



# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Spring Training 2007 - Atlanta, GA

### Sinamics S120 Work Shop with CU310 DP

- Sinamics S120 Overview featuring CU310 DP AC / AC demo unit
- Lab 1 • CU310 DP Servo & Vector Drive Commissioning with Starter or Scout
- Lab 2 • S120 Standalone Positioning (traversing & midi) and Speed set points using BOP20 (Basic Operator Panel) and on-board IO (Switches)
- Lab 3 • Speed set points from S7 PLC using DriveES blocks and HMI TP170B
- Lab 4 • Positioning (traversing & midi) from S7 PLC using DriveES blocks and HMI
- Lab 5 • CU310 AC / AC Positioning (traversing & midi) and Speed set points using HMI TP170B

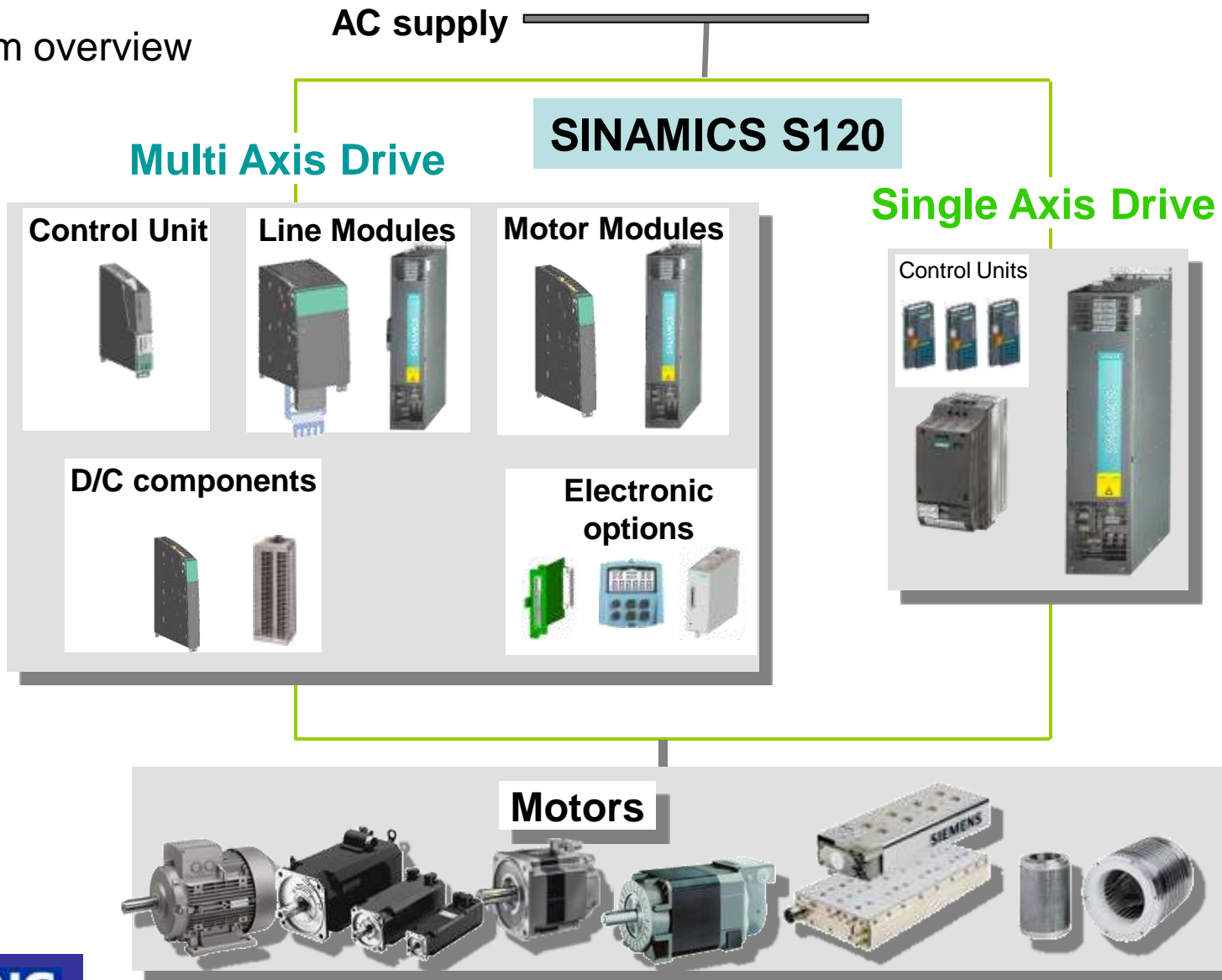




# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

System overview





# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS S120 - optimal solutions for productivity and flexibility

- Perfect basis for modular system and machine concepts through innovative system architecture and digital communication options
- Faster engineering and commissioning via the SIZER and STARTER tools as well as simple cabling with DRIVE-CLiQ
- Efficient and consistent solutions via Totally Integrated Automation (TIA), consistency from SINAMICS through to the automation level

## SINAMICS S120 - Technical data

Voltage and power ranges: 0.12 - 1200 kW 230 V, 380 - 480 V and 660 - 690 V (50/60 Hz)

Control principle: V/f open-loop control Vector control, with/without encoder Servo control, with/without encoder

## SINAMICS S120 - Typical uses

SINAMICS S120 means increased machine performance in many sectors – whether continuous material webs or cyclic and high-dynamic processes:

Packaging machines, Plastic machines, Textile machines, Printing machines, Paper machines, Handling and assembly systems, Machine tools, Rolling mills, Test stands.

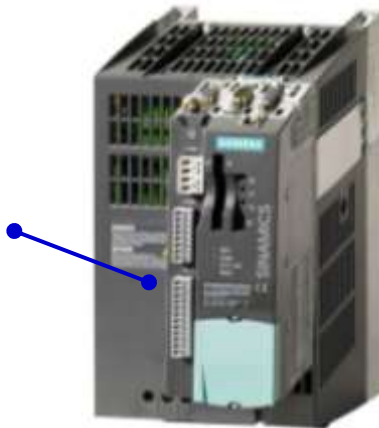
# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Sinamics S120 - CU310 DP AC / AC components

**CU310 DP  
(PROFIBUS)  
CU310 PN  
(PROFINET)**

**Solution for  
stand-alone  
units  
on PLC**



### Application

Single-axis device including controller  
Axis extension with DRIVE-CLiQ interface

### Performance classes

250 – 1100 W (Single phase)  
AC 200 – 240 V mains supply  
0.37 – 250 kW (Three phase)  
380 – 480 V mains supply

**CUA31**  
**Solution for  
interfacing to  
via DRIVE-CLiQ**



# SINAMICS S120 Servo / Vector Drive Operation

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**CU310 DP  
(PROFIBUS)  
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Solution for  
stand-alone  
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on PLC**



**CUA31  
Solution for  
interfacing to  
via DRIVE-CLiQ**



**PM 340  
Power  
Module**

The component supply provides the following customer benefits:

- Power modules and control units can be freely combined
- Spare-parts inventory for a reduced number of variants



# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Overview of Frame Sizes

**FSA**  
0.37-1.5kW



**FSB**  
2.2-4kW



**FSC**  
7.5-15kW



**FSD**  
18.5-30kW



**FSE**  
37-45kW



**FSF**  
55-90kW



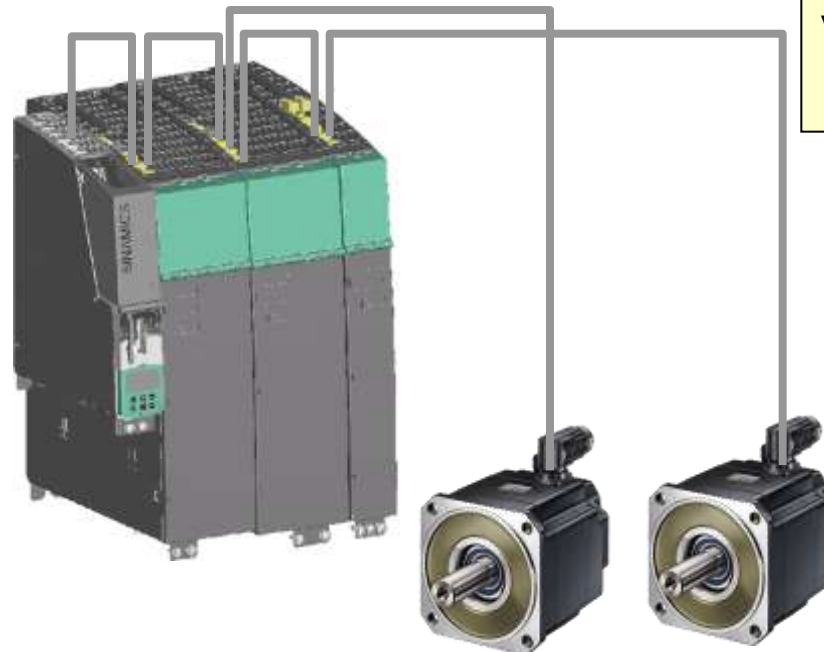


# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Multi-axis drives consist of at least three components

- **Line module** (supply)
- **Motor module** (power unit)
- **Control unit** for the control of several drives
  - Only one field bus connection to a higher-level control is required for the whole axis line-up



Communication for all components is performed via a uniform interface:

**DRIVE-CLIQ**





# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

**DRIVE-CLiQ and the unified software architecture enable combined operation of the various SINAMICS S120 designs**

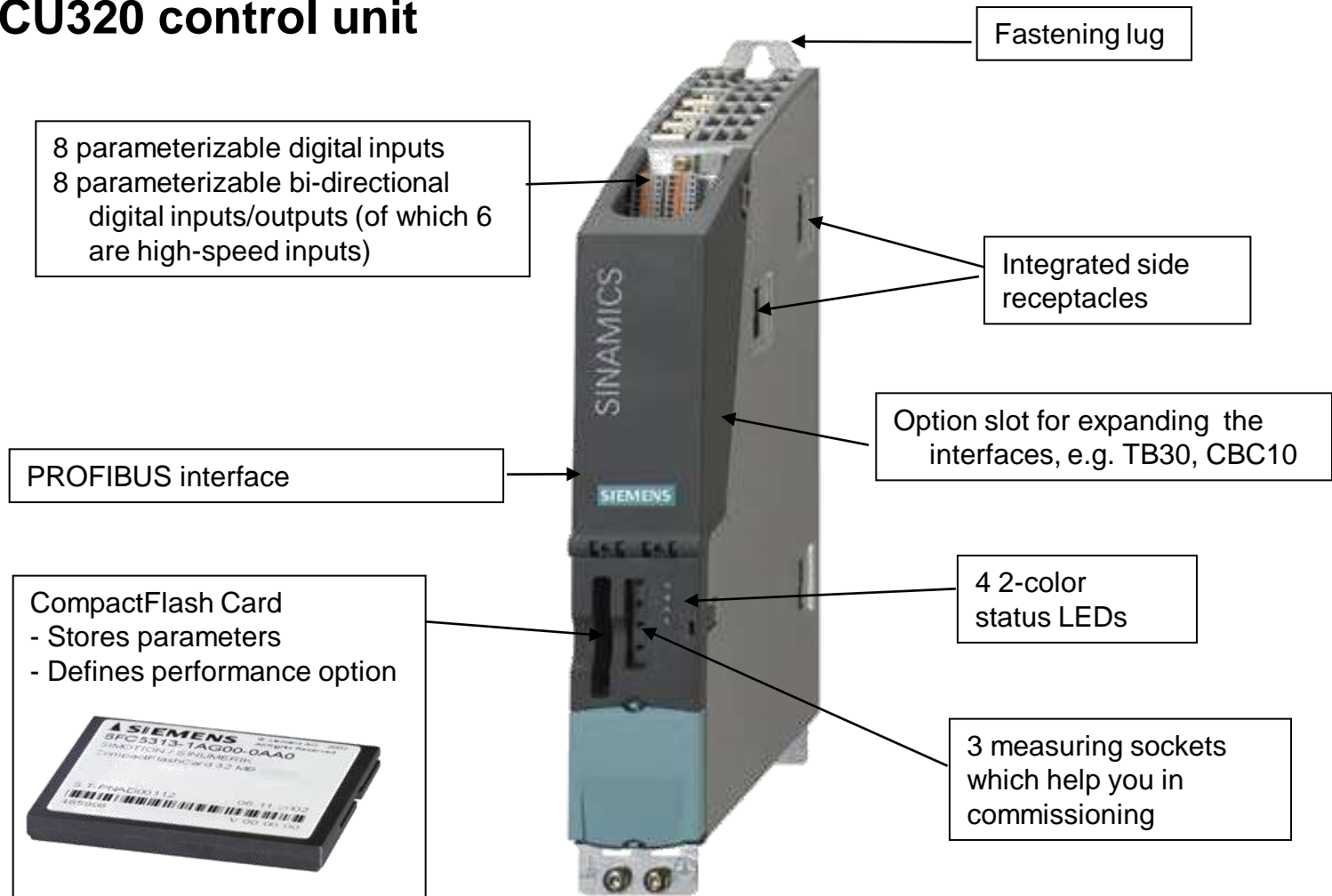


**Booksize and chassis units may be combined within a single line-up**

# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## CU320 control unit



*Parameterized as either a Servo or Vector Controller*



# SINAMICS S120 Servo / Vector Drive Operation

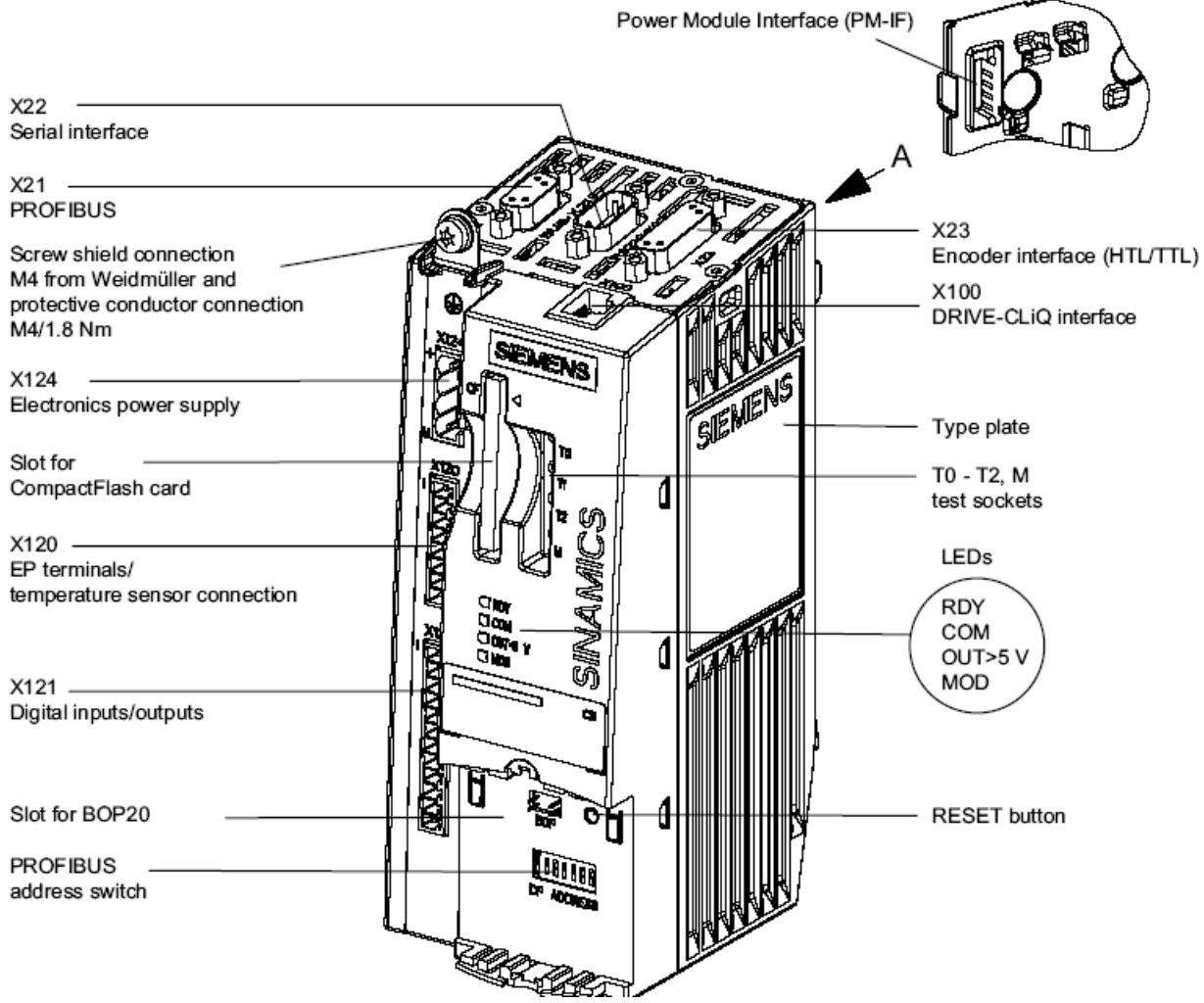
Connectivity and Functionality

## Sinamics S120 - CU310 DP AC / AC components

Slot for the CompactFlash card



Figure 6-5 Slot for CompactFlash card





# SINAMICS S120 Servo / Vector Drive Operation

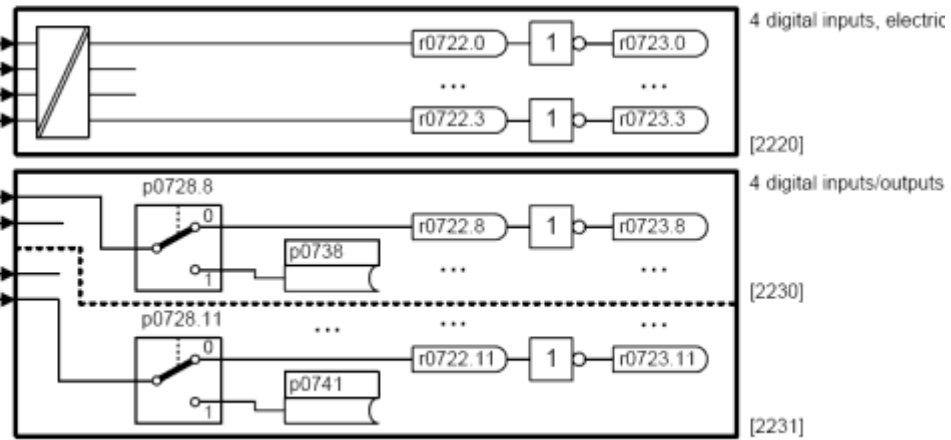
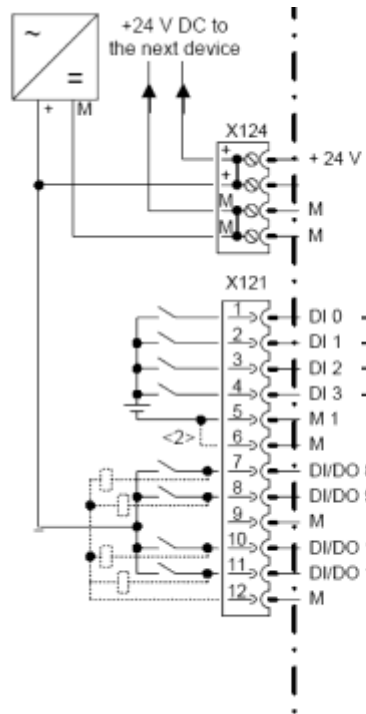
Connectivity and Functionality

## SINAMICS CU310 DP: Component Wiring

Table 6-3 Terminal strip X120

	Terminal	Function	Technical specifications
	1	Reserved, do not use	
	2	Reserved, do not use	
	3	M	Ground
	4	+Temp	KTY or PTC input
	5	-Temp	Ground for KTY or PTC
	6	Reserved, do not use	
	7	EP +24 V	Safe standstill input (+)
	8	EP M1	Safe standstill input (-)

Max. cross-section that can be connected 1.5 mm<sup>2</sup>





# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Safety Functions

SINAMICS has various integrated safety functions (Safety integrated). These increase the safety, flexibility, economics and availability of both machines and plant.



B	1	2	3	4
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The SINAMICS safety functions meet the requirements of **Safety Category 3** according to EN 954-1.

Safety relevant components are designed so that individual faults in these components cannot lead to the loss of safety functionality. The individual faults are to be detected at appropriate intervals.

