PSD1
PARKER SERVO DRIVE

Standalone Servo Drive and Multi-axis Servo System

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Table of Contents

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PARKER SERVO DRIVE - PSD

Overview

Description

The PSD1 is Parker Servo Drive family, available with different power rating from 2 to 30A and form factors. Today the offering contains:

- The PSD1-S is a standalone drive which can be connected directly to the main supply.
- The PSD1-M is a multi-axis servo system where each axis module can supply up to three servo motors.

The base configuration consists of a common DC bus supply and multiples PSD1-M modules, connected through DC bus bars. The modules are available as one, two or three axis versions. This makes the system highly flexible. PSD1-M servo system is particularly suitable for all centralised automation systems, such as those found in many packaging machines, where large numbers of drives are often required offering significant advantages.

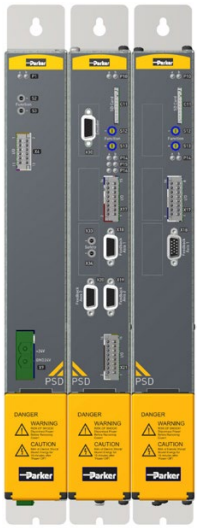
PSD1-S unique features

- Single or three phases power supply
- Compact housing
- Particularly suitable for small machines

Standalone axis PSD1 S	Continuous current [A_{rms}]	Peak current A (⩽ 2 s)
PSD1 SW1200	2	6
PSD1 SW1300	5	15
PSD1 SW1400	7.5	20

The PSD servo drive is available in two versions:

- **Basic: Used as fieldbus slave**
- **Programmable:**
  - Intelligent standalone drive
  - Runtime based on CODESYS V3
  - IEC 61131-3
  - PLCopen function blocks



PSD1-M unique features

- The most compact multi-axis servo system on the market
- One, two or three axis versions combined in one housing
- Common DC bus connection for energy exchange between drives

Common Features

The PSD servo drives support the following feedback systems (choosen by configuration):

- DSL (Single or Multiturn) Single cable solution
- Resolver
- 1 Vpp Rotary and Linear Encoders
- Incremental TTL Encoders

- EtherCAT / PROFINET / Ethernet/IP
- Quick and simple wiring
- Removable SD card
- Same software functionalities for standalone drive and multi-axis servo system

Multi axis PSD1 M	Continuous current [A_{rms}]	Peak current A (⩽ 2 s)
PSD1 MW1300	5	10
PSD1 MW1400	8	16
PSD1 MW1600	15	30
PSD1 MW1800	30	60
PSD1 MW2220	2 + 2	4 + 4
PSD1 MW2330	5 + 5	10 + 10
PSD1 MW2440	8 + 8	16 + 16
PSD1 MW3222	2 + 2 + 2	4 + 4 + 4
PSD1 MW3433	8 + 5 + 5	16 + 10 + 10

(additional module on request)

Applications

- Packaging machines
- Material forming machines
- Handling machines
- General automation

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PSD Overview

Communications

The support of all common Fieldbus interfaces is an essential feature of open systems. The PSD is based on the modern Ethernet based interfaces such as EtherCAT, PROFINET and Ethernet IP.

Feedback Systems

The PSD servo drives support the following feedback systems:

- DSL (Single or Multiturn) Single cable solution
- Resolver
- 1 Vpp Rotary and Linear Encoders
- Incremental TTL Encoders
- Analog hall

All different Feedbacks can be used on identical hardware, kind of feedback can be choosen just simple configuration

Note: On all single axis devices the full set of feedback is possible, and can be chosen by configuration. On double and triple axis modules either DSL or resolver can be configured.

The PSD is available in two versions:

B: Basic
The drive is used as slave on various field busses communicating via state machines

C: Programmable
This drive version is fully programmable via IEC 61131 and offers the full set of programming languages and a complete set of function blocks incl DS402 and Profidrive state machine

High speed communication

- Communication over Ethernet

Inputs / Outputs

- PSD offers 4 fast digital inputs and 2 digital outputs per axis.
- Connection via fast and simple push-in direct plug-in technology.

