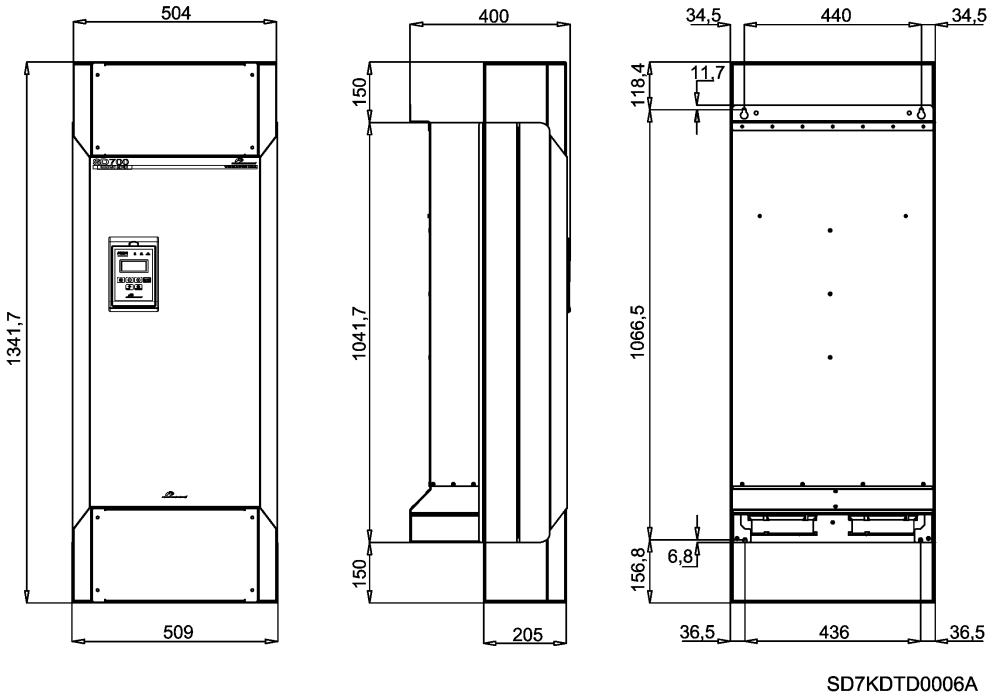

Figure 10.6 Dimensions of Frame 2 (mm)

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10.2.2. Dimensions of Frame 3 and Frame 4

FRAME	INPUT VOLTAGE				WEIGHT kg
	230VAC (±20%)	380-500VAC (-20% to +10%)	525VAC (-20% to +10%)	690VAC (-15% to +10%)	
3	SD7K0580 22 Y SD7K0650 22 Y SD7K0720 22 Y	SD7K0580 52 Y SD7K0650 52 Y SD7K0720 52 Y	SD7K0425 72 Y SD7K0470 72 Y SD7K0535 72 Y	SD7K0385 62 Y SD7K0460 62 Y	215,3
4	-	SD7K0840 52 Y SD7K0925 52 Y SD7K0990 52 Y SD7K0840 52 12 Y SD7K0925 52 12 Y SD7K0990 52 12 Y	SD7K0660 72 Y SD7K0750 72 Y SD7K0660 72 12 Y SD7K0750 72 12 Y	SD7K0550 62 Y SD7K0660 62 Y SD7K0550 62 12 Y SD7K0660 62 12 Y	299,7

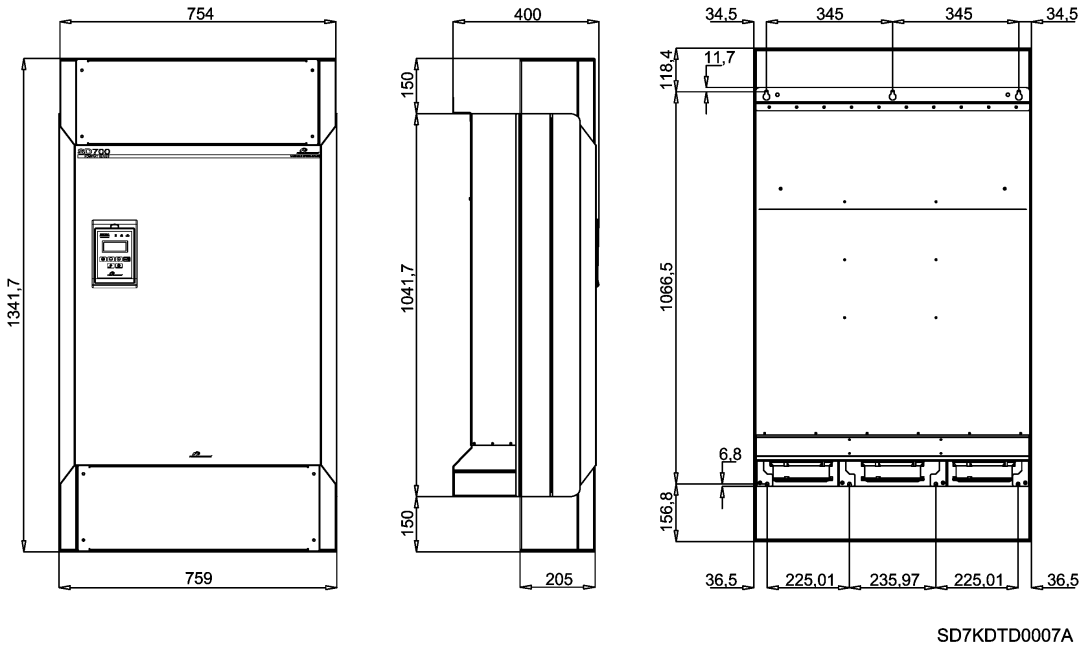


Figure 10.7 Dimensions of Frame 3 (mm)

