Model 940 PositionServo

Flexible, simple, economical

Lenze
AC Tech

AC Tech | Our promise

Commitment to Price Leadership

Price leadership is serious business. It takes continuous life cycle management to make price leadership a sustainable strategy. We are always investigating techniques to improve efficiency and take advantage of the latest microprocessor and power module technology. When we achieve efficiency gains or material cost reductions, we pass those savings on to our customers. This simple philosophy has permitted us to build and maintain a very loyal base of customers.

Commitment to Quality

Design quality is meticulously managed throughout our product's life cycle. Our design engineers are continuously monitoring new technology trends that increase product performance and component reliability. We never stop thinking about process improvements through automation. In fact, we have invested millions in automating our new state-of-the-art manufacturing facility. When you open any product box you will immediately see and feel the attention to detail that goes into it.

Commitment to Innovation

We pride ourselves on delivering products to the market that are designed to meet specific customer needs. Our portfolio of innovative products is broad and covers very simple variable speed applications up through complex motion control. Each product is positioned so our customers pay only for the level of technology necessary for their application.

Commitment to Simplicity

One of the cornerstones of our design philosophy is to make our products simple to use. Technology only benefits the user if it can be easily understood and applied. Each product is designed to dramatically simplify installation, commissioning and operation for our customers.

Commitment to Performance

Each Lenze/AC Tech product is in a class by itself when it comes to performance. We are not satisfied with average performance. Our products do not reach the marketplace unless they outperform our competitors and exceed our strict performance requirements. By using the most innovative components, we are able to provide that performance for a great value.

Our Promise

At AC Tech it is not good enough to deliver part of a promise. Our products deliver the entire package; Price Leadership, Quality, Innovation, Simplicity and Performance.

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PositionServo with programming capability, & even more features

Model 940 PositionServo
Servo drive/controller

The Model 940 PositionServo is the one drive that has it all. From basic torque control to full programmability, you choose your level of control.

As a distributed drive/controller solution, avoid all of the costly cables and connections and put the power of the motion controller in the same package as the drive.

The Model 940 can perform along with the most high-level motion controllers, but with a simple-to-use interface and clean Ethernet connection.

If a centralized control scheme is preferred; the model 940 will out perform any torque or velocity amplifier. It is also packed with more features; all this for a better price!

Model 940 Motion Control Features
- 64-bit indexing (incremental, absolute, registration, or segmented)
- Linear or S-Curve accel and decel
- “Real-time” Oscilloscope
- Removable memory

Model 940 Drive Features
- Torque, velocity and step-and-direction control
- Electronic gearing
- UL, cUL, CE(LVD & EMC)
- Two-year warranty

Model 940 Inputs/Outputs
- 12 Programmable digital inputs
- 5 Programmable digital outputs
- 2 Programmable analog inputs
- 1 Programmable analog output

Model 940 Communication Features
- Free MotionView software for configuration and programming
- RS-232 standard interface
- Optional Ethernet, CANopen, RS-485 Modbus RTU

Model 940 Power Features
Standard Drives
- 80 – 528 VAC input
- 2 – 12 Amps continuous rms current
- 6 – 36 Amps peak current (300%)

Doubler Drives
- When operating at 120VAC, Doubler Drives can run 240VAC motors at full speed.

Model 940 Compatible Motors
- MAS and MCS Series
- Third party AC permanent magnet synchronous and induction servo motors
- Encoder feedback or resolver (w/option module)

