Power +

Speed drive

PSD1 Series - 230V 12/16A PSD1 Series - 400V 18/24A









High Efficiency Solutions

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The Power+ drives are compliant with:

- Low voltage directive 2006/95/EC;
- Electromagnetic compatibility directive 2004/108/EC.

and have been designed and built in compliance with standard:

• EN 61800-5-1.



WARNINGS: Separate as much as possible the probe and digital input signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never run power cables (including the electrical panel wiring) and signal cables in the same conduits.

Note:

This instruction sheet is provided for the purpose of describing the operations for commissioning and installing the drive, as well as illustrating the main features of the product. For further information, see the user manual code +0300048EN, downloadable, including prior to purchase, from www.carel.com, under "Literature".

SYMBOLS



Dangerous voltage



Caution, hot surface



Important: brings critical subjects regarding use of the product to the user's attention



Note: when attention must be given to subjects of relevant importance, in particular regarding practical use of the various product functionalities.

WARNINGS 1.

1.1 **General warnings**

- The Power+ drive must be fitted by professionally gualified personnel inside of a complete unit or inside of a system as part of a fixed installation, anyway inside a metal enclousure in compliance with prescription 4.3.7 of EN 61800-5-1 Standard.
- The Power+ drive must be installed in TT ot TN power supply network and it must be connected permanently downstream of the main distribution board (overvoltage category III).
- This device features dangerous voltages, and consequently failure to observe the instructions contained in this instruction sheet and in the user manual may cause serious harm to people and damage to things.
- The system design, installation, commissioning and maintenance of the drive are operations that are reserved solely for gualified personnel, who understand all of the safety warnings, installation, operating and maintenance instructions contained in this instruction sheet and in the user manual code +0300048EN, available, including prior to purchase, at www.carel.com, under "Literature".

1.2 **Fundamental safety rules**

- Before performing any maintenance work:
 - disconnect Power+ and external control circuits from the power supply, moving the main system switch to "off"; wait at least 5 minutes;
 - always check, using a suitable multimeter, that there is no dangerous voltage across the terminals;
 - always make sure the motor has stopped completely. Motors that are still freely rotating may produce dangerous voltages at the Power+ terminals, even when this is disconnected from the power supply;
 - check the temperature of the heat sink: coming in contact with the heat sink may cause burns.



When Power+ is connected to the mains, motor terminals U, V, W are live, even if the motor is not running.



Do not measure insulation resistance or dielectric rigidity directly on Power+ or with Power+ connected.



The control terminals are isolated from the mains voltage. Nonetheless, the relay outputs may have a



dangerous control voltage even when Power+ is not connected to the mains. The level of safety provided by the enabling inputs on Power+ (excluding the "Safe Torgue Off" input when used in compliance with the standards) is not sufficient in critical applications without adopting further independent safety measures. For all applications where malfunctions may cause serious harm



Ensure correct earthing connections and cable selection as per defined by local legislation or codes. The drive typically have a leakage current of greater than 3.5mA so that a fixed installation to power line is required; furthermore the earth cable must be sufficient to carry the maximum supply fault current which normally will be limited by the fuses or magnetic MCB. Suitably rated fuses or MCB should be fitted in the mains supply to the drive, according to any local legislation or codes.



Observe all the general and local safety standards concerning installations of high voltage devices, as well as the regulations for the correct use of the personal protective equipment.

Use this device only for the purposes specified by the manufacturer. Do not make any modifications or replace any components unless recommended by the manufacturer, as these actions may cause fire, electric shock or other damage.



IP20 drives must be installed in a pollution degree 1 or 2 environment, mounted in a cabinet with IP54 or better.

2. INTRODUCTION

Power+ is a drive designed to control compressors with sensorless-brushless permanent magnet motors (BLDC/ BLAC) or asynchronous induction motors. The drives can also be used in some applications with fans and pumps, and consequently the device offers flexible use in the air-conditioning and refrigeration sectors. It is fitted for panel installation or with heat sink outside of the panel. Configuration and programming, as well as the run/stop controls and speed reference, are managed by a CAREL pCO controller or any controller device via RS485 serial connection using the Modbus® protocol in master mode.