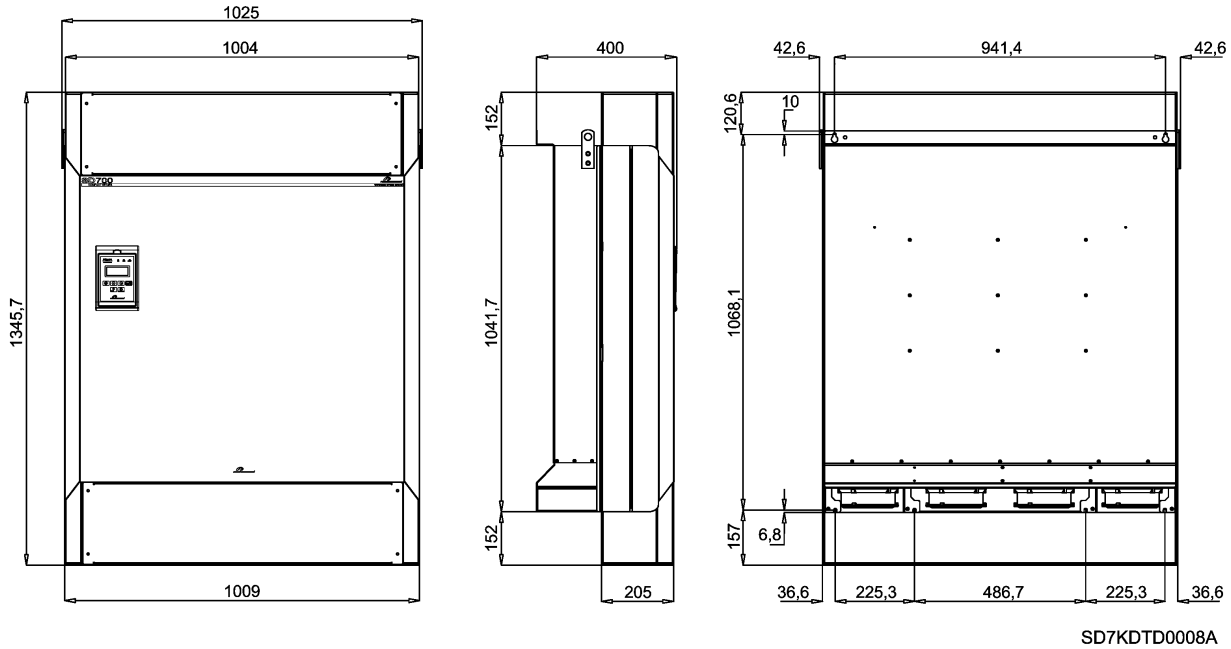


Figure 10.8 Dimensions of Frame 4 (mm)

11.INDUCTANCES

11.1. Inductances for SD700 KOMPAKT drive

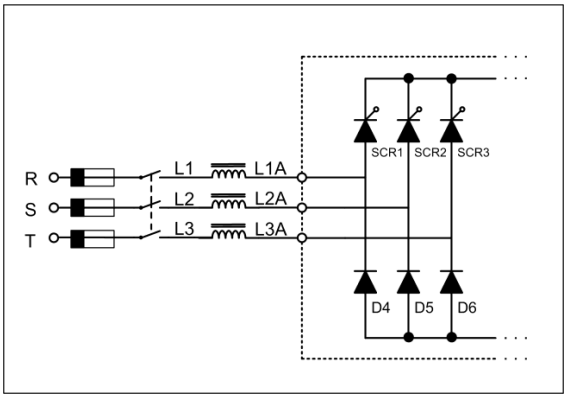
11.1.1. 230VAC Equipments

DRIVE		INDUCTANCE				
FRAME	REFERENCE	REFERENCE	I (A)	QUANTITY	CONNECTION	WEIGHT (kg)
1	SD7K0210 2X Y	P246B	250	1	Type A	33
	SD7K0250 2X Y					
	SD7K0275 2X Y	P256A				65
2	SD7K0330 2X Y	P256A	370	1	Type A	65
	SD7K0370 2X Y					
	SD7K0460 2X Y	P233A	500	1	Type A	53
3	SD7K0580 2X Y	P297A	2x290	2	Type B	2x48
	SD7K0650 2X Y	P298A	2x360	2	Type B	2x43
	SD7K0720 2X Y					

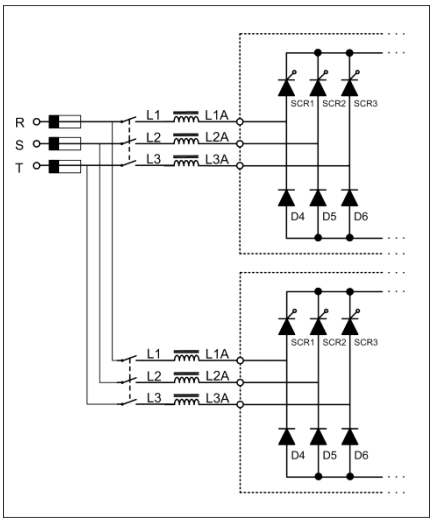
11.1.2. 400-500VAC Equipments

DRIVE		INDUCTANCE				
FRAME	REFERENCE	REFERENCE	I (A)	QUANTITY	CONNECTION	WEIGHT (kg)
1	SD7K0210 5X Y	P246B	250	1	Type A	33
	SD7K0250 5X Y					
	SD7K0275 5X Y	P256A				65
2	SD7K0330 5X Y	P256A	370	1	Type A	65
	SD7K0370 5X Y					
	SD7K0460 5X Y	P233A	500	1	Type A	53
3	SD7K0580 5X Y	P297A	2x290	2	Type B	2x48
	SD7K0650 5X Y	P298A	2x360	2	Type B	2x43
	SD7K0720 5X Y					
4	SD7K0840 5X Y	P233A	2x500	2	Type B	2x53
	SD7K0925 5X Y					
	SD7K0990 5X Y					
	SD7K0840 5X 12 Y					
	SD7K0925 5X 12 Y					
	SD7K0990 5X 12 Y					

Connection Type A



Connection Type B



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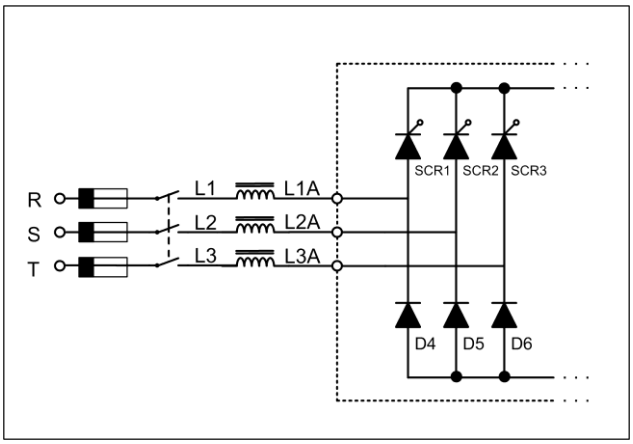
11.1.3. 525VAC Equipments

