

Certification Test

CT.Sigma7.01.eLV.Tuning.CertificationTest



Student Name: _____

Company Name: _____

Address: _____

Phone: _____

Email: _____

Test Date: _____

Answers:

1	_____	26	_____	_____	_____
2	_____	27	_____	_____	_____
3	_____	28	_____	_____	_____
4	_____	29	_____	_____	_____
5	_____	30	_____	_____	_____
6	_____	31	_____	_____	_____
7	_____	32	_____	_____	_____
8	_____	33	_____	_____	_____
9	_____	34	_____	_____	_____
10	_____	35	_____	_____	_____
11	_____	36	_____	_____	_____
12	_____	37	_____	_____	_____
13	_____	38	_____	_____	_____
14	_____	39	_____	_____	_____
15	_____	40	_____	_____	_____
16	_____	41	_____	_____	_____
17	_____	42	_____	_____	_____
18	_____		_____	_____	_____
19	_____		_____	_____	_____
20	_____		_____	_____	_____
21	_____		_____	_____	_____
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24	_____		_____	_____	_____
25	_____		_____	_____	_____

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Taking the Test

- The purpose of this test is to validate the learning experience corresponding to the applicable eLearning Module. It is recommended to preview the questions before viewing the module, and answer them as the module progresses.
- The test is open book. You may use any website, manuals, software, demo, etc. The test must be taken individually; you may not contact another person for help.
- Each question has only one correct answer unless otherwise noted. Please clearly record all answers on the answer sheet. All questions are equally weighted. A passing score is 90%.

Returning the Test

- Please return **only the first page** of the test (the answer sheet) with completed answers and contact information.

Option 1: Fax the answer sheet to **Yaskawa Technical Training Services** at **(847) 887-7185**.

Option 2: e-mail a scan, photo, or edited pdf of the answer sheet with all answers and contact information to training@yaskawa.com.

Receiving Your Score

You may review your answers only if a passing score is received. You will receive a system-generated email with your score. Please allow up to 5 business days.

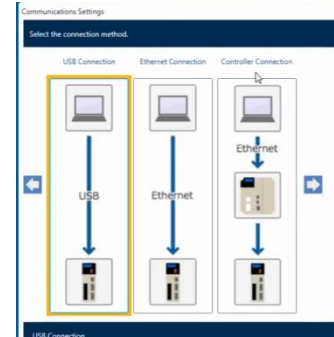
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YASKAWA

Connection

1. Which connection method is required to communicate from SigmaWin+ Ver.7 through the MPiEc controller to each configured Sigma-7 servo?
 - A. USB Connection
 - B. Ethernet Connection
 - C. Controller Connection
 - D. PCI Connection
 - E. Remote PCI Connection
 - F. MECHATROLINK Relay Device



2. The Test (Ping) button confirms communication between which 2 devices?
 - A. Computer and MPiEc Controller
 - B. Computer and Sigma-7 Servo
 - C. MPiEc Controller and Sigma-7 Servo

Navigate to the MP3300iec WebUI, Status, PLC Variables and enter the letter answer for the required action. If you implemented all of the exercises and demonstrations from the training videos, then these answers will already appear.

Alarms and Monitors

3. TestAnswer.**AlmMon1** appears when the Z_axis alarm A.d00 was cleared without the remote I/O.
 - Write the answer (from WebUI→Status→PLC Variables) on the answer sheet
4. Set Z_axis Pn520 to default setting. Clear the alarm history. Attempt to command the Z axis move at a speed of 4500 in the Remote IO. What value most closely approximates the highest speed the motor reached before the alarm?
 - A. 60 [min-1]
 - B. 250 [min-1]
 - C. 700 [min-1]
5. Command the Z_axis a speed of 30 from the Remote IO. What value most closely approximates the SigmaWin+ Ver.7 speed reference monitor?
 - A. 0
 - B. 1
 - C. 5
 - D. 10
 - E. 30
 - F. 60
6. TestAnswer.**AlmMon2** appears when the Z_axis alarm A.0b0 was cleared with software reset and ServoON was successful from remote IO interface.
 - Write the answer (from WebUI→Status→PLC Variables) on the answer sheet

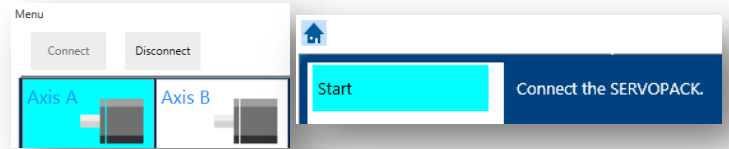
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YASKAWA

Parameters

7. After you open a SigmaWin+ Ver.7 project file, how do you connect?
- A. Use Menu – Connect on each axis
 - B. Use Home – connect the SERVOPACK