Powerful Innovation

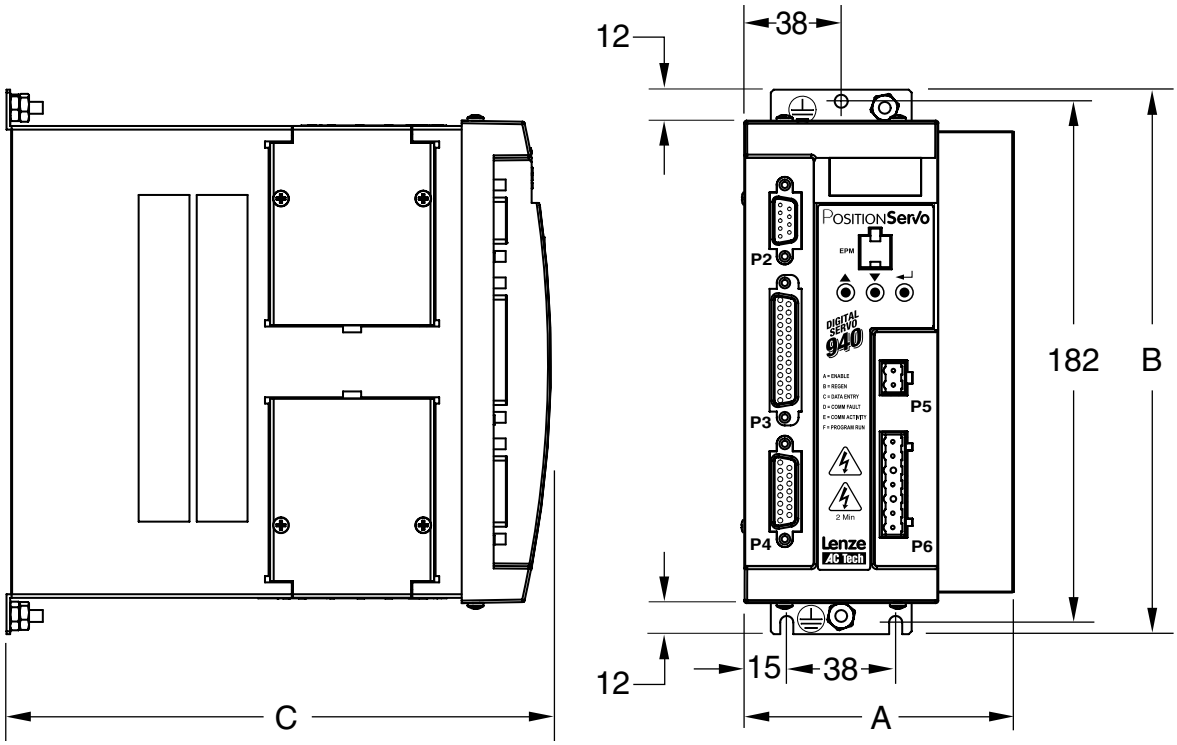
When do I use the Model 940 PositionServo?

- For torque, velocity and step & direction control.
  - When you are sending your drive a +/- 10V or Step & Direction signal.
- If you have a ratio following application.
  - When your axis is following an encoder signal.
- For high performing distributed control.
  - When you want a motion controller and drive in one compact package.
- If you want ONE product that can do it all!
  - The Model 940 can operate as a basic torque drive or a stand-alone fully programmable drive/controller.

Model 940 | Specifications

	E94P020	E94P040	E94P050	E94P060	E94P080	E94P100	E94P120
Drive Input							
120/240 VAC Unit w/out Filter	**E94P020Y2N** 80 – 264 VAC, 1Ø or 3Ø 50/60Hz	**E94P040Y2N** 80 – 264 VAC, 1Ø or 3Ø 50/60Hz			**E94P080Y2N** 80 – 264 VAC, 1Ø or 3Ø 50/60Hz	**E94P100Y2N** 80 – 264 VAC, 1Ø or 3Ø 50/60Hz	**E94P120Y2N** 80 – 264 VAC, 1Ø or 3Ø 50/60Hz
120/240 VAC Unit with Filter	**E94P020S2F** 80 – 264 VAC, 1Ø, 50/60Hz	**E94P040S2F** 80 – 264 VAC, 1Ø, 50/60Hz			**E94P080S2F** 80 – 264 VAC, 1Ø, 50/60Hz	**E94P100S2F** 80 – 264 VAC, 1Ø, 50/60Hz	**E94P120S2F** 80 – 264 VAC, 1Ø, 50/60Hz
480 VAC Unit	**E94P020T4N** 320 – 528 VAC, 3Ø, 50/60Hz	**E94P040T4N** 320 – 528 VAC, 3Ø, 50/60Hz	**E94P050T4N** 320 – 528 VAC, 3Ø, 50/60Hz	**E94P060T4N** 320 – 528 VAC, 3Ø, 50/60Hz			
120 VAC Input, 240 VAC Output (Voltage Doubler)	**E94P020S1N** 45 – 264 VAC,	**E94P040S1N** 45 – 264 VAC, 1Ø, 50/60Hz					
24V Keep Alive (optional)	24VDC +/-20%	24VDC +/-20%	24VDC +/-20%	24VDC +/-20%	24VDC +/-20%	24VDC +/-20%	24VDC +/-20%
Drive Ouput							
Continuous Current (rms)	2 Amps	4 Amps	5 Amps	6 Amps	8 Amps	10 Amps	12 Amps
Continuous Power @ 240VAC	400 Watts	800 Watts	NA	N/A	1.6 kW	2 kW	2.4 kW
Peak Current (rms) Overload*	6 Amps	12 Amps	15 Amps	18 Amps	24 Amps	30 Amps	36 Amps
*Peak Current (rms) Capability	Adjustable up to 300% X continuous current (rms) rating @ 8 kHz for 2 sec Adjustable up to 250% X continuous current (rms) rating @ 16 kHz for 2 sec						
Performance Servo Output	Accuracy: +/- 1 Encoder Count Commutation: Sinusoidal						
Torque Operation Mode	Reference: +/- 10VDC, 16-bit; scalable Torque Range: 100:1 Update rate: 32 µs						
Velocity Operation Mode	Reference: +/- 10VDC, scalable Regulation: +/- 1RPM Update rate: 255 µs Speed Range: 5000:1 with 4096 ppr encoder						
Step/Direction (Electronic Gearing)	Reference: 0 to 2 MHz, PWM input, scalable Minimum Pulse Width: 500 nanoseconds Update rate: 255 µs						
Inputs/Outputs							
12 Digital Inputs	5-24VDC, optically isolated						
1 Dedicated Digital Input	5-24VDC, optically isolated						
4 Digital Outputs	5-24VDC @ 100mA, optically isolated open collector						
1 Dedicated Digital Output	5-24VDC @ 100mA, optically isolated open collector						
2 Analog Inputs	1 @ +/- 10V differential, 16-bit and 1 @ +/- 10V single-ended, 10-bit						
1 Analog Output	+/- 10V single-ended, 10-bit						
Encoder Input	Up to 2MHz (1 encoder input standard, 1 additional optional)						
Optional Resolver Input	12 – bit resolution						
Communications Standard Optional	RS232 @ 38.4 KBPS Point to Point Protocol (PPP), Ethernet TCP/IP, RS485 @ 38.4 KBPS (addressable to 32 devices) PPP or Modbus RTU Slave CANopen 250/500/1000 KBPS						
Standards	UL, cUL, CE(LVD & EMC)						