### Safety functions

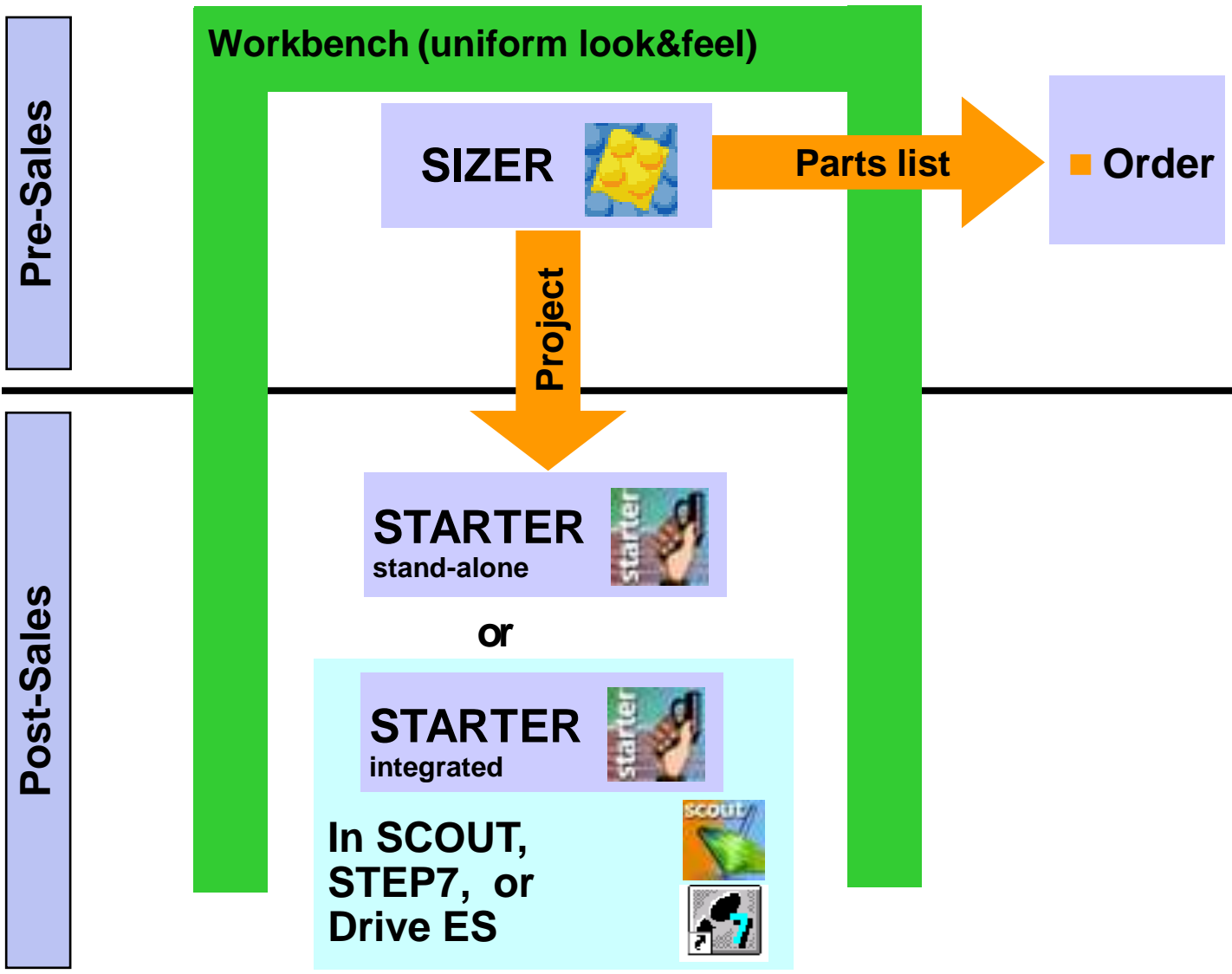
<ul style="list-style-type: none"> <li>■ Safe standstill</li> <li>■ Safe brake control</li> </ul>	<ul style="list-style-type: none"> <li>= Energy supply to the motor is disconnected</li> <li>= Safe monitoring of the brake switching signals</li> </ul>	<b>Drive</b>
<ul style="list-style-type: none"> <li>■ Safe operating stop</li> <li>■ Safely reduced speed</li> <li>■ Safe software limit switch</li> <li>■ Safe software cams</li> <li>■ Safe braking ramp</li> </ul>	<ul style="list-style-type: none"> <li>= Safe monitoring of the standstill position during operation</li> <li>= Safe monitoring of the load-side speed limit values</li> <li>= Safe monitoring of end positions</li> <li>= Safe determination of cam positions</li> <li>= Safe monitoring of the braking phase</li> </ul>	<b>Drive with SIMOTION</b>



# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS Engineering Workbench



# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS S120 CU310 DP shop manual

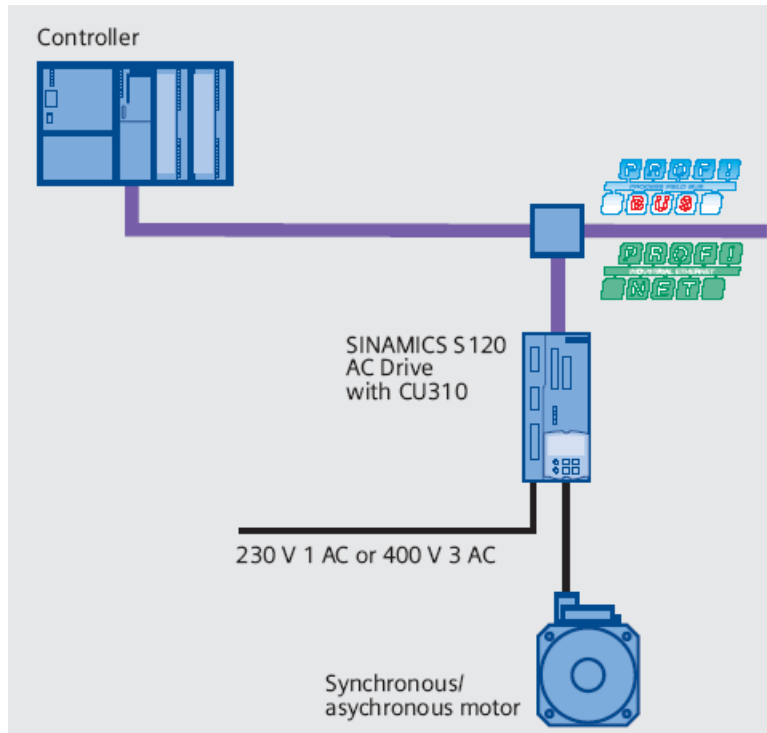


Figure 1: SINAMICS S120 AC Drive connected to a higher-level control

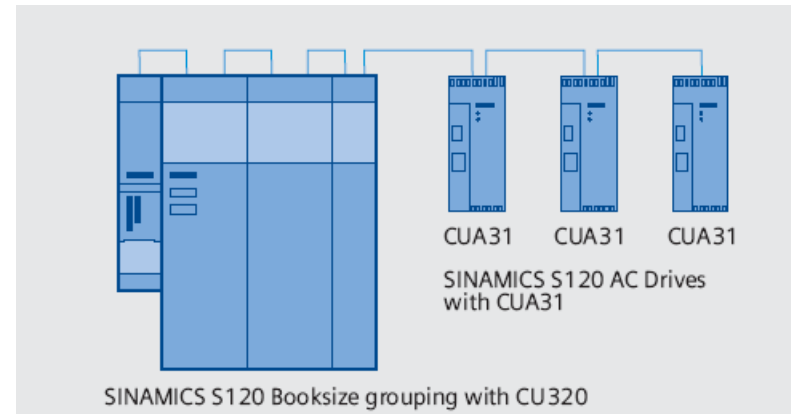


Figure 2: 3 SINAMICS S120 AC Drives connected to a SINAMICS S120 multi-axis grouping



# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS S120 CU310 DP - Workshop Lab #01

### CU310 DP Servo & Vector Drive Commissioning with Starter or Scout

 Lab 01 - CU310 DP Basic Servo Commissioning.doc





# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS S120 CU310 DP - Workshop Lab #02

### S120 Standalone Positioning (traversing & midi) and Speed set points using BOP20 (Basic Operator Panel) and on-board IO (Switches)