DRIVE		INDUCTANCE				
FRAME	REFERENCE	REFERENCE	I (A)	QUANTITY	CONNECTION	WEIGHT (kg)
1	SD7K0180 7X Y	**P317B**	210	1	Type A	40
	SD7K0205 7X Y	**P246B**	250	1	Type A	33
2	SD7K0270 7X Y	**P233A**	500	1	Type A	53
	SD7K0295 7X Y					
	SD7K0340 7X Y					
3	SD7K0425 7X Y	**P297A**	2x290	2	Type B	2x48
	SD7K0470 7X Y	**P298A**	2x360	2	Type B	2x43
	SD7K0535 7X Y					
4	SD7K0660 7X Y	**P233A**	2x500	2	Type B	2x53
	SD7K0750 7X Y					
	SD7K0660 7X 12 Y					
	SD7K0750 7X 12 Y					

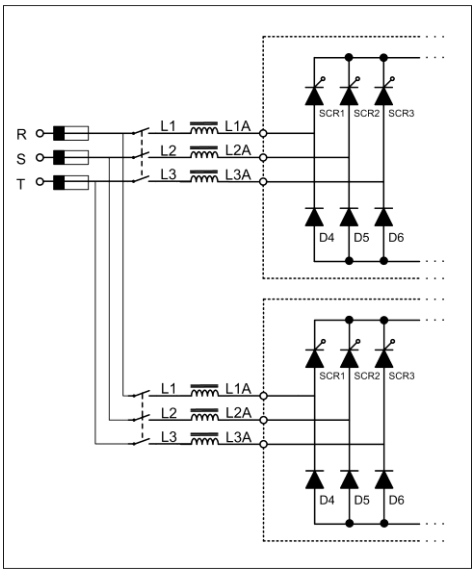
11.1.4. 690VAC Equipments

DRIVE		INDUCTANCE				
FRAME	REFERENCE	REFERENCE	I (A)	QUANTITY	CONNECTION	WEIGHT (kg)
1	SD7K0130 6X Y	**P316B**	170	1	Type A	33
	SD7K0150 6X Y					
	SD7K0170 6X Y					
2	SD7K0210 6X Y	**P317B**	210	1	Type A	40
	SD7K0260 6X Y	**P318A**	330	1	Type A	62
	SD7K0320 6X Y					
3	SD7K0385 6X Y	**P319B**	2x230	2	Type B	2x42
	SD7K0460 6X Y					
4	SD7K0550 6X Y	**P318A**	2x330	2	Type B	2x62
	SD7K0660 6X Y					
	SD7K0550 6X 12 Y					
	SD7K0660 6X 12 Y					

[1] Connection Type A



[2] Connection Type B



11.2. Dimensions of Inductances

11.2.1. P246B Inductance

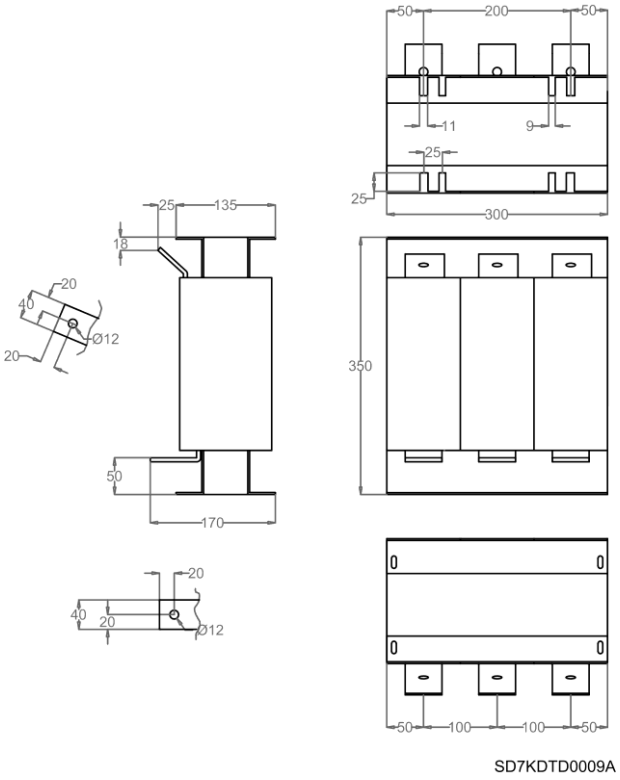


Figure 11.1 Dimensions of P246B Inductance (mm)

11.2.2. P256A Inductance

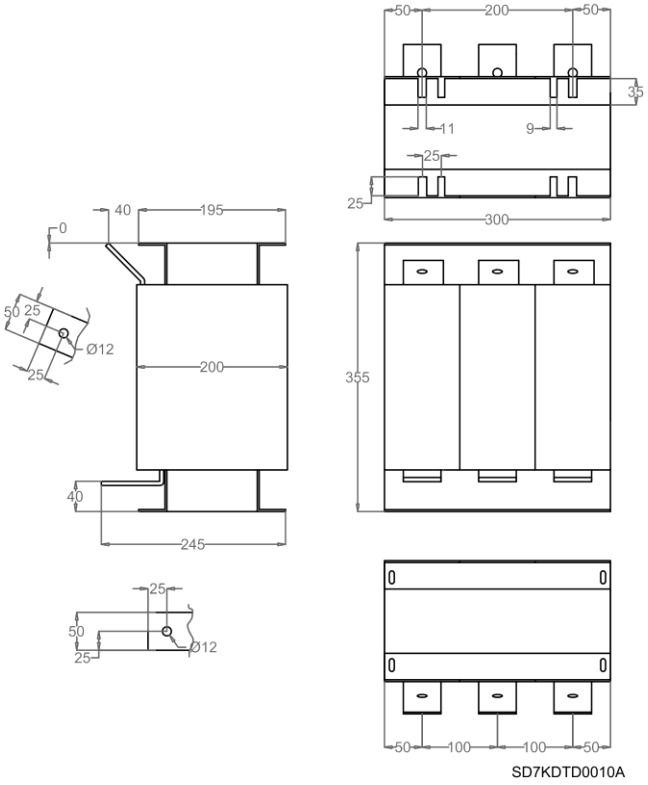


Figure 11.2 Dimensions of P256A Inductance (mm)