8. Are the axis parameters for 7W dual axis saved together or separately?
- A. Together
 - B. Separately
9. TestAnswer.**Param1** appears when the **Z**_axis Pn520 is set greater than default.
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet
10. TestAnswer.**Param2** appears when the **Z**_axis Pn316 is set and alarm A.510 produced
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet
11. TestAnswer.**Param3** appears when the **X**_axis parameters are initialized to default, which results in alarm A.F10
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet

Test Run

12. TestAnswer.**TestRun1** appears when the **Z**_Axis Jog speed is changed.
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet
13. TestAnswer.**TestRun2** appears when the **Z**_Axis is jogged through one of the over-travels.
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet
14. TestAnswer.**TestRun3** appears when the **Z**_Axis executes a Program Jog according to the setup parameters shown in the video
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet

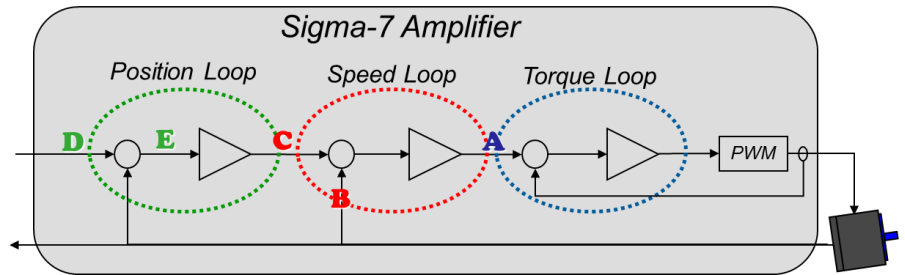
Tuning Basics

15. Which of the following lists the amplifier control loops in order of fastest to slowest?

- A. Position, Speed, Torque
- B. Position, Torque, Speed
- C. Speed, Torque, Position
- D. Speed, Position, Torque
- E. Torque, Speed, Position
- F. Torque, Position, Speed

16. Which letter on the diagram represents the position error?

- A. A
- B. B
- C. C
- D. D
- E. E



17. What type of test move is best for tuning?

- A. A slow, easy move with low duty cycle
- B. A moderate move with moderate duty cycle
- C. A worst-case move with rapid duty cycle
- D. A worst-case move with low duty cycle

18. Which tuning method is appropriate for dynamically changing loads?

- A. Tuning-Less
- B. Autotuning
- C. Custom Tuning

Tuning Filters

19. Which tuning filter is best for controlling oscillation at the lowest frequencies?

- A. Vibration Suppression
- B. Anti-Resonance
- C. Notch Filter

20. Refer to the “Ballscrew Mechanical Analysis” file in the class materials download. What filter is appropriate for this mechanical system?

- A. Vibration Suppression
- B. Anti-Resonance
- C. Notch Filter

21. TestAnswer.**Filters1** appears when the Z_Axis **anti-resonance** is set according to the mechanical analysis result as shown in the video.

- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet

22. TestAnswer.**Filters1** appears when the Z_Axis **vibration suppression** is set according to the mechanical analysis result as shown in the video.

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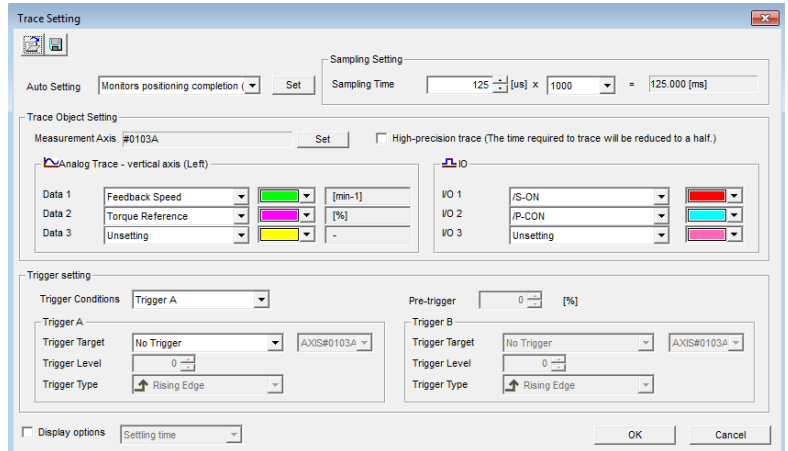
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet

Data Trace

23. In Trace Setup, which Auto Setting

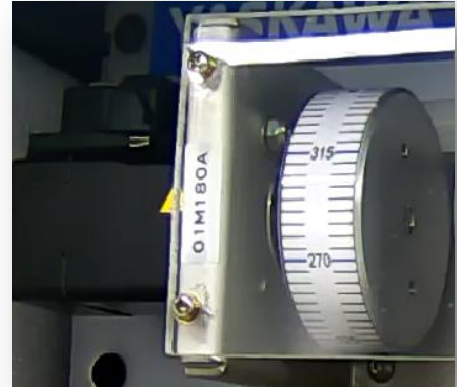
is used to measure Position Reference Speed, Torque Reference, and Feedback Speed?