Lab 02 - CU310 DP Vector BOP & Onboard IO.doc

Simple Positioning

Program traversing blocks

Maximum number of blocks: [64] Edit

Index	No.	Job	Parameter	Mode	Position	Velocity	Acceleration	Deceleration	Advance	Hide
1	0	POSITIONING	0	RELATIVE (1)	90000	1000	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
2	2	POSITIONING	0	RELATIVE (1)	915000	10000	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
3	4	POSITIONING	0	RELATIVE (1)	-270000	8000	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
4	5	WAITING	3000	ABSOLUTE (0)	0	600	150	100	CONTINUE_WITH_STOP (1)	<input type="checkbox"/>
5	6	POSITIONING	0	ABSOLUTE (0)	0	21400	100	100	CONTINUE_WITH_STOP (1)	<input type="checkbox"/>
6	1	WAITING	5000	ABSOLUTE (0)	0	600	100	100	CONTINUE_WITH_STOP (1)	<input type="checkbox"/>
7	3	WAITING	5000	ABSOLUTE (0)	0	600	100	100	CONTINUE_WITH_STOP (1)	<input type="checkbox"/>
8	7	POSITIONING	0	RELATIVE (1)	440000	50000	100	100	CONTINUE_WITH_STOP (1)	<input type="checkbox"/>
9	8	POSITIONING	0	RELATIVE (1)	414000	22000	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
10	9	POSITIONING	0	RELATIVE (1)	1000000	50000	150	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
11	10	WAITING	2000	ABSOLUTE (0)	0	600	100	100	CONTINUE_WITH_STOP (1)	<input type="checkbox"/>
12	11	POSITIONING	0	ABSOLUTE (0)	0	1000	100	100	END (0)	<input type="checkbox"/>
13	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
14	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
15	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
16	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
17	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
18	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
19	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
20	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
21	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
22	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
23	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
24	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
25	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
26	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
27	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
28	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
29	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
30	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>

Close Help




# SINAMICS S120 Servo / Vector Drive Operation

## Connectivity and Functionality

Program traversing blocks

Maximum number of blocks: [64]



Index	No.	Job	Parameter	Mode	Position	Velocity	Acceleration	Deceleration	Advance	Hide
1	0	POSITIONING	0	ABSOLUTE (0)	2000	600	100	20	CONTINUE_FLYING (2)	<input type="checkbox"/>
2	1	POSITIONING	0	ABSOLUTE (0)	4000	200	20	100	CONTINUE_WMTH_STOP (1)	<input type="checkbox"/>
3	2	POSITIONING	0	ABSOLUTE (0)	5000	200	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
4	3	POSITIONING	0	RELATIVE (1)	-5000	600	100	100	END (0)	<input type="checkbox"/>
5	4	POSITIONING	0	RELATIVE (1)	1000	600	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
6	5	WAITING	1000	ABSOLUTE (0)	0	600	100	100	CONTINUE_WMTH_STOP (1)	<input type="checkbox"/>
7	6	POSITIONING	0	RELATIVE (1)	1000	600	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
8	7	GOTO	2	ABSOLUTE (0)	0	600	100	100		<input type="checkbox"/>
9	8	POSITIONING	0	RELATIVE (1)	2000	300	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
10	9	WAITING	2000	ABSOLUTE (0)	0	600	100	100	CONTINUE_WMTH_STOP (1)	<input type="checkbox"/>
11	10	SET_O	1	ABSOLUTE (0)	0	600	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
12	11	POSITIONING	0	RELATIVE (1)	3000	600	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
13	12	RESET_O	1	ABSOLUTE (0)	0	600	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
14	13	WAITING	2000	ABSOLUTE (0)	0	600	100	100	CONTINUE_WMTH_STOP (1)	<input type="checkbox"/>
15	14	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	CONTINUE_FLYING (2)	<input type="checkbox"/>
16	15	GOTO	8	ABSOLUTE (0)	0	600	100	100		<input type="checkbox"/>
17	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
18	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
19	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
20	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
21	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
22	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
23	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
24	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
25	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
26	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
27	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
28	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
29	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>
30	-1	POSITIONING	0	ABSOLUTE (0)	0	600	100	100	END (0)	<input type="checkbox"/>

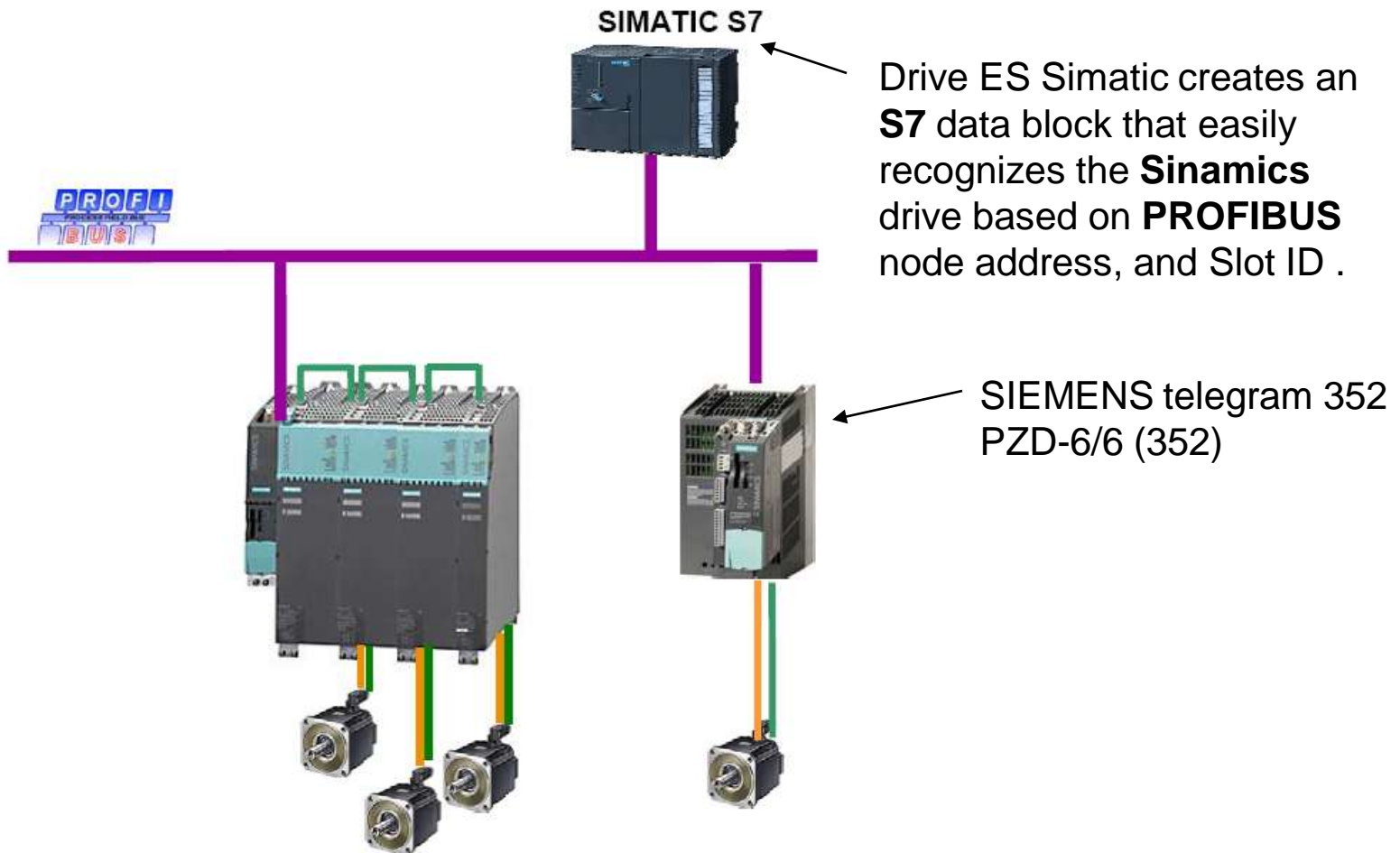
# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS S120 CU310 DP - Workshop Lab #03

### Speed set points from S7 PLC using DriveES blocks and HMI TP170B

 Lab 03 - CU310 DP Speed Control S7 DriveES.doc





# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Drive ES SIMATIC V5.4 Function Block Library DRVDPS7

"Drive ES SIMATIC" supports the connection of variable-speed drive systems SIMOREG, SIMOVERT, SIMODRIVE and SINAMICS to a higher-level SIMATIC S7 control system. This link is made via the standardized communications system PROFIBUS DP in accordance with the "PROFIBUS Profile Drive Technology" or, alternatively for SIMOREG and SIMOVERT, via the Universal Serial Interface (USS®) Protocol.