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11.2.3. P233A Inductance

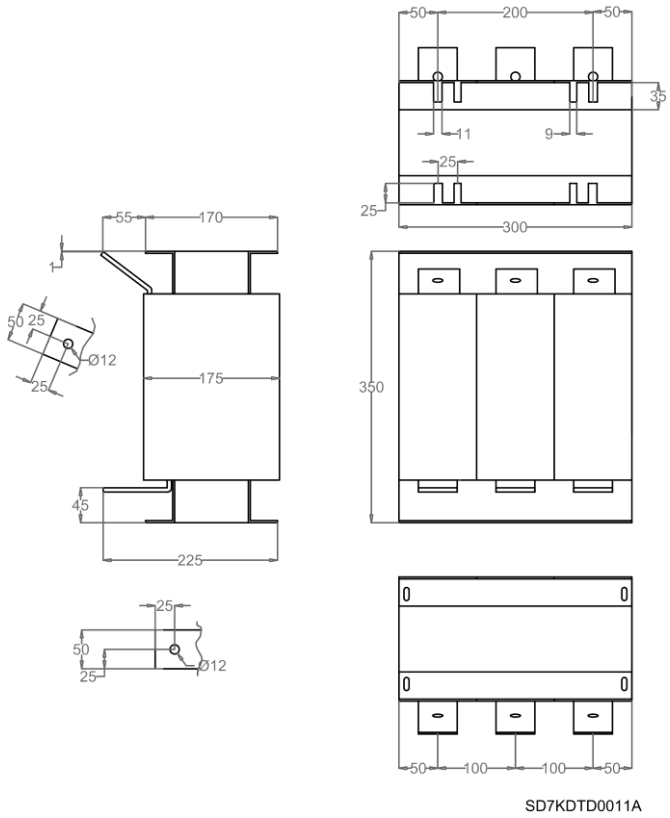

Figure 11.3 Dimensions of P233A Inductance (mm)

11.2.4. P297A Inductance

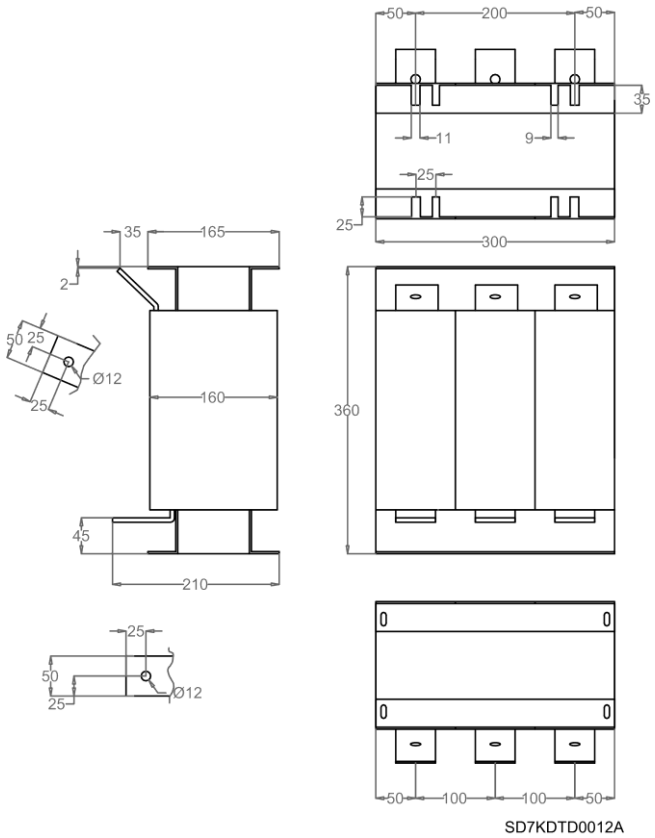

Figure 11.4 Dimensions of P297A Inductance (mm)

11.2.5. P298A Inductance

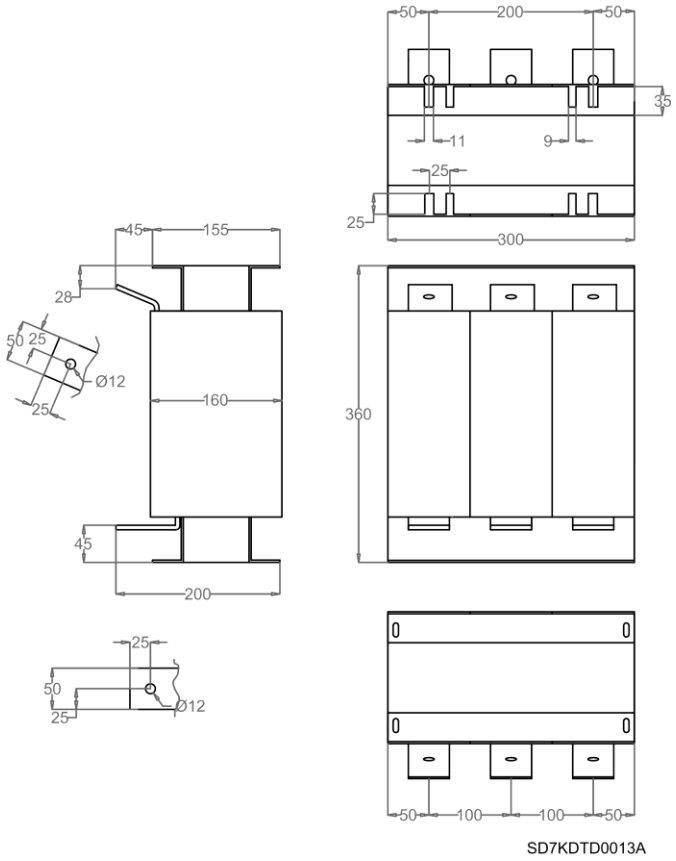

Figure 11.5 Dimensions of P298A Inductance (mm)

