MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

6SL3210-5FE12-0UA0

TWO-KILOWATT PULSE-TRAIN SERVO DRIVE

Used with the applicable SINAMICS V90 PTI configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens SINAMICS V90 catalog, PTI 400 V specifications, connection data and FSB outline.

SINAMICS V90

Technical data

Technical data									
Article No.	6SL3210-5FE	10-4UA0	10-8UA0	11-0UA0	11-5UA0	12-0UA0	13-5UA0	15-0UA0	17-0UA0
Frame size		FSAA	FSA		FSB		FSC		
Rated power (kW)		0.40	0.75	1.00	1.50	2.00	3.50	5.00	7.00
Rated output current (A)		1.2	2.1	3.0	5.3	7.8	11.0	12.6	13.2
Max. output current (A)		3.6	6.3	9.0	15.9	23.4	33.0	37.8	39.6
Line supply	Voltage	3AC 380V ... 480V, (-15% / +10%)							
	Frequency	50/60Hz, (-10% / +10%))							
	Capacity (kVA)	1.7	3.0	4.3	6.6	11.1	15.7	18.0	18.9
Control power supply	Voltage (V) [1]	24 DC (-15% / +20%)							
	Current (A)	1.6 (without holding brake), 3.6 (with holding brake)							
Line supply system		TN, TT, IT, TT earthed line							
Overload capacity		300% x rated current for 300ms every 10s							
Control system		Servo control							
Braking resistor		Integrated							
Ambient temperature	Operation	0 °C to 45 °C, without power derating 45 °C to 55°C, with power derating up to 20% at 55 °C							
	Storage	-40°C to +70°C							
Ambient humidity	Operation	< 90% (no condensation)							
	Storage	90% (no condensation)							
Pollution class		2							
Vibration severity	In operation	≤ 1 g (g=9,81 m/s²)							
	During transport	≤ 2 g (g=9,81 m/s²)							
Degree of protection		IP20							
Cooling		Natural cooling			Fan cooling				
Altitude		≤ 1000 m (without power derating); > 1000 m and up to 5000 m (with power derating)							
Weight approx. (kg)		1.5 kg	2.1 kg		2.7 kg		5.9 kg		
Standards		CE, KC, EAC, cULus, C-tick							

Interface	
USB	Mini USB
Pulse train input	2 channel, one exclusively for 5V differential signal, one for 24V single ended signal
Pulse train encoder output	5 V differential signal, phases A, B, Z
Digital inputs/outputs	10 inputs, NPN/PNP; 6 outputs, sink type
Analog inputs	2 analog intputs, input voltage range +/-10V, 13-bit
Analog outputs	2 analog outputs, output voltage range +/-10V, 10-bit

[1] When SINAMICS V90 controls a motor equipped with brake, the tolerance of the 24 V DC power supply must be -10% to +10% to comply with the voltage required by the brake.