2.1 Functions and main features

In summary:

- compact dimensions for assembly in electrical panels;
- operation at ambient temperatures from -20 to 60°C;
- can be installed in residential and industrial environments;
- connection via serial network to Master programmable controller;
- network address can be configured by setting the dipswitches inside to the drive;
- can control various types of compressors;
- safety digital input (Safe Torque Off);
- dedicated input for PTC thermistor or thermostat to monitor motor overtemperature;
- panel installation or with heat sink outside of the panel, to optimise the dissipation of heat inside the electrical panel;
- electrical connections can be made without needing to remove the plastic cover;
- programmable acceleration curve to adapt to the required specifications when starting compressor;
- high switching frequency to limit motor noise;
- detailed information on drive status via numerous read-only variables;
- protection functions for the drive (short-circuit, overcurrent, earth fault, overvoltage and undervoltage on the bus, overtemperature), motor (overtemperature and limitation of current delivered) and system (Safe Torque Off input, communication failure).
- Coldplate models to be thermal coupled to an auxiliary cooling device;

2.2 Models

Code	Power supply	Nominal output current (A)	Frame size (*)
PSD1012200	$200 - 240 \sqrt{26} + 100 \sqrt{1}$	13	1
PSD10122A0	$200 - 240$ VaC $\pm 10\%$, 1~	1Z	2
PSD1016200	200 240 / 65 + 100/ 1	10	1
PSD10162A0	$200 - 240$ Vac $\pm 10\%$, 1~	10	2
PSD1024400	200 400\/cc + 100/ 2	24	1
PSD10244A0	380 - 480VaC ± 10%, 3~	24	2
PSD1018400	200 400\/cc + 100/ 2	10	1
PSD10184A0	380 - 480VaC ± 10%, 3~	18	2
			Tab. 2.a

(*) For the dimensions see par. 3.3. (size 1) and par. 3.10 (size 2 - Coldplate models).

2.3 Accessories

Please, pay attention to the label on the cover of inverter. In the bottom-right, it is possible to read the product review (Rev.):



Fig. 2.a

Depending of the product review, yuo have to couple the following reactors:

Inverter	Review	Code
PSD10184**	1.112 and previous	PSACH10200
PSD10184**	1.213 and followers	PSACH10100
PSD10244**	any	PSACH10200
		Tab. 2.b

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3. INSTALLATION

Important: avoid installing the drive in environments with the following characteristics:

- relative humidity higher than 95% or with condensation;
- strong vibrations or knocks;
- exposure to water sprays;
- exposure to aggressive and polluting atmospheres (e.g.: sulphur and ammonia fumes, saline mist, smoke) to avoid corrosion and/or oxidation;
- strong magnetic and/or radio frequency interferences (thus avoid installation near transmitting antennae);
- exposure of the drive to direct sunlight and the atmospheric agents in general.

3.1 Identification

Power+ is identified by a rating plate located on the top of the device, which describes the code, serial number, production date and revision number.



Fig. 3.b

3.2 Structure



Fig. 3.c

Ref. Description

- A. Terminal block for power connections
- B. Terminal block for control connections
- C. Fastening brackets
- D. Cooling fans

- F. Operating status LED
- G. Terminal block for optional DC Choke in PSD10184** and PSD10244**

3.3 Dimensions

The overall dimensions of the drive vary based on cooling system (size 1 for models with forced air cooled finned heatsink and size 2 for Coldplate models) and the type of assembly (panel or with heat sink outside of the panel, see the paragraph on "Drilling and assembly"), as the position of the fastening brackets affects the total height. The side brackets are only needed for assembly with the heat sink outside of the panel. All the brackets have 5.5 mm diameter holes.



Fig. 3.d

Dimensions (mm)

				weight				
			Heat sink o	utside pane	Pa	(kg)		
Model / size	E	А	В	C	D	А	В	
PSD1012200/1	82	316	289,2	192,3	213	296	269,3	4,3
PSD1016200/1	82	316	289,2	192,3	213	296	269,3	4,4
PSD10122A0/2	12	316	289,2	192,3	213	-	-	2,8
PSD10162A0/2	12	316	289,2	192,3	213	-	-	2,9
PSD1018400 / 1	82	316	289,2	192,3	213	296	269,3	4,0
PSD1024400 / 1	82	316	289,2	192,3	213	296	269,3	4,1
PSD10184A0/2	12	316	289,2	192,3	213	-	-	2,4
PSD10244A0/2	12	316	289,2	192,3	213	-	-	2,5
								Tab. 3.c

3.4 Drilling and assembly

For installation with the heat sink outside of the panel (Fig. 3.d), make a hole with dimensions of the dashed rectangle, where the heat sink will be fitted, and holes for fastening the brackets. These are inserted in the slots located in the plastic base.