11.2.6. P316A Inductance

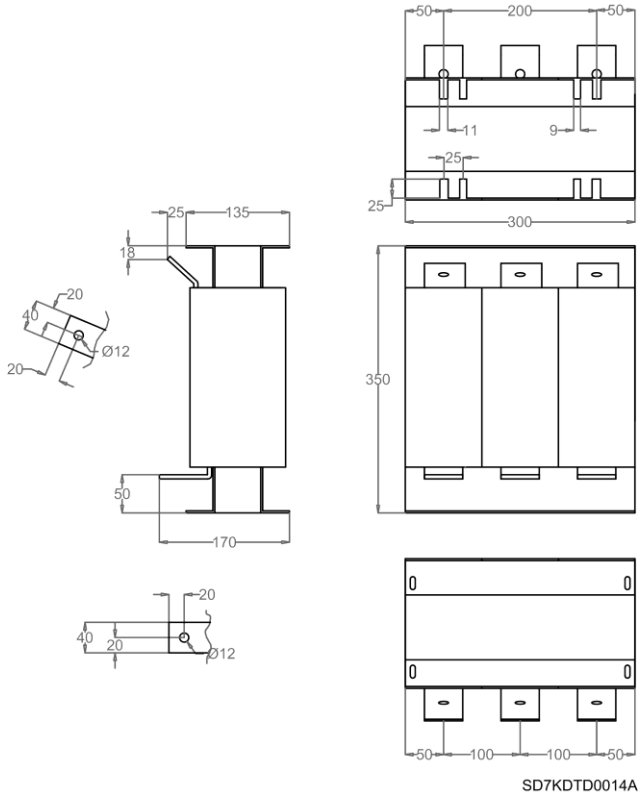

Figure 11.6 Dimensions of P316A Inductance (mm)

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11.2.7. P317A Inductance

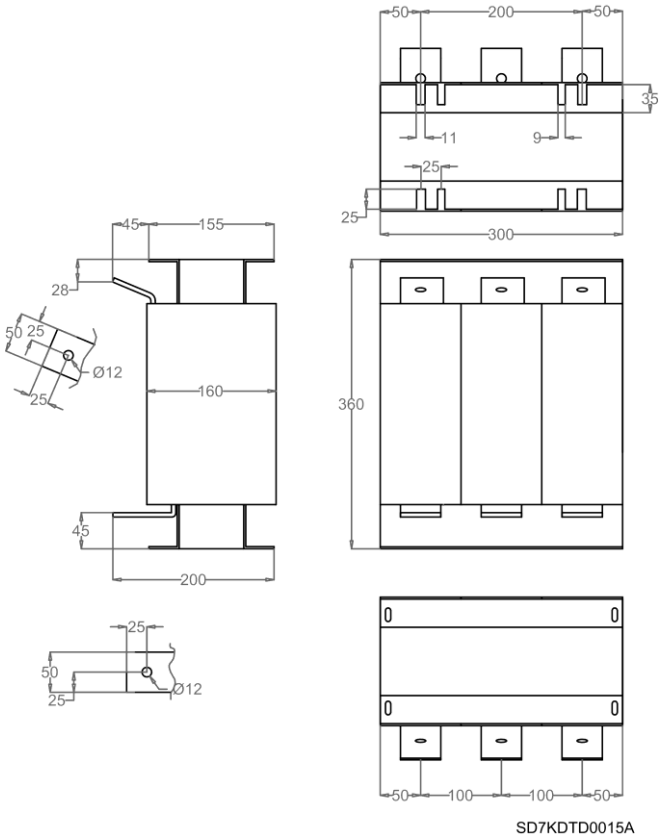


Figure 11.7 Dimensions of P317A Inductance (mm)

11.2.8. P318A Inductance

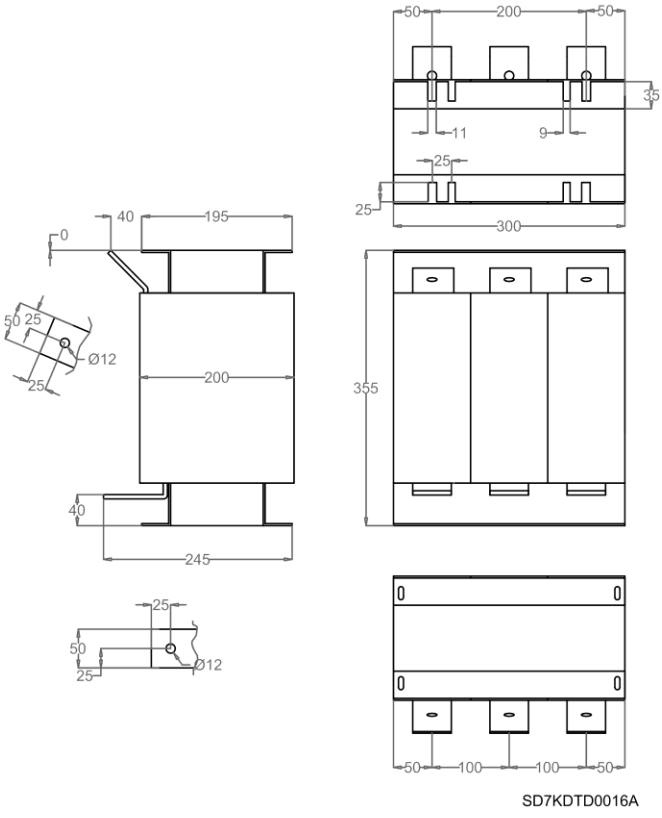


Figure 11.8 Dimensions of P318A Inductance (mm)

11.2.9. P319A Inductance

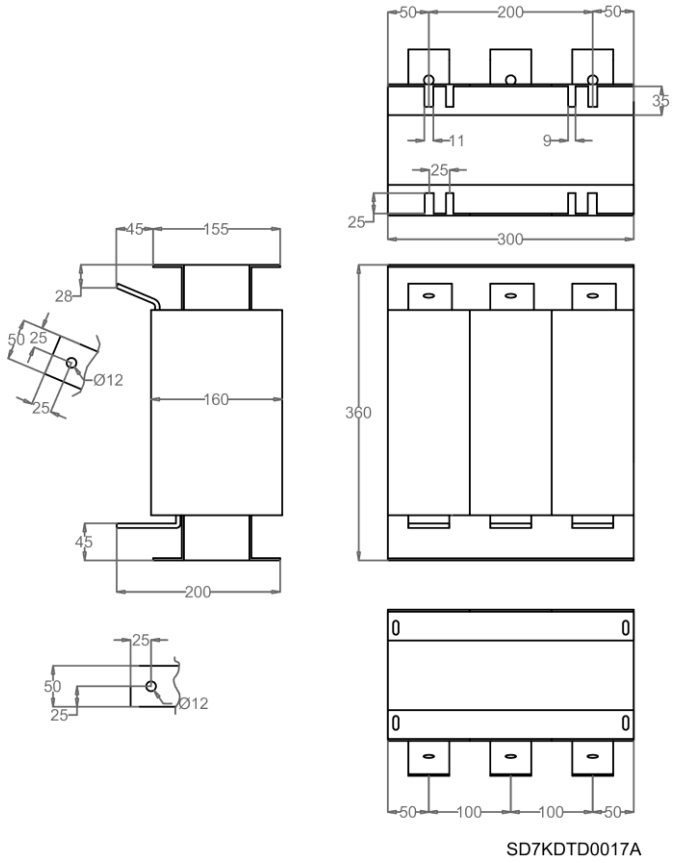


Figure 11.9 Dimensions of P319A Inductance (mm)