Motor Feedback

- Resolver, 1Vpp, TTL

Quick and Simple Wiring

- Single cable connection between drive and SMH motor
- Reduction in wiring costs
- Increase reliability

Reduce machine footprint

- Up to 3 axis in one single housing
- Reduce the size of the cabinet
- Electronics footprint is up to 40 % smaller than traditional solutions

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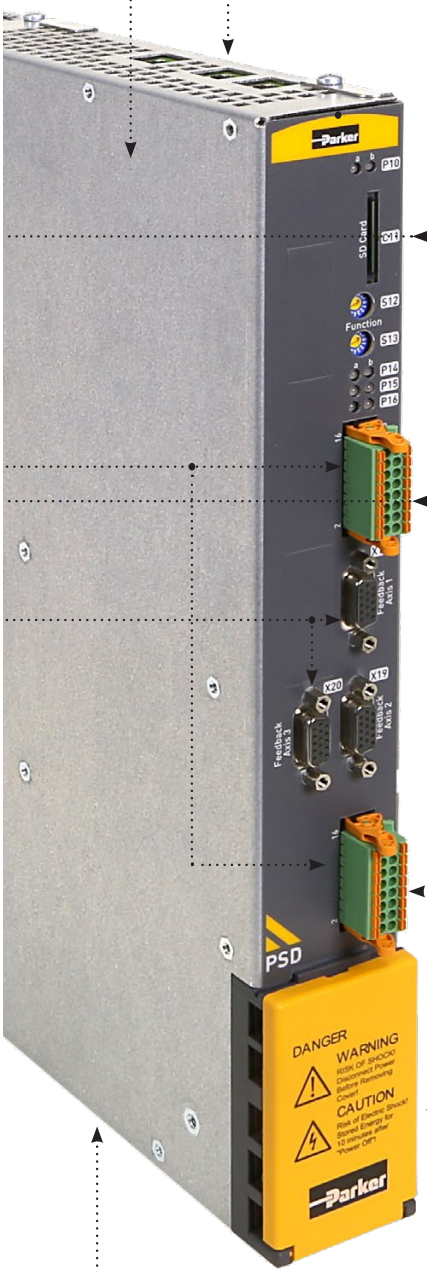
High Performance and customization capabilities

- Autotuning
- Observer technology
- Anti resonance adjustments, vibration suppression, notch-filter...
- Fast control loops (sample times)*
  - Current control 62,5 µs,
  - Speed control 125 µs,
  - Position control 125 µs



Removable SD card

- Easy exchange between drives less than 1 minute
- Software upgrade
- Parameters and application memory

STO Safety Functions reduce time and cost , no need additional cabling

- 2 Safety Torque Off (STO) circuits for 3 axis module (one for axis 1 and one for axis 2,3).
- 2 independent Safety Torque Off circuits for 2 axis module
- 1 Safety Torque Off circuit for 1 axis module
- Optional Safety Functions over EtherCAT FSoE

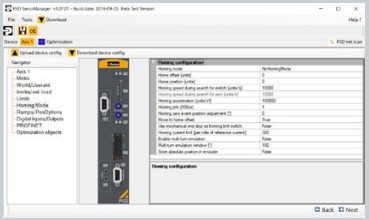
DC Bus energy saving

- Energy exchange between drives
- No accessories required

* (depending on the type and configuration of the axis module)

Parker Servo Manager

The set-up and commisioning of the drive can be done easily using the wizard based configuration tool. Parker motors will be recognized by a electronic nameplate.



- **Wizard-guided configuration and parametrization**
- **Graphical diagnostics/maintenance/service**
  - Setup mode (absolute/relative movements, homing, jog, ...)
  - Adjustable four channel oscilloscope (single/normal/auto/roll)
  - Export as image or table (CSV format)
  - Autotuning via automated inertia identification
  - Enhanced optimization possibilities
  - Configurable status overview

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TECHNICAL CHARACTERISTICS

Technical Data

PSD1 SW Standalone Axis

Type		Standalone Axis		
Input voltage	VAC	3*230 VAC ±10 % 50...60 Hz 1*230 VAC ±10 % 50...60 Hz 30...253 VAC		
PWM Frequency nom.	kHz	8	8	8
Possible PWM frequency	kHz	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16
Continuous current	A	2	5	7.5
Peak current (⩽ 2 s)	A	6	15	20

PSD1 MW Multi-Axis Module

Type		Single Axis			
DC Bus voltage	VDC	325...680 VDC ±10 % (Rated voltage 560 VDC)			
PWM Frequency nom.	kHz	8	8	4	4
Possible PWM frequency	kHz	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16
Continuous current	A	5	8	15	30
Peak current (⩽ 2 s)	A	10	16	30	60