For panel installation (Fig. 3.e), only use the top and bottom brackets, which are inserted in the slots above and below the heat sink.

Installation with heat sink outside of the panel



Fig. 3.e

Panel installation



Important:

in case of dismantling, do not grab the brackets, but rather the "solid" parts such as the heat sink anche the plastic cover. Remove the top bracket first, then the bottom one to prevent the drive from falling down.

3.5 Cooling

All the Power+ drives, Coldplate models excluded are fitted with heatsink and cooling fans. There must be sufficient air flow and air change inside the electrical panel. Refer to table 5.1 for maximum heat dissipation values. All the Power+ drives are fitted with internal cooling fans on the right side. Avoid hot air inlet to internal fan.





3.6 Electrical installation

- before carrying out any maintenance work, disconnect the drive and the external control circuits from the power supply by moving the main system switch to "off". Once power has been disconnected from the drive, wait at least 5 minutes before disconnecting the electrical cables;
- always make sure the motor has stopped completely. Motors that are still freely rotating may produce dangerous voltages at the Power+ terminals, even when this is disconnected from the power supply.

Description of the terminals



Rif.	Description									
L1/L, L2/N, L3	Three-phase power	hree-phase power supply input								
÷earth (*)										
L1/L, L2/N	ingle-phase power supply input									
🛨 earth (*)										
U, V, W	Motor output	Motor output								
÷earth (*)										
C1, C2	Terminal block not used in PSD10**2**. For optional									
	external DC Choke in PSD10184** e PSD10244**									
1, 2	Relay output									
3	0 V	RS485/ModBus® connection								
4	RX+/TX+	_								
5	RX-/TX-									
6	PTC Input	1								
7	24 Vdc	Auxiliary voltage								
8	OV									
9	STOa	Safe Torque Off digital input (**)								
10	STOD									
E	PE 😫									
F (Led)	POWER (green)	drive powered								
	RUN/FAULT	drive running / drive alarm								
	(green/red)									
	DATA (yellow)	communication active								

(*) The earth connections inside the drive are electrically connected together and to PE.

(**) To enable the drive for operation, apply a voltage of 24 Vac/Vdc to the Safe Torque Off digital input. The polarity is indifferent for direct current power supply.

\mathbf{O}

the group of terminals for control signals 3...10 and the group of terminals for relay 1,2 have double insulation between each other and with reference to the power terminals.



Warning: the max tightening torque is:

- power terminals: 1,5 Nm;
- control terminals: 0,5 Nm.

Important:

Note:

- in the European Union, all units that incorporate the drive must comply with the Machinery Directive 2006/42/EC. Specifically, the manufacturer of the unit is responsible for the installation of a main switch and the conformity to standard EN 60204-1;
- for fixed installations according to IEC61800-5-1, a disconnect device is required on the circuit between the power supply and the drive;
- only use permanently wired power input connections; the drive must be earthed: the earth wire must be sized for the maximum fault current that is normally limited by the fuses or a circuit breaker.

3.7 Conformity to EMC standards

As regards the general EMC guidelines, strictly follow the instructions shown in the paragraph on "Electrical connections" and in the user manual code +0300048EN, downloadable, even prior to purchase, from www.carel.com.

3.8 Electrical connections

For installation proceed as shown below, with reference to the general connection diagram (par. 3.9).

Important:

the following warnings must be observed when connecting the drive:

- separate as much as possible the probe and digital input cables (at least 40 cm) from the power cables to avoid possible electromagnetic disturbance. Never lay power cables (including the electrical panel cables) and probe signal cables in the same conduits;
- the cables must be sized according to the table in paragraph 5.1;
- when the fuses are used, these must be chosen according to the data shown in the table in paragraph 5.1, and must comply with the national and local standards in force (in general use type gG fuses for IEC and see Chap. 6 for UL);
- when a magnetic circuit breaker (MCB) is used, it must be of type B, rated according to the data shown in the table in paragraph 5.1;
- avoid installing cables connected to the control terminal block in the immediate vicinity of power devices (contactors, circuit breakers, etc.). Reduce the path of the cables as much as possible, and avoid spiral paths that enclose power devices.