The sample applications software is an integral component of the "Drive ES SIMATIC" product and stored in the STEP 7 library "DRVDPS7". Examples of configuration are given in the STEP 7 project example, "ZXy51\_03\_DriveES\_SAMP".

# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Speed set points from S7 PLC using DriveES blocks and HMI TP170B

The following blocks can be used both for PROFIBUS DP and for PROFINET IO

Usable blocks	FB31 PCD_SEND	FB32 PCD_REC	FB33 PDAT_CY	FB34 PDAT_AC	FB35 DEV_FLT1	FB36 PDAT_AC2	FB37 DEV_FLT2	FB38 DEV_FLT3	FB39 DEV_FLT4	FB40 PDAT_DL	FB41 PDAT_UD	FB42 PDAT_UD2	FC60 COM_STAT
Types of device													
MASTERDRIVES VC	Yes	Yes	Yes	Yes	Yes	Yes <sup>1*)</sup>	No	No	No	Yes	Yes	Yes <sup>2*)</sup>	Yes
MASTERDRIVES MC	Yes	Yes	Yes	Yes	Yes	Yes <sup>1*)</sup>	No	No	No	Yes	Yes	Yes <sup>2*)</sup>	Yes
MICROMASTER 3. Gen.	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	No	Yes
MICROMASTER 4. Gen.	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	No	No	Yes	Yes
SIMODRIVE 611U	Yes	Yes	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes
POSMO CA/CD/SI	Yes	Yes	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes
POSMO A	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes
SIMOREG DC Master	Yes	Yes	Yes	Yes	No	Yes <sup>1*)</sup>	Yes	No	No	Yes	Yes	Yes <sup>2*)</sup>	Yes
SINAMICS G/S	Yes	Yes	No	No	No	Yes	No	No	Yes	No	No	Yes	Yes





# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Speed set points from S7 PLC using DriveES blocks and HMI TP170B

**FB31 PCD\_SEND** Sending process data (control words and setpoints) to the drive

**FB32 PCD\_RECV** Receiving process data (status words and actual values) from the drive

You can freely specify the length of the PZD interface up to a total length of 16 words. The interface is parameterized in HW Config. For this purpose, it is possible to directly select the standard telegrams according to the PROFIdrive Profile Drive Technology, or PPO types 1 to 5.

The first word in the setpoint range (PCD\_1) must always be occupied by the control word.

# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

HW Config - [SIMATIC 300(1) (Configuration) -- Lab03\_2AG10]

Station Edit Insert PLC View Options Window Help

(0) UR

1	
2	CPU 315-2 DP
X2	DP
3	
4	
5	
6	
7	
8	
9	
10	
11	

PROFIBUS(1): DP master system (1)

(3) SINAMICS

DP Slave Properties

General Configuration Clock Synchronization Internode Communication - Overview

Default SIEMENS message frame 352, PZD-6/6

Slot	In local slave		PROFIBUS partner							
	Type	Add...	Type	D...	I/O ...	Pr...	L...	Unit	Consist...	Comm...
4	Actual v...	PC...	Input	2	256	---	6	Word	Entire I...	
5	Setpoint	PC...	Output	2	256	---	6	Word	Entire I...	
6										

(3) SINAMICS\_S120\_CU310

Slot	Module	...	I address	O address	Comment
4	Drive Data		256...267		
5	Drive Data			256...267	

Insert slot

Drive ES Simatic interrogates the Hardware configuration and automatically identifies the PROFIBUS slave addresses and number of drives assigned to each node. The generated data block provides communication access via the Drive Data Slot numbers.



# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SIEMENS telegram 352, PZD-6/6 (352)

### PROFIBUS receive direction

PROFIBUS receive direction | PROFIBUS transmit direction

Suppress inactive interconnections

Telegram selection: SIEMENS telegram 352, PZD-6/6 (352)

*PZD source offset*

[ 1 ]	M	0	0401	hex	STW1	-		
[ 2 ]	M	2	0000	hex	NSOLL_A	p1070[0], Cl: Main setpoint		

### Connector binector Transformer STW1

1. PZD BICO interconnection

0	<input checked="" type="radio"/>	p840[0], BI: ON/OFF1	
1	<input type="radio"/>	p844[0], BI: 1. OFF2	
2	<input type="radio"/>	p848[0], BI: 1. OFF3	
3	<input type="radio"/>	p852[0], BI: Enable operation	
4	<input type="radio"/>	p1140[0], BI: Enables the ran	
5	<input type="radio"/>	p1141[0], BI: Start ramp-funct	
6	<input type="radio"/>	p1142[0], BI: Enable speed s	
7	<input type="radio"/>	p2103[0], BI: 1. Acknowledge	
8	<input type="radio"/>	-	
9	<input type="radio"/>	-	
10	<input checked="" type="radio"/>	p854[0], BI: Master ctrl by PL	
11	<input type="radio"/>	p1113[0], BI: Direction revers	
12	<input type="radio"/>	-	
13	<input type="radio"/>	p1035[0], BI: Motorized pote	
14	<input type="radio"/>	p1036[0], BI: Motorized pote	
15	<input type="radio"/>	-	







# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SIEMENS telegram 352, PZD-6/6 (352)


### PROFIBUS transmit direction

PROFIBUS receive direction | PROFIBUS transmit direction

Suppress inactive interconnections

Telegram selection: SIEMENS telegram 352, PZD-6/6 (352)

Binector connector transformer



<input type="checkbox"/>	r2089[0], PROFIBUS send s	ZSW1	EB40	hex	[ 1 ]	0
<input type="checkbox"/>	r63[1], Actual speed value,	[ NIST_A_GLAT ]	0000	hex	[ 2 ]	2
<input type="checkbox"/>	r68[1], Absolute current actu	[ IAIST_GLATT ]	001C	hex	[ 3 ]	4
<input type="checkbox"/>	r80[1], Torque actual value,	[ MIST_GLATT ]	0000	hex	[ 4 ]	6
<input type="checkbox"/>	r2132, CO: Actual alarm cod	[ WARN_CODE ]	0000	hex	[ 5 ]	8
<input type="checkbox"/>	r2131, CO: Actual fault code	[ FAULT_CODE ]	0000	hex	[ 6 ]	10