Type		Twin Axis		
DC Bus voltage	VDC	325...680 VDC ±10 % (Rated voltage 560 VDC)		
PWM Frequency nom.	kHz	8	8	8
Possible PWM frequency	kHz	4 / 8 / 16	4 / 8 / 16	4 / 8 / 16
Continuous current*	A	2 + 2	5 + 5	8 + 8
Peak current (⩽ 2 s)	A	4 + 4	10 + 10	16 + 16

Type		Triple Axis	
DC Bus voltage	VDC	325...680 VDC ±10 % (Rated voltage 560 VDC)	
PWM Frequency nom.	kHz	8	8
Possible PWM frequency	kHz	4 / 8 / 16	4 / 8 / 16
Continuous current*	A	2 + 2 + 2	8 + 5 + 5
Peak current (⩽ 2 s)	A	4 + 4 + 4	16 + 10 + 10

*with an continuous limit current at 16A max. by module

PSD1-MW-P - Power Supply Unit

Mains Supply

Type	Unit	PSD1 MW P010			with IND-0001-02*			PSD1 MW P020			with IND-0002-0x*		
Input Voltage		3*230 ... 480 VAC ±10 % 50...60 Hz (Rated voltage 3*400 VAC)											
Output Voltage		325...680 VDC ±10 % (Rated voltage 560 VDC)											
Supplied Voltage	[VAC]	230	400	480	230	400	480	230	400	480	230	400	480
Output Power	[kVA]	6	10	10	9	15	15	12	20	20	19	30	30
Peak Output Power (<5 s)	[kVA]	12	20	20	18	30	30	24	40	40	36	60	60

Control Supply

Rated Input Voltage		24 VDC ±10 %			
Maximum Ripple		1 V_{pkpk}			
Supply Current	[A]	0.2 A	0. 8 A	0.3 A	0.3 A

(*) Operation of the P010 and P020 power supplies with additional line choke (to be ordered separately).

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Environmental Characteristics

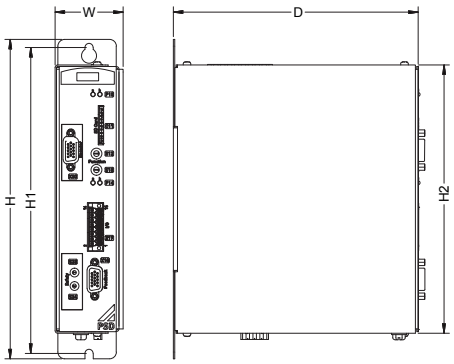
Operating Temperature	0...+40 °C
Storage Temperature	-25 °C...+70 °C
Shipping Temperature	-25 °C...+70 °C
Product Enclosure Rating	IP20 (only in closed electrical cabinet) UL open type equipment
Altitude	1000 m ASL. Derate output current by 1.0 % per 100 m to a maximum of 2000 m
Operating Humidity	Class 3K3 - Maximum 85 % non-condensing
Storage Humidity	Class 1K3 - Maximum 95 % non-condensing
Shipping Humidity	Class 2K3 - Maximum 95 % at 40 °C
Operating Vibration	IEC60068-2-6 10...57 Hz width 0.075 mm 57...150 Hz accel. 9.81 m/s^2

Standards & Conformance

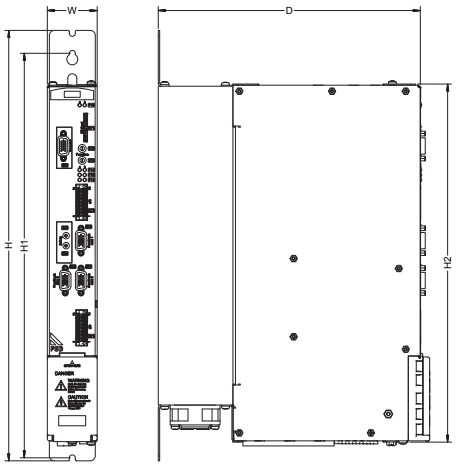
2006/95/EC	Low voltage directive
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61800-5-1	Adjustable speed electrical power drive systems - safety requirements, thermal and energy
UL	Power Conversion Equipment UL508C
2004/108/EC	EMC directive
EN 61800-3	Adjustable speed electrical power drive systems - Part 3: EMC product standard including specific test method
STO	Performance Level PL=e according to EN ISO 13849