12. MAINTENANCE

SD700 KOMPAKT drives consist of advanced semiconductor devices. Temperature, humidity, vibration and deteriorated components can reduce their efficiency. To avoid any possible irregularity we recommend making periodic inspections.

12.1. Warnings

- Be sure to remove the input power while performing maintenance.
- Be sure to perform maintenance after checking the DC Link capacitor has discharged. Check that the voltage between terminals +HVDC and -HVDC is below DC 30V. The bus capacitors in the drive main circuit can still be charged even after the power is turned off.
- The correct output voltage of the drive can only be measured by using an RMS voltage meter. Others voltage meters, including digital voltage meters, are likely to display incorrect values caused by the high frequency PWM output voltage of the drive.

12.2. Routine Inspection

Be sure to check the following points before handling the drive:

- Installation site conditions.
- Drive cooling system conditions.
- Excessive vibrations.
- Excessive overheating.
- Normal output value on the monitor.

Inspection site	Inspection element	Inspection	Period			Inspection method	Criterion	Instrument of Measurement
			Monthly	1 year	2 years			
All	Ambient conditions	Are there dust particles? Are the ambient temperature and the humidity within specification?	o			See "Warnings"	Temperature: -30 to +50 Humidity: below 95% non-condensing.	Thermometer, Hygrometer, Recorder.
	Module	Are there any abnormal noises or oscillations?	o			Visual and audible.	There are no anomalies.	
	Input power	Is the input power to the main circuit correct?	o			Measure the voltage between terminals R, S, T and N.		Digital multimeter. Tester.
	Power connections	Are the Power terminals correctly fastened?		o		Measure the temperature and torque of the power connections	Fasten the bolts again one week after its start-up. Check that the temperature is homogeneous and below 70ºC	Infrared thermometer, Torque key
Main circuit	Conductor/ Cable	Is the conductor corroded? Is the sheathing of the cable damaged?		o o		Visual check.	No anomaly.	
	Terminal	Is any damage visible?		o		Visual check.	No anomaly.	
	IGBT's module Diodes module and Rectifier	Check the resistance value between each one of the terminals			o	Disconnect the cables of the inverter and measure the resistance value between: R, S, T ⇔ VDC+, VDC- and U, V, W ⇔ VDC+, VDC- with a tester > 10kΩ		Digital multimeter. Analogue tester.

Inspection site	Inspection element	Inspection	Period			Inspection method	Criterion	Instrument of Measurement
			Monthly	1 year	2 years			
Main circuit	Correct capacitor	Have fluid leakages been observed? Is the capacitor well fastened? Is any dilation or retraction sign observed? Measure the capacitance	o o	o		Visual check. Measure the capacitance with a proper instrument.	No anomaly Capacitance higher than 85% of rated capacitance.	Instrument for measuring capacity.
	Input Inductances	Is there any liquid leak? Is there any overheated point?		o o		Visual check. Measure the surface and connectors' temperature.	No anomaly. Check that the temperature is homogeneous and below 70ºC	Infrared thermometer.
	Contactor	Is there any contactor chatter? Is the contact damaged?		o o		Audible check. Visual check.	No anomaly.	
Control circuit and Protections	Operating check	Is there any imbalance between output voltage phases?		o		Measure voltage between output terminals U, V and W.	Balanced voltage between phases i.e. lower than 8V difference for 400V models.	Digital multimeter / RMS voltage meter.
Cooling system	Cooling fans	Are there any abnormal noises or oscillations? Is the cooling fan disconnected?	o	 o		Disconnect the power supply (OFF) and rotate the fan manually. Check the connections.	Fan should rotate effortlessly. No anomaly.	
Display	Measurement	Is the displayed value correct?	o	o		Check the reading instrument with an external measurement.	Check the specified values and the control values.	Voltage meter / Current meter etc.
Motor	All	Is there any noise or abnormal vibrations? Has any unusual smell been perceived?	o o			Audible, sensory and visual check. Check if damages have been produced by overheating.	No anomaly.	
	Insulation resistance	Megger check (between terminals of output circuit and ground terminal)			o	Disconnect the cables U, V and W and join them together. Check the resistance between this join and ground.	More than 5MΩ	Megger type 500V

Note: Long life of the main components above indicated is based on a continuous operation for the stipulated load. These conditions can change according to the environment conditions.

13. OPTIONAL EQUIPMENT

13.1. Accessories

CODE	DESCRIPTION
SD7PD	**Profibus Communication Board.**
SD7ET	**Ethernet Communication Board.**
SD7DN	**DeviceNet Communication Board.**
SD7CO	**CAN Open Communication Board.**
- *	**N2 Metasys Communication Gateway.**
SD7EC	**Encoder Board.** It allows connecting up to 2 differential Encoders (one of them for the user and the other one for vector control) working from 5 to 24VDC, according to the requirements.
SD7IO	**Inputs / Outputs Expansion Board.** It allows increasing the number of inputs and outputs of the drive. It includes: • 4 Programmable Digital Inputs optically isolated • 1 Programmable Analogue Input • 5 Digital Outputs (Relays) • 1 Programmable Analogue Output
SD7FO	**Fibre Optic Board.**
SD7STO	**Safe Torque Off (STO) board.** Allows implementing in the drive the safe torque off function according to IEC 61800-5-2 (SIL1 or SIL3).
SD7ES05I	**External 24V Power Supply.** For **Frame 1** of SD700 KOMPAKT. Interior Assembly.
SD7ES06I	**External 24V Power Supply.** For **Frames 2 and 3** of SD700 KOMPAKT. Interior Assembly.
SD7ES08I	**External 24V Power Supply.** For **Frame 4** of SD700 KOMPAKT. Interior Assembly.
SD7TD	**Touch-Graphic Display.** (For further information, see section 'Touch-Graphic Display').
V11	**Kit 3 meters Extender for Display.**
V12	**Kit 5 meters Extender for Display.**
GSM01	**GSM Module.** (For Touch-Graphic Display option).
B150	**Dynamic Braking Unit.** (For further information, see section 'Dynamic Braking Unit B150).
SD7DB	**Optional Board for Slave Mode Brake.** **(For Dynamic Braking Unit B150 option).**

* Consult availability with Power Electronics.