SINAMICS V90

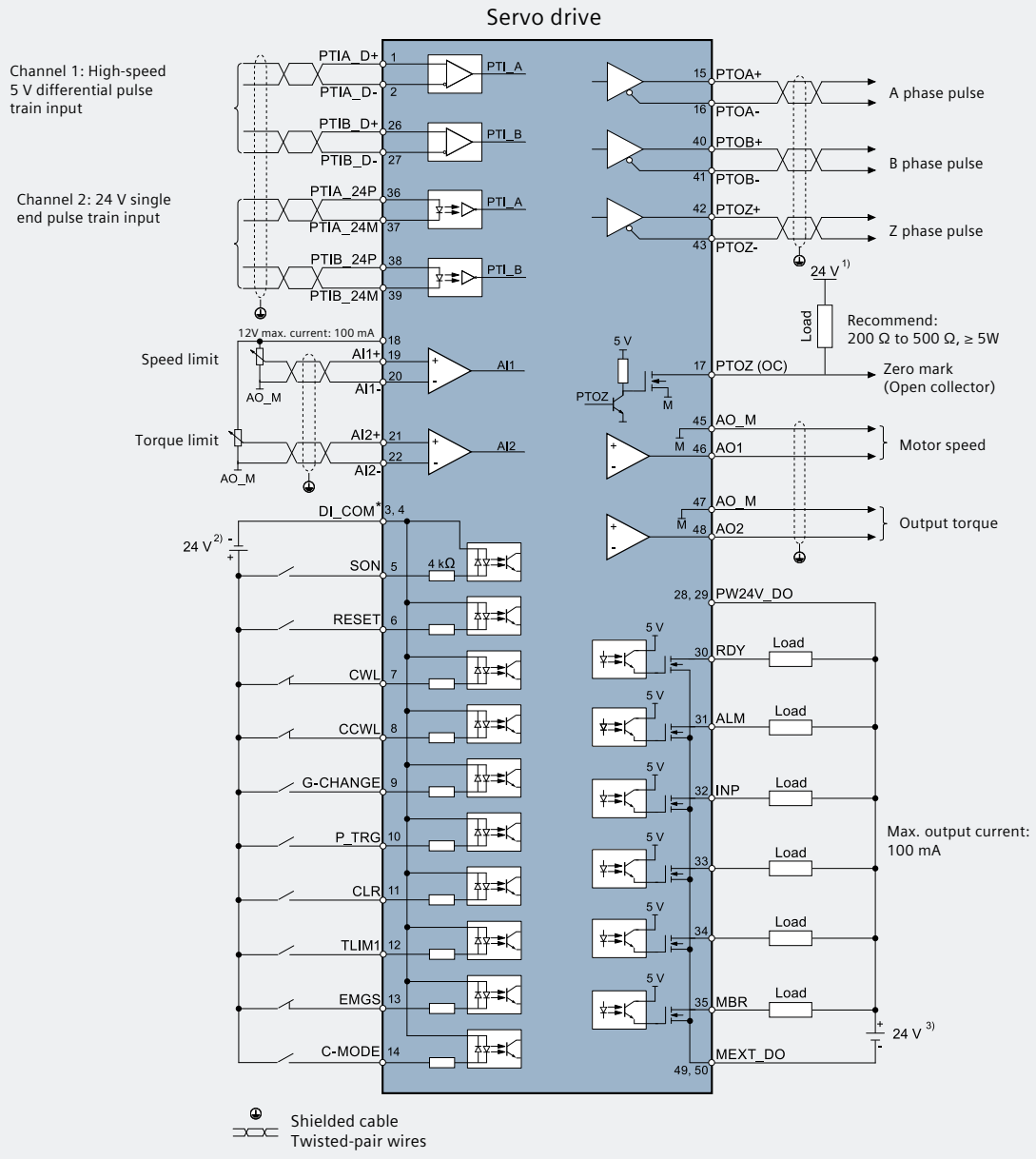
Control features

Control features		
Control modes	• Pulse train input position control (PTI), with torque and speed limit • Internal position control (IPos), setpoints selected using a combination of digital inputs (traversing blocks) • Speed control (S), via analog input or fixed internal speed setpoint, with torque limit • Torque control (T), via analog input or fixed internal torque setpoint, with speed and torque limits • Control mode switchover, e.g. switchover from position control to speed control on-the-fly via digital input • Jog using buttons on the integrated operator panel (BOP)	
Speed control mode	Speed control range	Analog speed command: 1:2000 Internal speed conmand:1:5000
	Analog speed input	-10 V DC to +10 V DC/rated speed
	Torque limit	Set using a parameter or an analog input command
Pulse train input position control	Max. input pulse frequency	High-speed differential line driver (5V), 1MHz optocoupler(24V), 200kHz
	Multiplying factor	Electronic gear ratio (A/B), A:1-65535, B:1-65535, 1/50<A/B<200
	In-position range	0 to ±1000pulse(command pulse unit)
	Torque limit	Set using a parameter or analog input command
Torque control	Analog torque input	-10 V DC to +10 V DC/max. torque (input impedance >25 kΩ)
	Speed limit	Set using a parameter or an analog input command
Control functions	Real time auto tuning	Estimates the machine characteristic and sets the closed loop control parameters (gain, integral, etc.) continuously in real time without any user intervention
	Resonance suppresses	Suppress the mechanical resonance, such as workpiece and foundation vibration
	One-button tuning	Optimizes the control parameters such as position loop gain, speed loop gain, speed loop integral time, mechanical resonance frequency etc. by just clicking one button on the operator panel or SINAMICS V-ASSISTANT
	Gain switch	Switches between gains using an ext. signal or int. operating conditions to reduce noise, shorten positioning time and improve the operational stability of a servo system
	PI/P control switch	Switches from PI control to P control with an external signal or internal operating conditions
	Speed and torque limit	Limits motor speed using an external analog speed limit command (0 to ±10 V DC) or internal speed limit commands (up to three groups)
	DI/DO parameterization	Freely assigns the control signals to 8 digital inputs and 6 digital output
	External braking resistor	An external braking resistor can be used when the internal braking resistor is not capable of handling the regenerative energy
	Position smoothing	Transforms position characteristics from the pulse train input setpoint into an S-curve profile with a parameterized time constant
	Measuring machine function	The machine frequency characteristics are analyzed using SINAMICS V-ASSISTANT
	Zero speed clamp	Stops motor and locks motor axis when motor speed setpoint is below a parameterized threshold level
SD card	SD card for parameter cloning and FW update	
Safety functions	Safe torque off (STO) via terminal	
Operator Panel (OP)	Integrated, 6-digit / 7-segment display, 5 buttons	
PC tool	SINAMICS V-ASSISTANT engineering tool exclusively for SINAMICS V90	