Dimensions

Type	H [mm]	H1 [mm]	H2 [mm]	W [mm]	D [mm]	Weight [kg]
PSD1-SW 2A/5A	235	225	200	50	180	1.3
PSD1-SW 7.5A	235	225	200	65	180	1.6
PSD1-MW 1/2/3 axes	432	405	360	50	263	4.3
PSD1-MW Single axis 30 A	432	405	360	100	263	8.6
PSD1-MW-P-010	432	405	360	50	263	3.6
PSD1-MW-P-020	432	405	360	100	263	5.4



PSD1-SW



PSD1-MW

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SPECIFIC FUNCTIONALITIES

Input & Output Option Board

With the additional I/O option board, the Parker Servo Drives are suitable for an even wider range of applications. The numerous in- and outputs can be used for a direct connection of sensors or as setpoint input (e.g. for current or velocity). The multifunctional encoder interface meets the requirements for a second encoder input (e.g. for internal load control) or an encoder emulation as an output.

8 Digital I/Os (switchable)

Digital Inputs

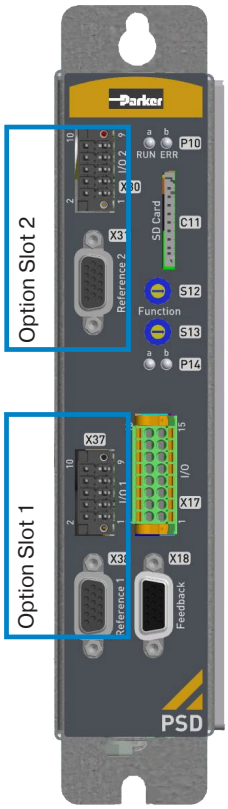
- Inputs according to IEC 61131-2 Type3
- Update rate 125µs

Digital Outputs

- High side switch
- Operation Voltage 12..30V
- Iout 70mA
- Short circuit protection to Output signal ‹250µs

4 Analog Inputs

- Input Signal type
  - ±10V
  - 0..10V
  - 0..20mA
  - 4..20mA (Error detection)
- Resolution / Accuracy
  - 14Bit (12Bit ADC + 32x Oversampling)
- Update rate
  - Ta ‹125 µs
  - For setpoint and PLC issues Ta ‹500 µs



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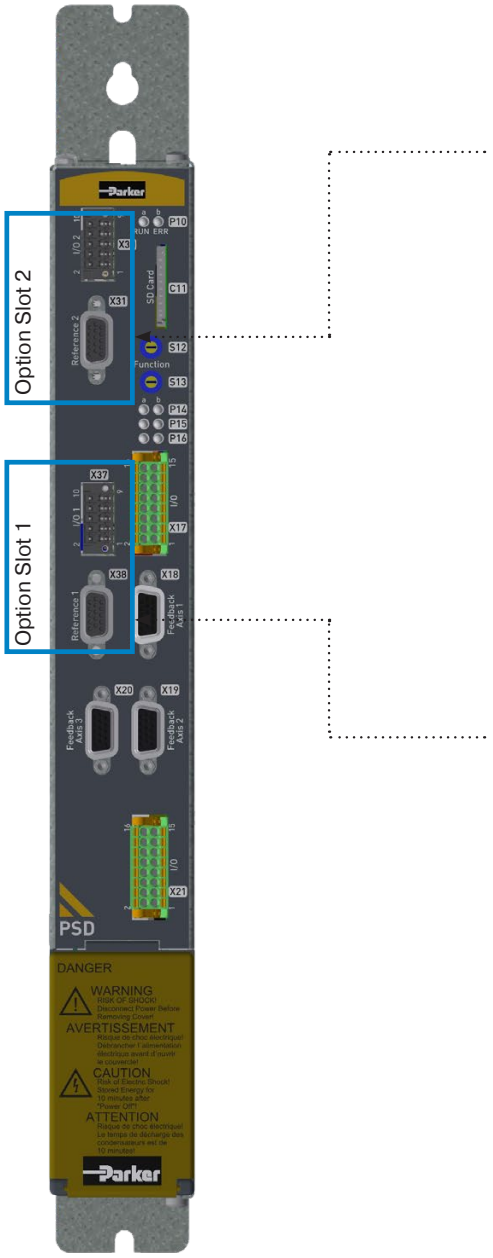

Encoder Interface

- Encoder Input
  - Physical layer RS422
  - Supported protocols
    - RS422 A/B Encoder with Index
    - RS 422 Step/Direction
  - Power Supply for the external Encoder
    - 5V / 150mA
    - 24V (70mA)
  - Update rate for load control Ta ≤125µs
- Encoder Emulation
  - Max Frequency 400kHz (1460rp-m@16384imp/U)
  - RS422 as physical layer
  - Supported types:
    - A/B Encoder signal with Zero pulse
    - Step/Direction
- Bypass function

1 or 2 option boards are possible per device.