Use cables rated to 90 °C, and if the temperature of the terminals exceeds 85 °C, use cables rated to 105 °C. Use cable terminals suitable for the terminals and the cables used. Loosen each screw and insert the cable ends, then tighten the screws and lightly tug the cables to check correct tightness. The drive must be earthed: to do this, use either the screw terminal (earth symbol $\frac{1}{2}$), or the screw (PE symbol $\frac{1}{2}$) on the side of the heat sink, in accordance with local standards in force. To minimise EMC problems, use a shielded power cable with earth wire included, connected to terminal $\frac{1}{2}$. The power supply earth must be connected directly to the earth bar in the electrical panel, without branches to other devices; the earth wire size must be greater than or equal to the phase wires; the earth impedance must be compliant with national and local standards; in compliance with UL requirements, the protective earth connections (PE) must be made using eyelet lugs.

Power supply

Connect the power supply cables: for PSD10122** and PSD10162** connect the power supply to terminals L1/L and L2/N, for PSD10184** e PSD10244** to terminals L1, L2, L3; for the size of the cables and the type of fuses, see the table in paragraph 5.1.

To ensure conformity to the EMC directive, use shielded cable with tape + braid shields (SN/ST). The cable can also be laid in steel and copper cableways.

Earth the shield with 360° a metal clamp on both ends of the cable, as close as possible to the terminals. In case of connection of the shield to the drive earth terminal $\frac{1}{2}$ (not recommended), the shield has to be twisted. The twisted part must be left as short as possible, and the length must not exceed five times the width.

For PSD10122^{**} and PSD10162^{**} it is recommended to use a ferrite cable core (e.g. Fair-Rite 2646665702) rounding earth wire only, located just in front of the drive earth terminal $\frac{1}{2}$.



- Important:
- do not connect the power supply to terminals U, V, W;
- make sure the voltage, frequency and number of phases in the power supply match the ratings of the specific model.

Terminals C1 e C2



The use of terminals C1 and C2 is possible only for PSD10184** and PSD10244** models (3phase power supply). There are two possible cases:

1. if compliance with EN61000-3-12 is required:





- Connect the optional DC choke to terminals C1 and C2
- Connect the DC choke to earth using the relevant metal terminal
- To connect the DC choke to terminals C1 and C2, use a cable that is the same size as the power cable
- The maximum length of the cable must be 2 m.

See paragraph 3.12 for the dimensions of the DC choke.

PSD10244**	1,6 mH, 45A peaks
PSD10184** (rev. 1.112 and previous)	1,6 mH, 45A peaks
PSD10184** (rev. 1.213 and followers)	2mH, 25A peaks
	PSD10184** (rev. 1.112 and previous) PSD10184** (rev. 1.213 and followers)

Tab. 3.d

2. if compliance with EN61000-3-12 is NOT required:



• jumper terminals C1 and C2 (the drive leaves the factory with C1 and C2 jumpered).



Earth leakage current

As for all inverter devices, earth leakage current may occur greater than 3,5mA. The drive is designed to produce the minimum possible leakage current. The current depends on the length and the type of motor cable, the effective switching frequency, the type of earth connection used and the type of RFI filter installed.



Important:

When earth leakage current is greater than 3,5mA the protective conductor should be at least 10mm² if copper or 16mm² if aluminium. As an alternative an additional protective conductor could be used.

If a residual-current circuit breaker (RCCB) is to be used, the following conditions apply:

- it must be a type B device (suitable to protect the equipment against leakage current with a DC component);
- Individual RCCBs should be used for each drive.

Motor

Connect the motor power cable: use four-wire cable, the impedance of the earth wire must be less than or equal to the impedance of the phase wires. For the size and maximum length of the cable according to the model, see the table in paragraph 5.1. To ensure conformity to the EMC directive, use shielded cable with tape + braid shields (SN/ST). The cable can also be laid in steel and copper cableways.





Earth the shield with 360° a metal clamp on both ends of the cable, as close as possible to the terminals. In case of connection of the shield to the drive earth terminal $\frac{1}{2}$ (not recommended), the shield has to be twisted. The twisted part must be left as short as possible, and the length must not exceed five times the width. Earth the motor directly using the drive earth terminal $\frac{1}{2}$.