Model 940 | Dimensions & Environment Ratings



Dimensions				
Type	**A** (mm)	**B** (mm)	**C** (mm)	**Weight** (kg)
E94P020S1N	67	190	190	1.1
E94P040S1N	69	190	190	1.2
E94P020S2F	67	190	235	1.3
E94P040S2F	69	190	235	1.5
E94P080S2F	88	190	235	1.9
E94P100S2F	103	190	235	2.2
E94P020Y2N	67	190	190	1.3
E94P040Y2N	69	190	190	1.5
E94P080Y2N	95	190	190	1.9
E94P100Y2N	115	190	190	2.2
E94P120Y2N	67	190	235	1.5
E94P020T4N	69	190	190	1.5
E94P040T4N	95	190	190	1.9
E94P050T4N	115	190	190	2.2
E94P060T4N	67	190	235	1.4

Environment Ratings	
Vibration	2 g (10 - 2000 Hz)
Ambient Operating Temperature Range	0 to 40ºC
Ambient Storage Temperature Range	-10 to 70ºC
Temperature Drift	0.1% per ºC rise
Humidity	5 - 90% non-condensing
Altitude	1500 m/5000 ft [derate by 1% per 300m (1000 ft) above 1500m (5000 ft)]

Model 940 | Command Sets

Below is a list of the 940 command sets.
Each command often has a sub-set of commands for program flexibilty.

KEYWORD	Long Name
ASSIGN	Assign Input As Index Bit
DEFINE	Define name
DISABLE	Turns servo OFF
DO/UNTIL	Do/Until
ENABLE	Enables servo
END	END program
EVENT	Starts Event handler
ENDEVENT	END of Event handler
EVENT ON/OFF	Turn events on or off
EVENTS ON/OFF	Globally Enables/disables events
FAULT	User generated fault
GOTO	Go To
GOSUB	Go To subroutine
HALT	Halt the program execution
JUMP	Jump to label from Event handler
ICONTROL ON/OFF	Enables interface control
IF	If/Then/Else
MOVE	Move
MOVED	Move Distance
MOVEP	Move to Position
MOVEDR	Registered Distance Move
MOVEPR	Registered Position Move
MDV	Segment Move
MOTION SUSPEND	Suspend
MOTION RESUME	Resume Motion
ON FAULT/ENDFAULT	Resume Fault Handler
REGISTRATION ON	Registration On
RESUME	Resume Code Execution
RETURN	Return from subroutine
SEND/SEND TO	Send network variable(s) value
STOP MOTION [Quick]	Stop Motion
VELOCITY ON/OFF	Velocity Mode
WAIT	Wait
WHILE/ENDWHILE	While

Command Set Examples

(MDV)
Example 1

```
{Statements…}

MDV 5, 10       ;Move 5 user units and accelerate to a velocity of 10
MDV 10,10       ;Move 10 user units and maintain a velocity of 10
MDV 10,5        ;Move 10 user units and decelerate to velocity of 5
MDV 5,0         ;Move 5 user units and decelerate to velocity 0.
                (last MDV has to have 0 final velocity)
{Statements…}
```