Benefits:

- **Flexible & Cost-effective:** Wider choice of sensors. Saving costs by using sensors with standard interface instead of usually more expensive sensors with fieldbus interface.
- **Fast operation:** Achieving faster cycle times and less delay with direct connected sensors results in better performance of the closed loop controls.
- **Smart:** Small applications can be realized without external PLC
- **Support** for outdated technologies like PLCs with analog interface as setpoint channel to servo drives.

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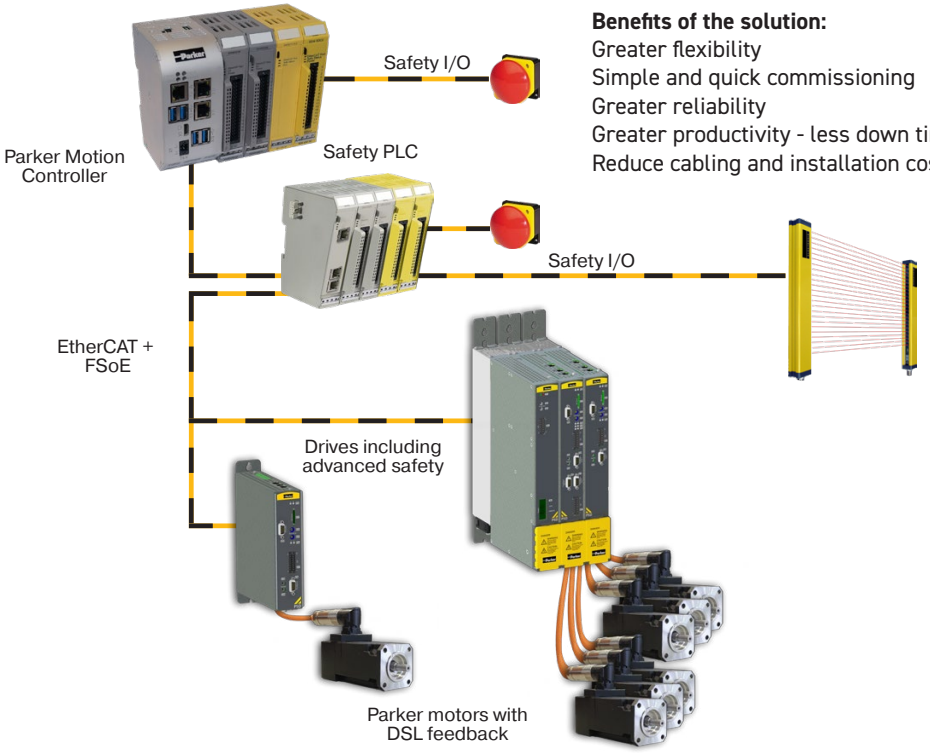
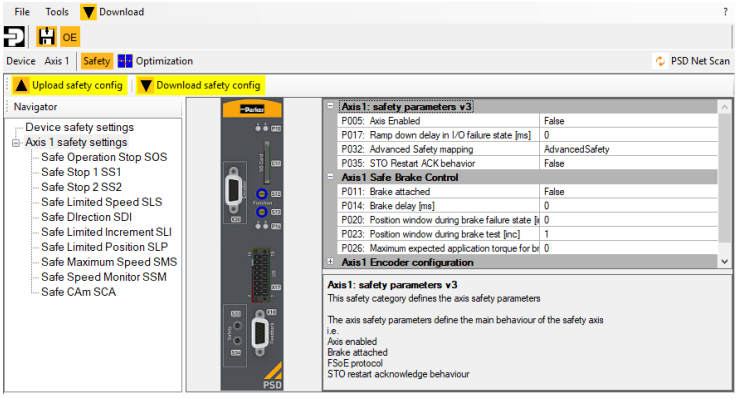
Safety configuration

The Parker Servo Drives have featured "Safe Torque Off" (STO) as standard function, helping to protect users and machinery against unexpected motor start-up. Performance Level PL=e according to EN ISO 13849.
In order to fulfil the new machinery directive 2006/42/EG, the PSD can be equipped with a safety option board.
The system does not need any additional wiring, as the Functional Safety over EtherCAT (FSoE) uses the existing wiring.