It is recommended to use a ferrite cable core (e.g. Fair-Rite 2631102002) rounding U, V, W wires only, located between shield earthing and the drive terminals.



Connect the motor phases so as to ensure the required direction of rotation: to reverse direction, swap over two of U, V, W wires as indicated in the following figures.



Fig. 3.1

Fig. 3.m

Note: Most general purpose motors are wound for operation on dual voltage supplies. This is indicated on the nameplate of the motor. The operational voltage is normally selected when installing the motor by selecting either Star or Delta connection. Star always gives the higher of the two voltage ratings. Typical ratings are:



Important: do not turn on or off a switch between the drive and the motor when the drive is running.

Motor protector

Connect a PTC thermistor motor protector to terminals 6 and 7: use a cable with a minimum cross-section of 1 mm²; alternatively, a Klixon thermostat can be connected (see the general connection diagram). The PTC thermistor must be selected so that at activation temperature the resistance is >2600 Ω .

Safety digital input

Connect the "Safe Torque Off" digital input to a safety device (for example, a maximum pressure switch) with normally closed voltage-free contact, in series with an external 24 Vac/24 Vdc voltage source, without needing to observe the polarity for direct current (ref. A). When the contact is open, the drive stops operating, bypassing the software control. If the Safe Torque Off function is not used, the input must be connected to the auxiliary 24 Vdc available on the terminal block, so as to enable correct operation of the drive (ref. B).



Note: IEC61508 requires that the power supply applied to the safety input is isolated from the drive.

Serial network connection

For the serial connection use a three-wire shielded cable. For large networks, install a 120 ohm ¼ W resistor between terminals 4 and 5 on the last drive or device connected, to avoid possible communication problems.



3.9 General connection diagram (Codes PSD10122**, PSD10162**)



3.10 General connection diagram (Codes PSD10184**, PSD10244**)



Fig. 3.r

3.11 Power+ Coldplate models

The Power+ Coldplate (PSD10***A0) models are the same as respective standard Power+ models, with the unique difference that the finned heatsink and fan are replaced by a flat aluminium plate.

The plate has threaded holes M5 for fixing an additional device with cooling function (coldplate), typically using liquid refrigerant. The coldplate is the user's responsibility and is not supplied by Carel.

Dimensions



Cooling device - coldplate (example) Holes/screws for cooling device fitting Power+ plate





Important:

- Make sure that the cooling device is dimensioned and fixed to the plate in a way to dissipate the heat while keeping the temperature of the plate below 70°C in the various operating conditions and that the overheating alarm does not intervene.
- Make sure that the cooling device does not cause the formation of condensate on the inner surface of the plate.
- Clean the contact surfaces of the Power+ plate and of the coldplate and ensure they couple perfectly.
- The use of thermal compound or similar product, between the contact surfaces of the Power+ and the coldplate allows better heat coupling.
- It is recommended that cooling device follows prescription as indicated in par. 4.4.5 of the EN 61800-5-1 Standard.

3.12 EMI filter (PSD10**2**)

The EMI filter is an optional that can be supplied separately to be used with Power + drives PSD10122** e PSD 10162** to reduce the emissions to the levels envisioned by EN61800-3 category C1.

The filter must be connected between the power supply and terminals L1/L, L2/N and earth of the drive.





		Dimensions (mm)								
EMI filter code	L1	L2	L3	B1	B2	B3	Н	D	(kg)	
PSARF10000 (CNW102.1/30)	180	150	90	98	88	70	70	5	1,3	

Fig. 3.t

Technical specifications:

Current	30A	Leakage current	< 3,5mA
Voltage	250V	Connection by terminal	4mm ²
Temperature	60°C		



- Connect power supply cable and drive as shown on the label.
- Position the filter as near as possible to the drive in a way to minimise connection cable length. •
- Connect the filter metal casing to earth.

3.13 DC Choke (PSD10**4**)

The DC choke is an optional that can be supplied separately to be used with the Power+ drives with three-phase power supply (PSD10**4**) to reduce the harmonic currents to the levels envisioned by EN61000-3-12. The choke has four holes for fixing to the wall.



Fig. 3.u

DC chaka cada	Dimensions (mm)							
DC CHOKE CODE	А	В	С	D	E	F	G (diam)	(kg)
PSACH10000, PSACH10100	86	96	98	94	84	71	5	2,7
PSACH10100	86	96	98	94	84	71	5	2,7



Important:

- Position the choke as near as possible to the drive in a way to minimise connection cable length (max 2m).
- For connection to the drive use cables with section at least equal to the power supply cable.
- Envision the space necessary for connection of the cables to the choke terminals.