13.2. IP20 Housing

IP00 equipments can be easily improved to IP20 by installing an extra enclosure so that the drive becomes protected from the ingress of foreign objects larger than 12.5mm of diameter, like fingers for example. The following table resumes the dimensions of that extra enclosure in function of frame size:

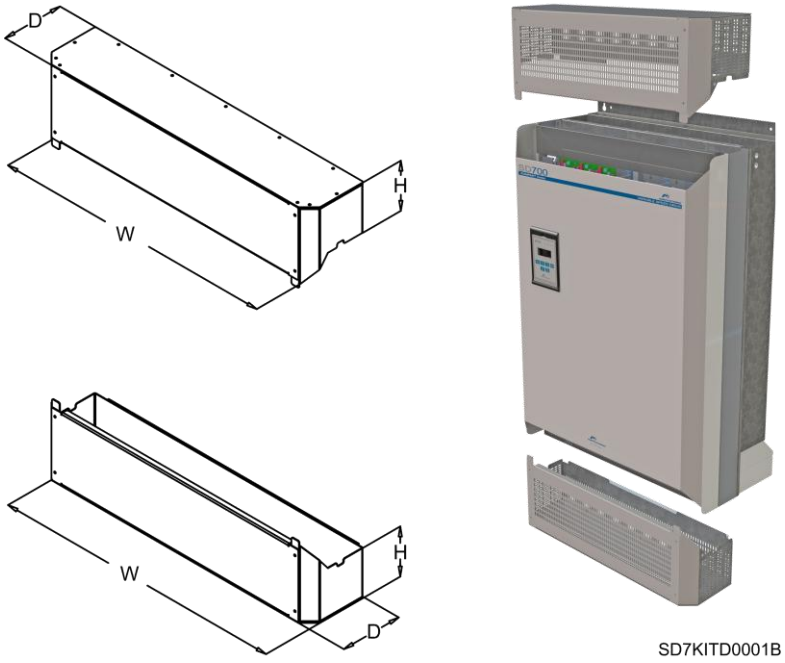


Figure 13.1 Extension Box Dimensions

CODE	FRAME	DIMENSIONS (mm)		
		W	H	D
SD7KEB1	1	303	150	202
SD7KEB2	2	501	150	202
SD7KEB3	3	751	150	202
SD7KEB4	4	1001	150	202

13.3. Communication boards

SD700 family is compatible with the most commonly used communication protocols (Profibus-DP, DeviceNet, Modbus TCP, Ethernet IP, N2 Metasys, CAN Open…), thanks to its optional boards.

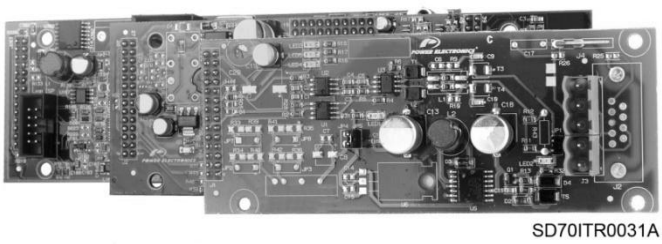


Figure 13.2 Example of Profibus optional board

13.4. Dynamic Braking Unit B150

The Dynamic brake permits to control the regenerated energy for series SD700, SD700KOMPAKT and SD700FL. B150 dynamic brake activates an IGBT to discharge the DC bus over external resistors when the DC voltage overpasses a pre-set value. This activation signal could also be delivered by the drive acquiring an optional Master- Slave mode braking board.

The B150, with reduced dimensions and high reliability, is the main power-switching device of such a dynamic braking systems.

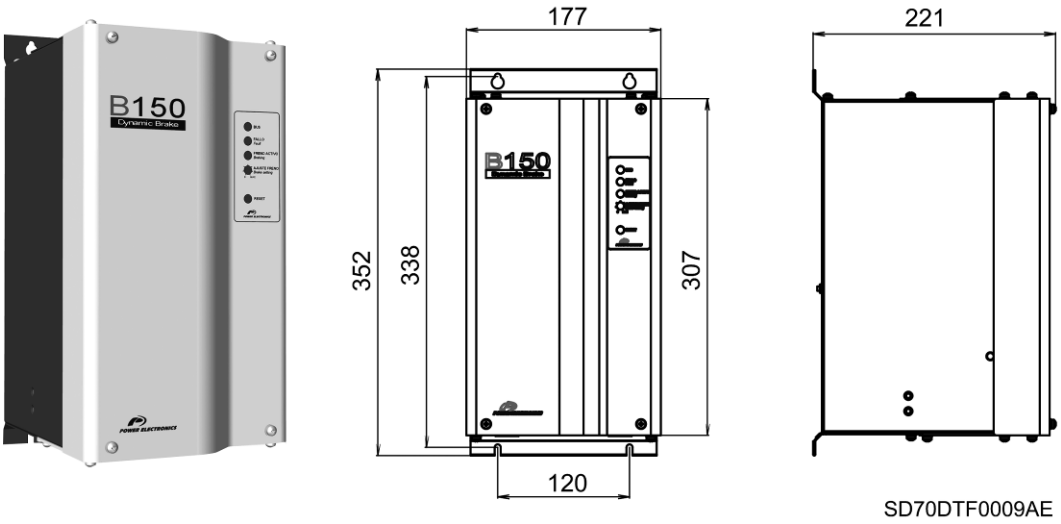


Figure 13.3 Dynamic Braking Unit. Dimensions [mm]

REFERENCE	VOLTAGE	CURRENT (A)		MINIMUM RESISTANCE RATING (Ω)	DIMENSIONS (MM)			WEIGHT
		MAXIMUM	CONTINUOUS		W	D	H	
B150.2	230Vac	300A	150A	2.4Ω	177	221	352	7 kg
B150	400Vac, 500Vac	300A	150A	2.4Ω				
B150.6	690Vac	200A	100A	5.75Ω				

13.4.1. Optional Board for Slave Mode Brake

There is the possibility for the drive to control the activation of the dynamic braking module B150. In this way, the optional board SD7DB must be used to allowi the drive to control the dynamic braking unit B150 that will operate as slave unit of the drive. This optional board is not required in case of the unit B150 operates in master mode.