Benefits of the solution:
Greater flexibility
Simple and quick commissioning
Greater reliability
Greater productivity - less down time & quicker restart
Reduce cabling and installation costs

The Safety option board offers following safety functions:



Besides the functionality shown in the picture it is possible to choose the STO either as hardwired input or via FSoE.
Safe Brake Control is available as well.

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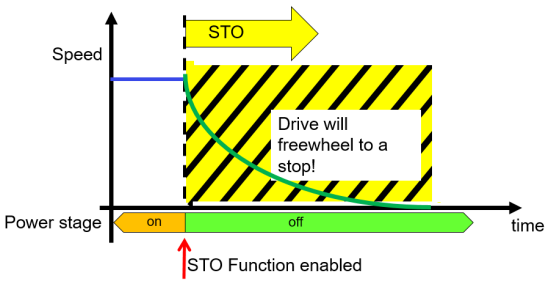
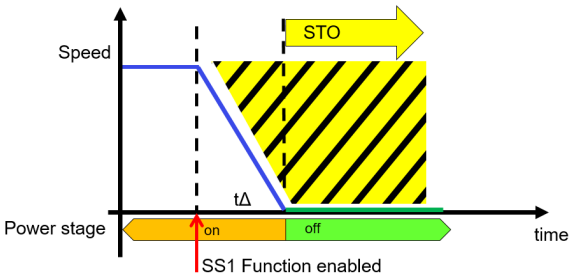
A few examples for the safety functions:

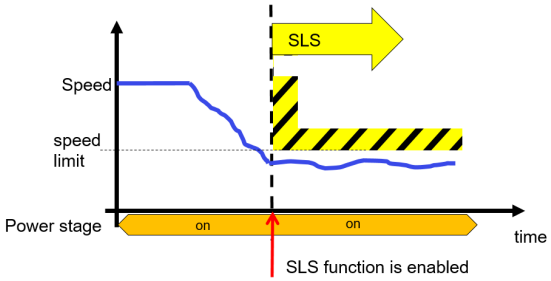
STO: Safe Torque Off



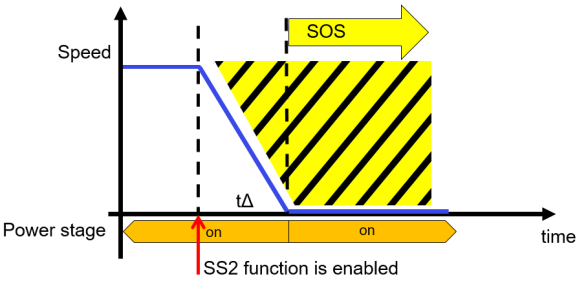
SS1: Safe Stop 1



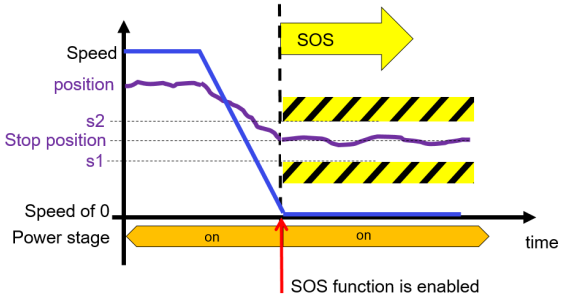
SLS: Safe Limited Speed



SS2: Safe Stop 2



SOS: Safe Operating Stop



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Programmable Version

Programming
- According to IEC 61131-3
- Using at least CODESYS 3.5.15
- PLC Project management with Parker Servo Manager (Drive cloning, import & export)
- Profile State Machine Function block (Called up in IEC cycle)

Technical Specifications
- Up to 3 PLC Tasks + one fast PLC Task (500µs)
- 500 * 16 Bit Variables / BOOL, INT, WORD
- 150 * 32 Bit Variables / DINT, DWORD, TIME, REAL
- 352 Recipe Variables (axis specific) / 32 columns and 11 rows (3 x LREAL, 4 x DINT, 2 x INT, 1 x LINT, 1 x STRING)