4. CHECKS

4.1 Checks before starting

Before starting the device, check that:

- the drive output current is greater than or equal to the rated current or the maximum expected current of the motor;
- the working voltage range is correct;
- the size of the power cables is correct;
- the size and the maximum length of the motor cables is correct, and that these are connected according to the wiring diagrams;
- all control inputs are connected correctly;
- drive is not in alarm: in case remove alarm cause (see Chapter 8 of the User Manual) and reset the alarm (see Paragraph 5.12 of the User Manual)

4.2 Routine Maintenance

The drive should be included within the scheduled maintenance program so that the installation maintains a suitable operating environment, this should include:

- ambient temperature is at or below that set out in the "Environment" section;
- heat sink and internal fans freely rotating and dust free;
- the enclosure in which the drive is installed should be free from dust and condensation; furthermore ventilation fans and air filters should be checked for correct air flow;
- checks on all electrical connections, ensuring screw terminals are correctly torqued; and that power cables have no signs of heat damage.

Important

The internal capacitors must be reformed if the drive has been stored for more than two years. For information on capacitor reforming, please contact your local Carel representative.

5. TECHNICAL SPECIFICATIONS

	Storage ten	nperature	-40T60 °C		
	Operating temperature		-20T60 °C		
Environmental	Humidity		<95% rH non-condensing		
			Maximum allowed: 4000 m above sea level		
conditions	Altitude		Up to 1000 m a.s.l. without declassing		
			Declassing of maximum output current: 1% /100 m		
	Pollution de	egree	Max 2		
Power supply			200 - 240 Vac ± 10%, 50/60 Hz, 1~ (Codes PSD10**2**)		
Power supply		je	380 - 480 Vac ± 10%, 50/60 Hz, 3~ (Codes PSD10**4**)		
	Output volt	age	0 - Input voltage		
Motor output	Output freq	uency	0 - 500 Hz		
Μοτοι ουτρατ	Maximum le	ength	see par. 5.1		
	Switching fi	requency	4, 6, 8 kHz		
			Drive: short-circuit, overcurrent, earth fault, overvoltage and		
	Protection f	unctions	undervoltage, overtemperature		
Functions			Motor: overtemperature and overload (150% rated current for 1 minute)		
			System: Safe Torque OFF input, communication failure		
	Frequency i	resolution	0,1 Hz		
Control unit	Each drive r	nust be connected	in the network via Modbus® to a CAREL pCO controller or third party		
	control unit	that manages the	drive based on Master/Slave logic.		
	1 motor pro	tector input	PTC temp. probe or voltage-free contact max source current 10 mA, max.		
Innuts			length 25 m		
inputs	1 "Safe Torque Off" digital		1 contact at 24 Vdc \pm 20%, 24Vac $+10\%$ -20%: typical input current 10 mA,		
	input		maximum length 25 m		
Outputs	1 relay		Programmable output, voltage-free contact: 240 Vac, 1 A		
	24Vdc auxil	iary power supply	Double insulation, precision 10%, 50 mA max		
			RS485, Modbus [®] protocol, maximum transmission speed 19200 bit/s		
Interface	Serial data d	connection	receiver input resistance 96K Ω (1/8 unit-load, that is 1/256 of total bus		
Interface			load)		
	Maximum le	ength	100 m shielded cable		
Casing index	IP20 (front p	banel)			
of protection	IP44 for hea	<u>t sink (installation v</u>	vith heat sink outside of panel)		
		l ow voltage	2006/95/EC		
		directive	EN 61800-5-1: Adjustable speed electrical power drive systems. Safety		
			requirements. Electrical, thermal and energy.		
			2004/108/EC		
Conformity	CF		EN 61800-3 ed.2.0: Adjustable speed electrical power drive systems. EMC		
to standards	conformity	Electromagnetic	requirements and specific test methods.		
	coniormity	compatibility	EN61000-3-12: Electromagnetic compatibility (EMC) Part 3-12: Limits		
		directive	- Limits for harmonic currents produced by equipment connected to		
			public low-voltage systems with input current > 16 A and <= 75 A per		
			phase.		
		Maximum short-ci	rcuit current allowed at the drive terminals (IEC60439-1): 100kA		

Tab. 5.a

5.1 Rated values

The table below shows the rated input and output values, as well as the specifications for sizing the cables (cross-section, maximum length) and the fuses. The values refer to an operating temperature of 60 °C and a switching frequency of 8 kHz, unless otherwise specified.