**PZD  
offset**

- ZSW1      PROFIBUS send status word, Status word 1
- NIST\_A    Actual speed value, Smoothed with p0045
- IAIST     Absolute current actual value, Smoothed with p0045
- MIST     Torque actual value, Smoothed with p0045
- WARN     CO: Actual alarm code
- FAULT    CO: Actual fault code





# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SIEMENS telegram 352, PZD-6/6 (352)

### PROFIBUS transmit direction

Connector binector transformer | Binector connector transformer

Status word 1 sources

0	r899: Bit 0, CO/BO: Status word	○
1	r899: Bit 1, CO/BO: Status word	○
2	r899: Bit 2, CO/BO: Status word	○
3	r2139: Bit 3, CO/BO: Status word	○
4	r899: Bit 4, CO/BO: Status word	○
5	r899: Bit 5, CO/BO: Status word	○
6	r899: Bit 6, CO/BO: Status word	●
7	r2139: Bit 7, CO/BO: Status word	○
8	r2197: Bit 7, CO/BO: Status word	●
9	r899: Bit 9, CO/BO: Status word	●
10	r2199: Bit 1, CO/BO: Status word	○
11	r1407: Bit 7, CO/BO: Status word	○
12	r899: Bit 12, CO/BO: Status word	○

Status word 1 sources

p2051[0], PROFIBUS PZD: [ ] ←

Status word 2 sources

[-] [ ]

Status word 3 sources

[-] [ ]

Status word 4 sources

[-] [ ]

Binector connector Transformer ZSW1

- r899.0 Ready to power up
- r899.1 Ready
- r899.2 Operation enabled
- r2139.3 Fault present
- r899.4 No coasting active
- r899.5 No fast stop active
- r899.6 Power-on inhibit active
- r2139.7 Alarm present
- r2197.7 Speed setp - act val deviation in tolerance t\_off
- r899.9 Control requested
- r2199.1 f or n comparison value reached or exceeded
- r1407.7 Torq limit reached
- r899.12 Holding brake open



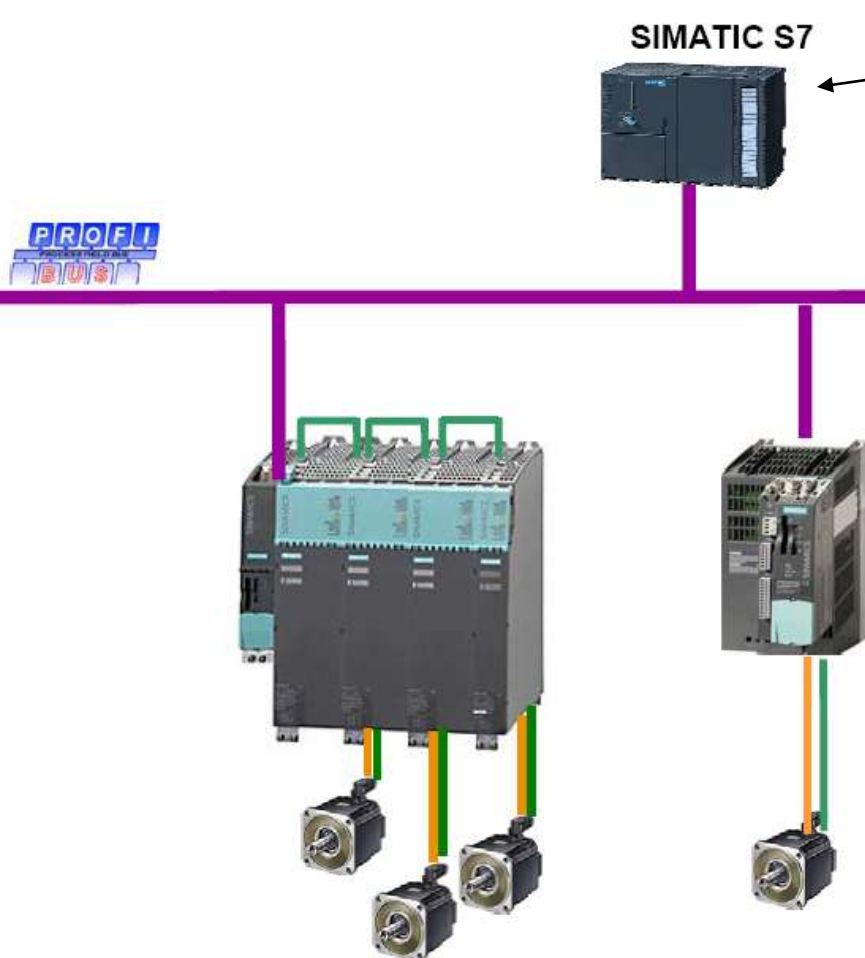
# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS S120 CU310 DP - Workshop Lab #04

- Positioning (traversing & midi) from S7 PLC using DriveES blocks and HMI

 Lab 04 - CU310 DP Servo Positioning with SFC S7.doc



SIMATIC S7

The SIMATIC controller will use SFC 14 & SFC 15 for PROFIBUS communications to the drives:

- SFC 15 "DPWR\_DAT" (write consistent data to a DP standard slave)
- SFC 14 "DPRD\_DAT" (read consistent data of a DP standard slave)

The CU310 DP will be configured for a 10 word (Free BICO) data exchange. Free telegram configuration with BICO (999)

# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## SINAMICS S120 CU310 DP - Workshop Lab #04

- Positioning (traversing & midi) from S7 PLC using DriveES blocks and HMI

**SIMOTION SCOUT - Lab04\_SFC\_Positioning - [SINAMICS\_S120\_CU310 - Configuration]**

Project Edit Insert Target system View Options Window Help

PROFIBUS message frame Version overview

The drive objects are supplied with data in the following sequence from the PROFIBUS message frame:

Object	Drive object	No.	Message frame type	Input data			Output data			SIM
				Std.	add	Address	Std.	add	Address	
1	SERVO_02	2	Free telegram configuration with BICO	✓	-	10 256..275	-	10 256..275	-	-
2	CU_S_003Unit	1	SIEMENS telegram 390, PZD-1/1	✓	2	0 276..279	2	0 276..279	-	-

Without PZDs (no cyclic data exchange)

- The SERVO drive PROFIBUS message telegram is configured for a 10 word (20 byte) exchange with the PROFIBUS master.
- The Control Unit PROFIBUS message telegram uses SIEMENS telegram 390, PZD-1/1. This telegram is ideally suited for mapping the SINAMICS onboard I/O onto the telegram.

# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

Free telegram BICO

PROFIBUS receive  
(Commands to the drive)

PROFIBUS receive direction | PROFIBUS transmit direction

Suppress inactive interconnections

Telegram selection: Free telegram configuration with BICO (999)

*PZD source offset*

[ 1 ]	M 0	0000	hex	-	▶	▶
[ 2 ]	M 2	0000	hex	-	▶	▶
[ 3 ]	M 4	0000	hex	-	▶	▶
[ 4 ]	M 6	0000	hex	p2646, CI: EPOS velocity ov	▶	▶
[ 5 ]	M 8	0000_0000	hex	p2642, CI: EPOS direct setp	▶	▶
[ 7 ]	M 12	0000	hex	p2644, CI: EPOS direct setp	▶	▶
[ 8 ]	M 14	0000	hex	p2645, CI: EPOS direct setp	▶	▶

**PZD BICO interconnection**

Connector binector transformer

PROFIBUS transmit  
(Status from the drive)

PROFIBUS receive direction | PROFIBUS transmit direction

Suppress inactive interconnections

Telegram selection: Free telegram configuration with BICO (999)

*PZD offset*

▶	r2089[0], PROFIBUS send s	0340	hex	[ 1 ]	0
▶	r2089[1], PROFIBUS send s	0009	hex	[ 2 ]	2
▶	r2089[2], PROFIBUS send s	EC00	hex	[ 3 ]	4
▶	r63, CO: Actual speed, smo	FFFF_9C01	hex	[ 4 ]	6
▶	r2521, CO: LR position actu	0000_0000	hex	[ 6 ]	10
▶	r2132, CO: Actual alarm coc	0000	hex	[ 8 ]	14
▶	r2131, CO: Actual fault code	0000	hex	[ 9 ]	16

Binector connector transformer

# SINAMICS S120 Servo / Vector Drive Operation

Connectivity and Functionality

## Highlights of the first two words of the Free telegram BICO

### r2050[0] PROFIBUS Send Word 1

Parameter	Parameter text	PZD BICO Value VECTOR_02
p840[0]	BI: ON/OFF1	VECTOR_02 : r2090.0
p844[0]	BI: 1. OFF2	VECTOR_02 : r2090.1
p848[0]	BI: 1. OFF3	VECTOR_02 : r2090.2
p852[0]	BI: Enable operation	VECTOR_02 : r2090.3
p2640	BI: EPOS intermediate stop (0 signal)	VECTOR_02 : r2090.4
p2641	BI: EPOS reject traversing task (0 signal)	VECTOR_02 : r2090.5
p2103[0]	BI: 1. Acknowledge faults	VECTOR_02 : r2090.7
p2589	BI: EPOS jogging 1 signal source	VECTOR_02 : r2090.8
p2590	BI: EPOS jogging 2 signal source	VECTOR_02 : r2090.9
p854[0]	BI: Master ctrl by PLC	VECTOR_02 : r2090.10
p2591	BI: EPOS jogging incremental	VECTOR_02 : r2090.12
p2582	BI: EPOS software limit switch activation	VECTOR_02 : r2090.14
p2568	BI: EPOS STOP cam activation	VECTOR_02 : r2090.15

### r2050[1] PROFIBUS Send Word 2

Parameter	Parameter text	PZD BICO Value VECTOR_02
p2595	BI: EPOS referencing start	VECTOR_02 : r2091.0
p2596	BI: EPOS set reference point	VECTOR_02 : r2091.1
p2597	BI: EPOS referencing type selection	VECTOR_02 : r2091.2
p2604	BI: EPOS search for reference, start direction	VECTOR_02 : r2091.3
p2510	BI: LR selecting measuring probe evaluation	VECTOR_02 : r2091.4
p2511	BI: LR measuring probe evaluation edge	VECTOR_02 : r2091.5
p2647	EPOS direct input/MDI selection	VECTOR_02 : r2091.8
p2653	EPOS direct input/MDI setting-up selection	VECTOR_02 : r2091.9
p2648	EPOS direct input/MDI positioning type	VECTOR_02 : r2091.10
p2651	EPOS direct input/MDI direction selection, positive	VECTOR_02 : r2091.11
p2652	EPOS direct input/MDI direction selection, negative	VECTOR_02 : r2091.12
p2650	EPOS direct input/MDI setpoint transfer edge	VECTOR_02 : r2091.13
p2649	EPOS direct input/MDI transfer type selection	VECTOR_02 : r2091.14

### r2051[0] PROFIBUS Receive Word 1 PZD BICO

Parameter	Bit	Value VECTOR_02	PZD BICO
p2080[0]	Bit 0	VECTOR_02 : r899.0	Ready to power up
p2080[1]	Bit 1	VECTOR_02 : r899.1	Ready
p2080[2]	Bit 2	VECTOR_02 : r899.2	Operation enabled
p2080[3]	Bit 3	VECTOR_02 : r2139.3	Fault present
p2080[4]	Bit 4	VECTOR_02 : r899.4	No coasting active
p2080[5]	Bit 5	VECTOR_02 : r899.5	No fast stop active
p2080[6]	Bit 6	VECTOR_02 : r899.6	Power-on inhibit active
p2080[7]	Bit 7	VECTOR_02 : r2139.7	Alarm present
p2080[8]	Bit 8	VECTOR_02 : r2199.0	n_act  < speed threshold value 3
p2080[9]	Bit 9	VECTOR_02 : r899.9	Control requested
p2080[10]	Bit 10	VECTOR_02 : r2094.0	
p2080[11]	Bit 11	VECTOR_02 : r2094.1	
p2080[12]	Bit 12	VECTOR_02 : r2094.2	
p2080[13]	Bit 13	VECTOR_02 : r2094.3	
p2080[14]	Bit 14	VECTOR_02 : r2094.4	
p2080[15]	Bit 15	VECTOR_02 : r2684.1	Flying referencing active

### r2051[1] PROFIBUS Receive Word 2 PZD BICO

Parameter	Bit	Value VECTOR_02	PZD BICO
p2081[0]	Bit 0	VECTOR_02 : r2684.11	Reference point set
p2081[1]	Bit 1	VECTOR_02 : r2684.15	Travel command active
p2081[2]	Bit 2	VECTOR_02 : r2684.10	Target position reached
p2081[3]	Bit 3	VECTOR_02 : r2684.8	Follow err in tol
p2081[4]	Bit 4	VECTOR_02 : r2683.6	Software limit switch minus reached
p2081[5]	Bit 5	VECTOR_02 : r2683.7	Software limit switch plus reached
p2081[6]	Bit 6	VECTOR_02 : r2684.13	STOP cam minus active
p2081[7]	Bit 7	VECTOR_02 : r2684.14	STOP cam plus active
p2081[8]	Bit 8	VECTOR_02 : r2684.12	Acknowledgment, traversing block activated
p2081[9]	Bit 9	VECTOR_02 : r2683.2	Setpoint available
p2081[10]	Bit 10	VECTOR_02 : r2683.4	Axis moves forwards
p2081[11]	Bit 11	VECTOR_02 : r2683.5	Axis moves backwards
p2081[12]	Bit 12	VECTOR_02 : r2684.4	Axis accelerating
p2081[13]	Bit 13	VECTOR_02 : r2684.5	Axis decelerating
p2081[14]	Bit 14	VECTOR_02 : r2684.3	Printing mark outside outer window
p2081[15]	Bit 15	VECTOR_02 : r2683.1	Velocity limiting active



# SINAMICS S120 Servo / Vector Drive Operation

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## SINAMICS S120 CU310 DP - Workshop Lab #04

- Positioning (traversing & midi) from S7 PLC using DriveES blocks and HMI

```

FC100 : Title:
Comment:

Network 1: Title:
Comment:

```

PROFIBUS starting address  
 272 dec = W#16#100 hex

```

CALL "DPWR_DAT"
LADDR :=W#16#100
RECORD := "DB100".SEND_AXIS_1
RET_VAL:=#RET_VAL1

```

SFC15 / DPWR\_DAT / Write Consistent Data to a Standard DP Slave

PROFIBUS starting address  
 272 dec = W#16#100 hex

```

CALL "DPRD_DAT"
LADDR :=W#16#100
RET_VAL:=#RET_VAL2
RECORD := "DB100".RECEIVE_AXIS_1

```

SFC14 / DPRD\_DAT / Read Consistent Data of a Standard DP Slave