IEC 61131-3 standard modules
- Up to 8 timers (TON, TOF, TP)
- Triggers (R_TRIG, F_TRIG
- Flip-flops (RS, SR)
- Counters (CTU, CTD, CTUD)

Device specific functions modules
- PSD_Input: Generates an input process image
- PSD_Output: Generates an output process image
- PSD_RecipeTable:Acces to recipe table

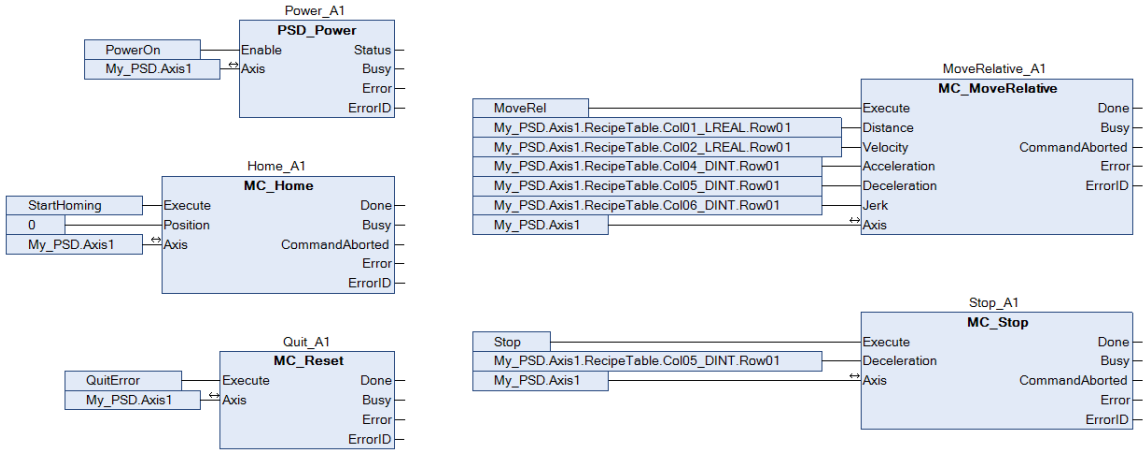
PLCopen function modules
- Positioning: absolute, relative, additive, continuous
- Machine zero
- Stop, energizing the powerstage, reset error
- Position, device status, read axis error
- Electronic gearing (MC_Gearin)
- Digital I/O control (4I/20 per axis)

Programming language

Text languages
- Structured text (ST)
- Instruction List (IL)

Graphical languages
- Ladder Diagram (LD)
- Function Block Diagram (FBD)
- Sequential Function Chart (SFC)
- Continuous Function Chart (CFC)

IEC Programme example in CFC



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ORDER CODE

Parker Servo Drive PSD

	1	2	3	4	5	6	7	8	9	10
Order example	**PSD1**	**M**	**W**	**3**	**433**	**B**	**1**	**1**	**00**	**000**

1	**Drive Family**	
	PSD1	Parker Servo Drive
2	**Device Type**	
	S	Standalone 230VAC
	M	Multi-axis 400VAC
3	**Mounting Type**	
	W	Wall mounting
4	**Device Type**	
	1	One powerstage
	2	Two powerstages
	3	Three powerstages
	P	Power module
5	**Device Type**	
	PSD1SW1 Standalone	
	200	2 Ampere
	300	5 Ampere
	400	7.5 Ampere
	PSD1MW1 One powerstage	
	300	5 Ampere
	400	8 Ampere
	600	15 Ampere
	800	30 Ampere
	PSD1MW2 Two powerstages	
	220	2 + 2 Ampere
	330	5 + 5 Ampere
	440	8 + 8 Ampere
	PSD1MW3 Three powerstages	
	222	2 + 2 + 2 Ampere
	433	8 + 5 + 5 Ampere
	PSD1MWP Passive power supply	
	010	10 kVA
	020	20 kVA

6	**Technology**	
	B	Basic
	C	Programmable[3]
7	**Interface**	
	1	EtherCAT
	2	EtherCAT, PROFINET, Ethernet/IP
8	**Feedback**	
	1	DSL®
	2	DSL®, Resolver, Encoder (1 Vss)[1], Encoder A/B (TTL)[1], Analog Hall (1 Vss)[1],
9	**Options**	
	00	No option
	10	Functional Safety over Ethercat[2]
	02	1 x I/O option board[4]
	22	2 x I/O option board[4]
10	**Customisation**	
	000	Non customized