(Do/Until)
Example 2

```
DO MOVED V1     ;Keeplooping through the Do Move statements
Until_IN_B4     ;Until the input is made
```

(Wait)
Example 3

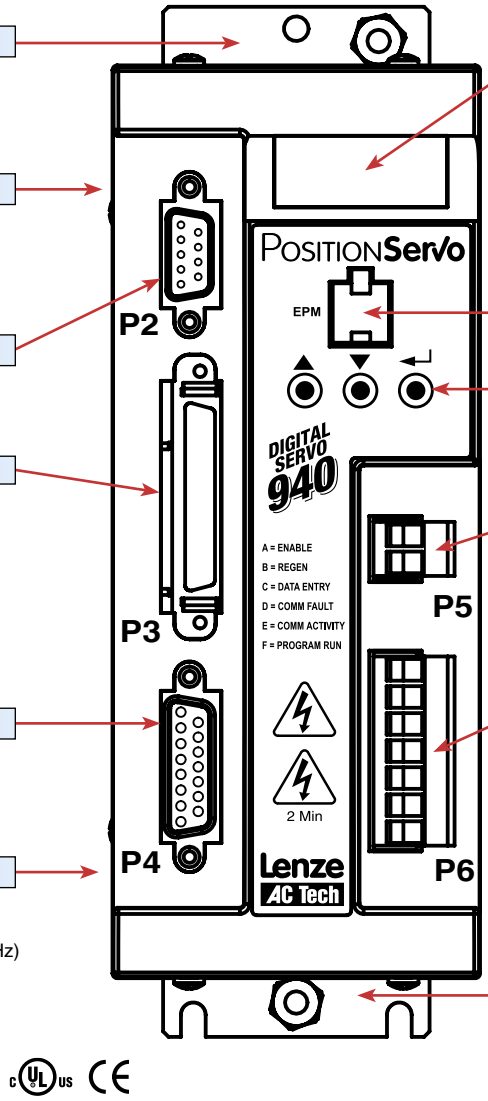
```
WAIT UNTIL (APOS>2 && APOS>3)  ;Wait until Apos is > 2 and <3 APOS>1
WAIT WHILE (APOS<2 && APOS>1)  ;Wait while Apos is <2 and >1
WAIT TIME 1000                 ;Wait 1 Sec (1 Sec=1000mS)
MDV 20, 20                     ;Start MDV moves
MDV 20,0                       ;Start MDV moves
WAIT MOTION COMPLETE           ;Waits until motion is done
```

Command Flexibility

Every resource on the drive is accessible via a variable or flag.
For Example:

- I/O
- Current
- Position
- PID Gain Sets

Model 940 | Connections



Input Power (nominal)

- 1~ 120 VAC with Voltage Doubler Models
- 1~ 200/240 VAC
- 3~ 200/240 VAC
- 3~ 400/480 VAC

Option Bay 1

Communications Options

- RS485
- CANopen
- Ethernet

RS232 Programming Port

Windows Configuration/Programming Software ships with each controller.

Controller I/O

Model 940

- 12 Digital Inputs
- 5 Digital Outputs
- Encoder Output
- 2 Analog Inputs
- 1 Analog Output

Encoder Feedback

Quadrature Incremental Encoder (2 MHz)

Option Bay 2

Feedback Options

- Resolver Feedback (12 to 14-bit)
- Second Incremental Encoder Feedback (2 MHz)

LED Display

Bright 4 Digit Indication of:

- Controller Status
- Diagnostics

Status LEDs for:

- Enable
- Regenerating
- Data Entry
- Communication Activity
- Communication Fault
- Program Running

EPM - Electronic Programming Module

Control Pushbuttons

Pushbuttons permit viewing of servocontroller conditions, diagnostics and faults.

24VDC - External Power Input

Keeps control circuits active during loss of mains

Braking & DC Bus

- Internal regen circuitry requires only external resistor.
- ± Bus for DC input or load sharing

Motor Output

- U, V, W 3~ for Synchronous AC Brushless Servomotors
- PTC Thermister input

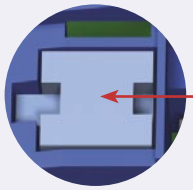
EPM • Electronic Programming Module

The EPM stores the drive's memory (programs and parameters).

The EPM saves time and money. It's as easy as 1, 2, 3…

1. Create your program and parameters in your first drive.
2. Use the EPM Programmer to make multiple copies of the EPM.
3. Insert the copied EPMs into your non-programmed drives, and they are instantly programmed.

   Imagine programming 20 drives in less than one minute.



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