- A. Monitors positioning completion (Fwd).
- B. Monitors positioning completion (Rev).
- C. Monitors positioning completion (Fwd and Rev).
- D. Checks speed reference.
- E. Checks position reference
- F. Monitors positioning (From the start).
- G. Checks gain switching when motor is stopped.



24. An MPiec controller commands a Sigma-7 servomotor which directly drives a rotary load, as shown in the photo. The position completion width is 0.1[degrees]. What is the required value of Pn522?

- A. Pn522=0.1
- B. Pn522=1
- C. Pn522=10
- D. Pn522=290
- E. Pn522=4660
- F. Pn522=1048576
- G. Pn522=16277216

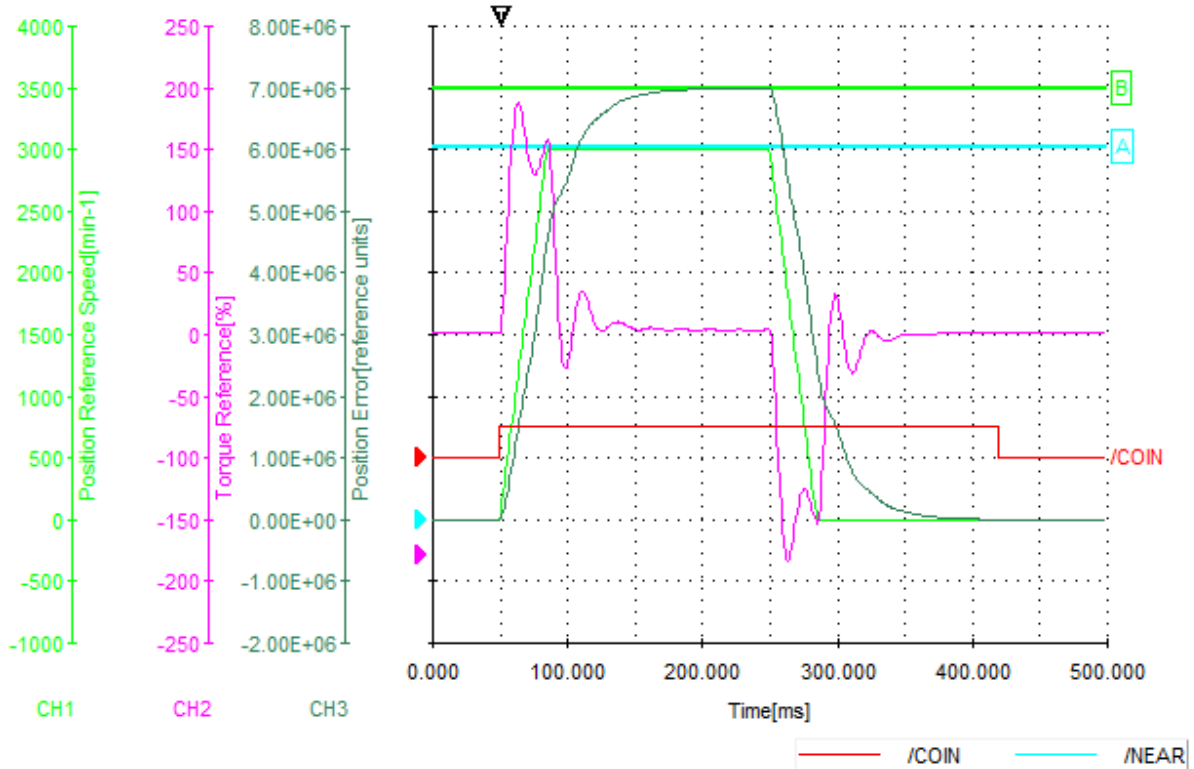


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Refer to the data trace to answer the following questions. The data trace file "X_DataTrace.std" is included in the class materials download.