[1] Only for PSD1-S and first power stage of multi-axis unit PSD1MW1 ...
[2] Only available with Interface 1: EtherCAT and Feedback 1: Hiperface DSL®
[3] Available with combination 11 (EtherCAT, DSL) and 22 (Multi Fieldbus, Multi Feedback)
[4] Only available with combination 22 (Multi Fieldbus, Multi Feedback)

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Accessories

Braking Resistors	Description	Compatible with
ACB-0004-01	0.1kW	PSD1SW1200/300
ACB-0005-01	0.12kW	PSD1SW1200/300
ACB-0001-01	0.50kW	PSD1SW1400 / PSD1MWP010
ACB-0002-01	0.50kW	PSD1MWP020
ACB-0003-01	1.50kW	PSD1MWP020

Motor Choke	Description	Compatible with
ECM-0005-01	1mH; 7A; Motor Cable Length >50m	PSD1SW1200/300
ECM-0005-02	2mH; 8A; Motor Cable Length >50m	PSD1SW1400
ECM-0004-01	3.6mH; 6,3A; Motor Cable Length >50m	PSD1MW1/2/3
ECM-0001-01	2mH; 16A; Motor Cable Length >50m	PSD1MW1
ECM-0002-01	1,.1mH; 30A; Motor Cable Length >50m	PSD1MW1

Mains Filters	Description	Compatible with
ECP-0001-02	Single phase; Motor Cable Length >10m	PSD1SW1200/300
ECP-0001-03	Single phase; Motor Cable Length > 5m	PSD1SW1400
ECP-0002-01	3 phase; Motor Cable Length >10m	PSD1SW1200/300
ECP-0002-02	3 phase; Motor Cable Length > 5m	PSD1SW1400
ECP-0003-01	Motor Cable Length < 6x10m	PSD1MWP010
ECP-0003-02	Motor Cable Length < 6x50m	PSD1MWP010
ECP-0003-03	Motor Cable Length < 6x50m	PSD1MWP020

Fieldbus Accessories	Description	Compatible with
SSK28/20	Ethernet cable 0.25m	universal
SSK28/21	Ethernet cable 0.5m	universal
CBD000C0-T00-T00-0010-00	Ethernet cable 1m	universal

Mains Choke	Description	Compatible with
IND-0001-02	0.86mH; 30A; UL	PSD1MWP010
IND-0002-01	0.45mH; 55A	PSD1MWP020
IND-0002-02	0.45mH; 55A; UL	PSD1MWP020

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Cables

	1	2	3	4		5		6		7		8
Order example	**CBM**	**015**	**H**	**B**	**-**	**C01**	**-**	**D01**	**-**	**0050**	**-**	**00**

Type

CBM	Motor cable
CBF	Feedback cable

Cross section motor cable / Feedback type

007	0.75 mm²
015	1.5 mm²
025	2.5 mm²
040	4.0 mm²
060	6.0 mm²
RE0	Resolver

Raw cable

S	Standard
H	Highflex
T	High Temperature (for ATEX Motors)

Equipment Type

0	Standard
B	With brake
D	With brake & DSL

Type of motor connector

C01	SMH Motor Power – M15
C02	SMH or MH– M23
C04	NX Motor Power – M23
C06	SMH or MH Motor Resolver – M23
C07	NX2-8 – Resolver Connector – M23
C11	M15 Hiperface DSL Feedback + Power
C12	M23 Hiperface DSL Feedback + Power –SMH, NX
C13	M40 Hiperface DSL Feedback + Power – MH
C14	SMH Motor Resolver – M15
T02	SMx82-100-115 & MB105-205 Motor Power – Terminal Box
T03	EX/EY Motor Power with Hiperface DSL – Terminal Box
T04	EX Motor Power – Terminal Box

Type of drive connector

D01	PSD1S, PSD1MW18, C3 motor cable
D02	PSD1MW1-3 (w/o PSD1MW18) motor cable
D03	PSD1S or PSD1M – Resolver Feedback
D05	C3 (Compax3) – Resolver Feedback

Length

0030	3 m
0050	5 m
0070	7 m
0100	10 m
0150	15 m
0200	20 m
...	...

Customization/Special

00	Standard

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Notes

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