SINAMICS V90

Connection diagram

Standard wiring for pulse train input (PTI) position control mode (detailed information and connection diagram for other control modes, please refer to the operating instructions). The diagram shown is given as a reference for selecting the drive type. When using the selected servo drive system, establish the wiring connections according to the connection diagram and the instructions provided in the users manual.



Only one of the pulse train input channels can be used.

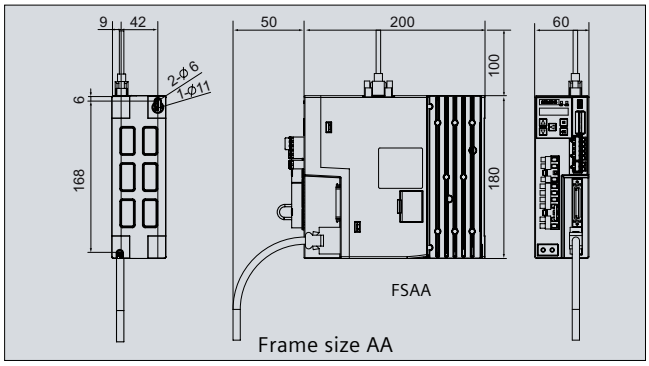
Other control signals can be assigned to digital inputs and 6 digital outputs, please refer to the operating instructions.

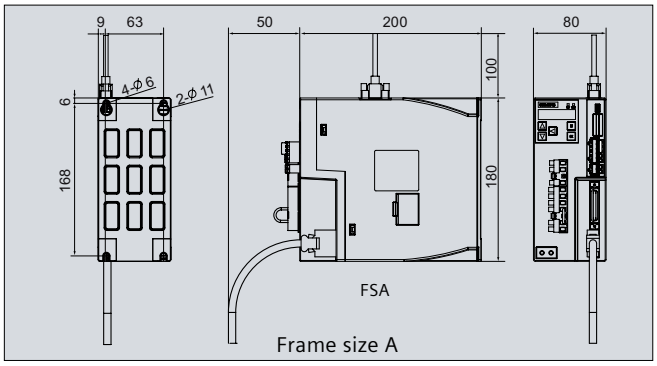
* Digital inputs, supporting both PNP and NPN types.
The 24 V power supplies in the connection diagram are as follows:
1) 24 V power supply for SINAMICS V90. All the PTO signals must be connected to the controller with the same 24 V power supply as SINAMICS V90.
2) Isolated digital input power supply. It can be the controller power supply.
3) Isolated digital output power supply. It can be the controller power supply.

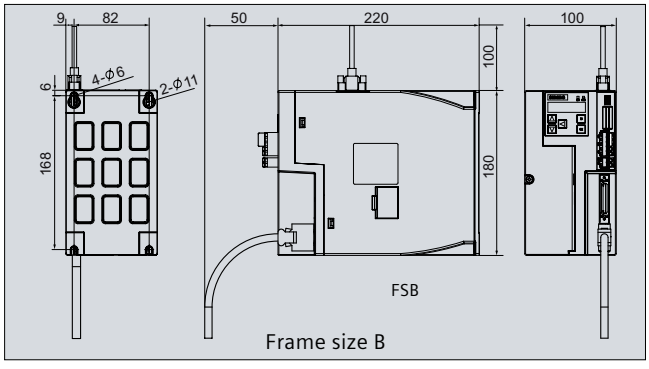
SINAMICS V90

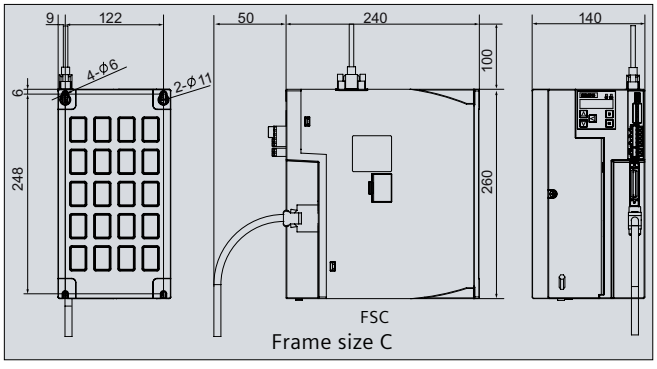
Dimensions and mounting clearances

Dimension drawings (mm)