Model	Rated input current (*)	Fuse or type B circuit breaker	Power cable cross-section	Rated output current	Rated output power (**)	Max. total dissipation	Max. heatsink dissipation	Minimum motor cable cross-section	Maximum motor cable length
PSD10122*0	22 A	32 A	4 mm ²	12 A	4,5 kW	330 W	190 W	2,5 mm ²	5 m
PSD10162*0	28 A	40 A	6 mm ²	16 A	6,0 kW	450 W	250 W	2,5 mm ²	5 m
PSD10184*0	23 A	32 A	4 mm ²	18 A	10,5 kW	320 W	250 W	4 mm ²	5 m
PSD10244*0	30 A	40 A	6 mm ²	24 A	14 kW	485 W	380 W	4 mm ²	5 m
									Tab. 5.b

(*) Rated input current is referred to input voltage of 230 Vac for single phase power supply drives (PSD 10**2**) and to 400 Vac for 3phase power supply ones (PSD 10**4**). If voltage is lower than nominal, input current in drive code PSD10122** and PSD10162** can increase up to 32 A.

(**) Rated output power is referred to following conditions:

- output voltage: 230 Vac for single phase drives, 400 Vac for 3phase ones
- rated output current
- $cos\phi$ 0.94 for single phase drives and $cos\phi$ 0.88 for 3phase ones

6. UL NOTES FOR INSTALLATION INSTRUCTIONS

The PSD1 models, that conform to the UL Standard and CSA Standard have the UL/CSA mark on the nameplate.

• Transient Voltage Surge Protection

The drives are equipped with internal type 2 Surge Protection Device according to the United States Standard UL508C.

For Canadian end-use applications, an external Surge Protection Device is recommended in according to the Canadian Standard CSA C22.2-No.14-13. See table below:

Drive model No.	Manufacturer	UL file	Model	Vnom.	Vclamp.	Mov type	Surge current	lsc
PSD10162** PSD10122**	ERICO INTERNATIONAL CORPORATION	E325047	TDS1501SR240	240V	900V	2	20 kA	5000 A
PSD10244** PSD10184**	ERICO INTERNATIONAL CORPORATION	E325047	TDS350TNC277	480V	1800V	2	20 kA	5000 A

Tab. 6.c

O Note:

Others equivalent UL listed components with same ratings may be used.

- The PSD1***2** drives are suitable for use on a circuit capable of delivering not more than 5000 Amperes rms symmetrical, 240 Vac +10% maximum.
- The PSD1***4** drives are suitable for use on a circuit capable of delivering not more than 5000 Amperes rms symmetrical, 480 Vac +10% maximum.

Protection fuses must be provided according to the following table:

Drive model No.	Manufacturer	UL file	Model	Rated current Arms	Vnom. (Vac)
PSD10122**	Siemens	E167357	3NE4101	32	1000
PSD10162**	Siemens	E167357	3NE4102	40	1000
PSD10184**	Siemens	E167357	3NE4101	32	1000
PSD10244**	Siemens	E167357	3NE4101	32	1000
					Tab. 6.d

O_{Note:}

Other equivalent UL Listed or UL Recognized External Semiconductor Fuses with the same ratings and in particular with "Peak-let-trough-current Ip" and "Clearing I2t" equal or lower than the ones of fuse models indicated in Tab. 6.b.

- The PSD1 series is designed for a maximum surrounding air temperature of 60°C.
- The PSD1 series must be placed in a pollution degree 2 Environment.
- The Field Wiring Power Terminals must be used with the tightening torque of 13 lib-in (1,5 Nm)
- Any Auxiliary Wiring Terminal Blocks must be used with the tightening torque of 4,4 lib-in (0,5 Nm)
- Any field connection, either power or auxiliary, must be used within the ratings specified by the manufacturer. See Chap. 5 for details.
- The auxiliary field wiring connection must be made with the female connectors supplied with the drive.
- The metal-sheet carter grounding connection must be made with an eyelet tube terminal insulated wire.

Note:	
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