25. Which measurement most closely approximates the Position Settling Time?

A. 0 [ms]	D. 150 [ms]	G. 2000 [ms]
B. 10 [ms]	E. 500 [ms]	H. None of the above
C. 100 [ms]	F. 800 [ms]	

26. Which measurement most closely approximates the Torque Ripple?

A. 1 [%]	D. 60 [%]	G. None of the above
B. 13 [%]	E. 100 [%]	
C. 30 [%]	F. 200 [%]	

27. Which measurement most closely approximates the maximum Position Error?

A. 50 [reference units]	D. 3500 [reference units]
B. 200 [reference units]	E. 7E+06 [reference units]
C. 500 [reference units]	F. None of the above

28. What does the measurement between cursor A and B represent?

A. Position Error	D. Settling Time
B. Speed Error	E. None of the above
C. Torque Ripple	

Tuning-less

29. For which reason might the Tuning-less level (rigidity level) be decreased?
- A. To reduce settling time
 - B. To reduce position error
 - C. To reduce vibration
30. Which feed-forward parameter is effective in reducing position error and settling time during Tuning-less operation, assuming other tuning parameters are at default settings?
- A. Pn109
 - B. Pn141
 - C. Pn147
31. TestAnswer.**Tless1** appears when the X_Axis Tuning-less level and feed forward have been optimized as shown in the video.
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet

Autotuning

32. Which Autotuning “Mode Selection” will result in the lowest position settling time?
- A. 1: Standard
 - B. 2: For Positioning
 - C. 3: For positioning especially to prevent overshooting
33. TestAnswer.**Autotune1** appears when the X_Axis moment of inertia has been measured and set
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet
34. TestAnswer.**Autotune2** appears when the X_Axis Autotuning has been completed
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet
35. TestAnswer.**Autotune3** appears when the Y_Axis Autotuning has been completed
- Write the answer (from WebUI → Status → PLC Variables) on the answer sheet

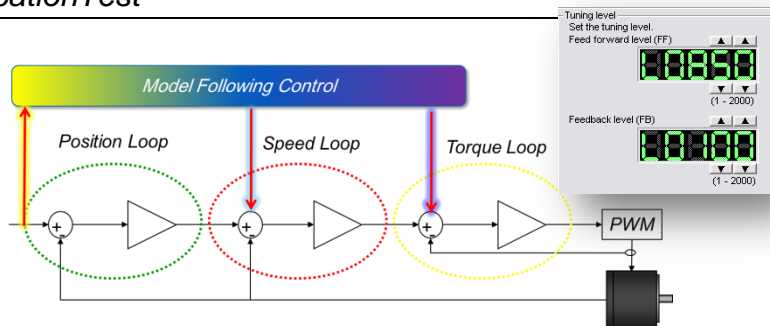
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Custom Tuning

36. The “Feedback level (FB)” adjustment affects which part of the control system?
- A. Position loop and speed loop gain
 - B. Model Following control gain

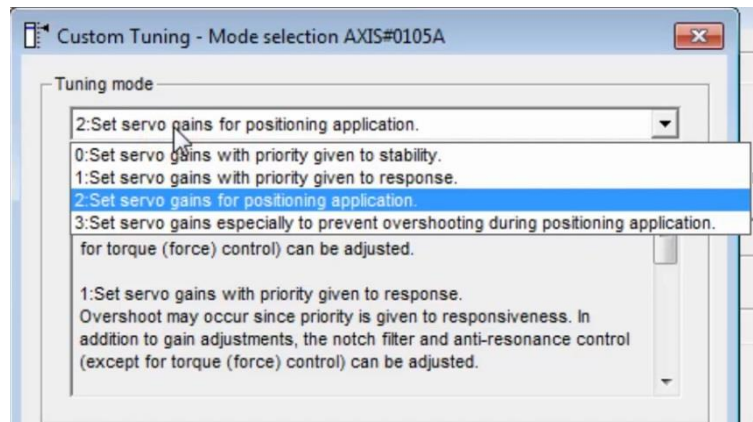


37. TestAnswer.**Custom1** appears when the **X_Axis** position completion width is properly set for 0.01 [degrees] and the **X_Axis** custom tuning has been completed as shown in the video
- Write the answer (from WebUI→Status→PLC Variables) on the answer sheet
38. TestAnswer.**Custom2** appears when the **X_Axis** and **Y_axis** are synchronized to run with the same position error, as shown in the video
- Write the answer (from WebUI→Status→PLC Variables) on the answer sheet

Tuning for Low Position Error

39. What is the recommended setting of feed forward (Pn109) when tuning for lowest position error?
- A. Pn109=0
 - B. Pn109=25
 - C. Pn109=50
 - D. Pn109=75
 - E. Pn109=100

40. Which custom tuning “Mode Selection” is required for when tuning for lowest position error?
- A. 0: “...stability”
 - B. 1: “...response”
 - C. 2: “...positioning ...”
 - D. 3: “...overshooting...”



41. TestAnswer.**LowPE1** appears when the **Z_Axis** has been autotuned for low position error
- Write the answer (from WebUI→Status→PLC Variables) on the answer sheet
42. TestAnswer.**LowPE2** appears when the **Z_Axis** runs the worst-case test move with low position error
- Write the answer (from WebUI→Status→PLC Variables) on the answer sheet