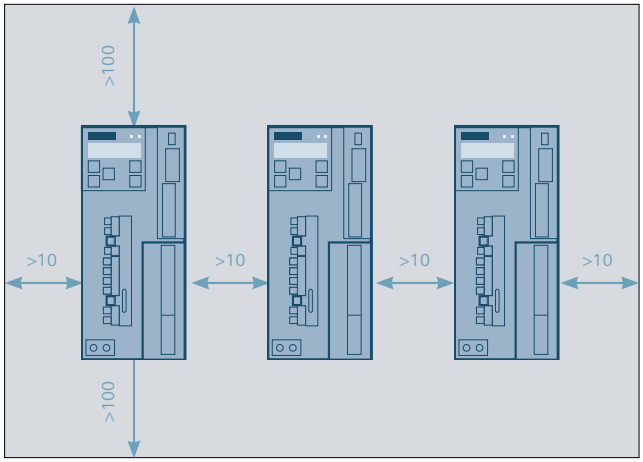








Mounting clearances (mm)



Dimensions [1] and weight

Frame size	Width (mm)	Height (mm)	Depth (mm)	Weight (kg)
FSAA	60	180	200	1.45
FSA	80	180	200	2.09
FSB	100	180	220	2.73
FSC	140	260	240	5.95

[1] All dimensions refer to the maximum outer dimension

SINAMICS V90 and SIMOTICS S-1FL6 Ordering information

SINAMICS V90 servo drive



6SL3210 - 5F E 17 – 0 UA0

Symbol	Line supply voltage
E	380...480 3AC

Symbol	Rated power of supported servomotor
10 - 4	0.40 kW
10 - 8	0.75 kW
11 - 0	1.00 kW
11 - 5	1.50 kW
12 - 0	2.00 kW
13 - 5	3.50 kW
15 - 0	5.00 kW
17 - 0	7.00 kW

SIMOTICS S-1FL6 servomotor



1FL6 06 7- 1A C 61 – 0 A H 1

Symbol	Shaft height
04	45
06	65
09	90

Symbol	Shaft version
A	Feather key, without holding brake
B	Feather key, with holding brake
G	Plain shaft, without holding brake
H	Plain shaft, with holding brake

Symbol	Rated torque
04 2	1.27 Nm
04 4	2.39 Nm
06 1	3.58 Nm
06 2	4.78 Nm
06 4	7.16 Nm
06 6	8.36 Nm
06 7	9.55 Nm
09 0	11.90 Nm
09 2	16.70 Nm
09 4	23.90 Nm
09 6	33.40 Nm

Symbol	Rated speed
C	2000 rpm
F	3000 rpm

Symbol	Encoder types
A	Incremental TTL 2500 S/R
L	Absolute 20-bit

SIMOTICS S-1FL6								SINAMICS V90	
Rated Power (kW)	Rated torque (Nm)	Rated speed (rpm)	Shaft height	Article number				Article number	Frame size
0.40	1.27	3000	SH45	1FL6042 -1AF61-0	□	□	1	6SL3210-5FE10-4UA0	FSAA
0.75	2.39	3000		1FL6044 -1AF61-0	□	□	1	6SL3210-5FE10-8UA0	FSA
0.75	3.58	2000	SH65	1FL6061 -1AC61-0	□	□	1	6SL3210-5FE11-0UA0	
1.00	4.78	2000		1FL6062 -1AC61-0	□	□	1		
1.50	7.16	2000		1FL6064 -1AC61-0	□	□	1	6SL3210-5FE11-5UA0	FSB
1.75	8.36	2000		1FL6066 -1AC61-0	□	□	1		
2.00	9.55	2000		1FL6067 -1AC61-0	□	□	1	6SL3210-5FE12-0UA0	
2.50	11.90	2000	SH90	1FL6090 -1AC61-0	□	□	1		
3.50	16.70	2000		1FL6092 -1AC61-0	□	□	1	6SL3210-5FE13-5UA0	FSC
5.00	23.90	2000		1FL6094 -1AC61-0	□	□	1	6SL3210-5FE15-0UA0	
7.00	33.40	2000		1FL6096 -1AC61-0	□	□	1	6SL3210-5FE17-0UA0	
Encoder type		Incremental encoder TTL 2500 S/R			A				
		Absolute encoder 20-bit single-turn + 12-bit multi-turn			L				
Shaft version Feather key and holding brake		Feather key, without holding brake				A			
		Feather key, with holding brake				B			
		Plain shaft, without holding brake				G			
		Plain shaft, with holding brake				H			