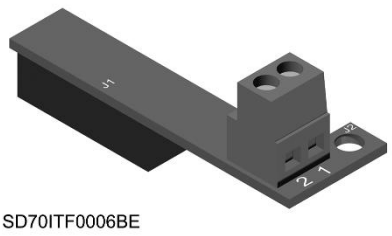


Figure 13.4 Optional Board for Slave Mode Brake (SD7DB)

13.5. Touch-Graphic Display

The Touch-Graphic Display provides a much more intuitive data presentation, an easy navigation through the control parameters and allows saving thousands of customized configurations defined by the user. Some of the outstanding characteristics of the graphic display are:

- TFT-LCD Touch screen of 3,5 inches and 240x320 pixels
- Customized visualization by the user
- GSM and GPRS communication (SMS Service)
- System help built-in
- Fault Register (Logs)
- Language selection
- 4 Gbytes Micro SD for data history storage.
- Built in Quad band GSM Modem for sending SMS with Consultations or Notifications (Events, Alarms...)
- Dual Ethernet Connection –LAN RJ45 and USB connection.
- Possibility of external or battery 5Vdc power supply.

The Touch-Graphic display for the SD700 Kompakt is a removable display unit for its remote installation, as the following figure shows:

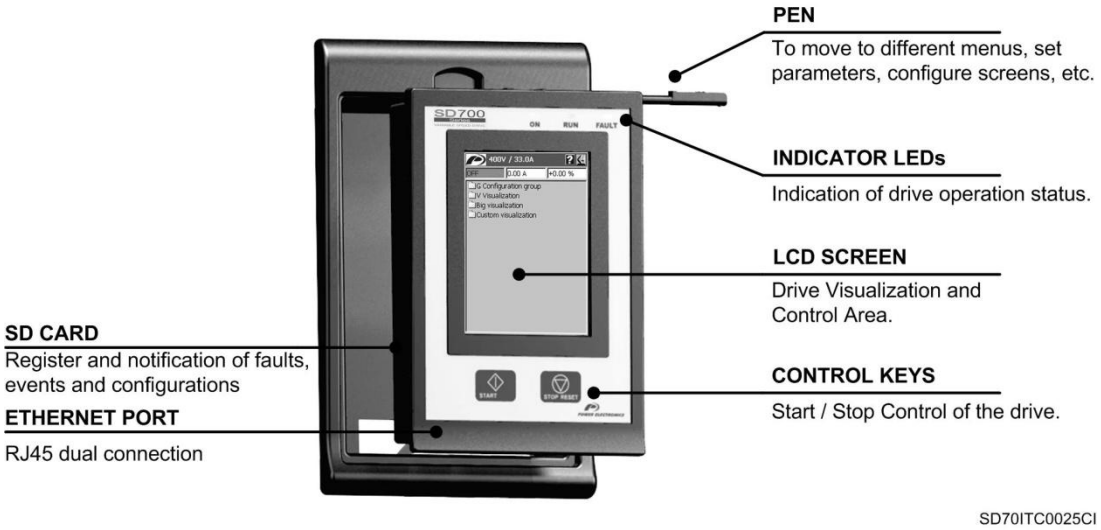


Figure 13.5 Touch-Graphic Display Unit

There are three indicator leds integrated on the display that supply information about the drive operational status. In addition, there are a LCD screen of 3.5" and two control keys to Start / Stop the drive.

14.CE MARKING

The CE Marking is a system to identify equipment that complies with the relevant directives (EMC directive). CE marking guarantees the free movement of the product within the EEA. CE marking shows that the product complies with technical safety, compatibility issues and conformity assessment.

14.1. EMC Directive

The EMC Directive defines the requirements for immunity and emissions of electrical equipment used within the European Union. SD700 KOMPAKT Series drives are in accordance with the directive IEC 61800-3:2004 about adjustable speed electrical power drive systems.

14.2. Low Voltage Directive

The low voltage directive defines the security requirements of low voltage electrical equipment in order to circulate freely within the European Economic Area. SD700 KOMPAKT Series drives are in accordance with the directive IEC 61800-5-1:2007 about adjustable speed electrical power drive systems.

DECLARATION OF CONFORMITY CE

The Company:

Name:	**POWER ELECTRONICS ESPAÑA, S.L.**
Address:	C/ Leonardo Da Vinci, 24-26, 46980 Paterna (Valencia)
Telephone:	+34 96 136 65 57
Fax:	+34 96 131 82 01

Declares under its own responsibility, that the product:

Variable Speed Drive for A.C. motors

Brand: Power Electronics
Model name: SD700 KOMPAKT Series

Is in conformity with the following European Directives:

References	Title
2006/95/CE	Electrical Material intended to be used with certain limits of voltage
2004/108/CE	Electromagnetic Compatibility
***2006/42/CE**	Machinery directive

*Models with optional STO card installed

References of the harmonized technical norms applied under the Low Voltage Directive:

References	Title
EN 61800-5-1:2007	Adjustable speed electrical power drive systems – Part 5-1: Safety requirements - Electrical, thermal and energy (IEC 61800-5-1:2007);

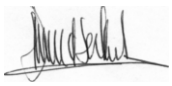
References of the harmonized technical norms applied under the Electromagnetic Compatibility Directive:

References	Title
IEC 61800-3:2004	Adjustable speed electrical power drive systems. Part 3: EMC requirements and specific test methods.

References of the harmonized technical norms applied under the Machinery Directive:

References	Title
IEC 61800-5-2:2007	Adjustable speed electrical power drive systems. Part 5-2: Safety requirements - Functional

Paterna, October 5th 2012



Functional Safety Type Approved
TÜVRheinland® FS

David Salvo
Executive Director

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