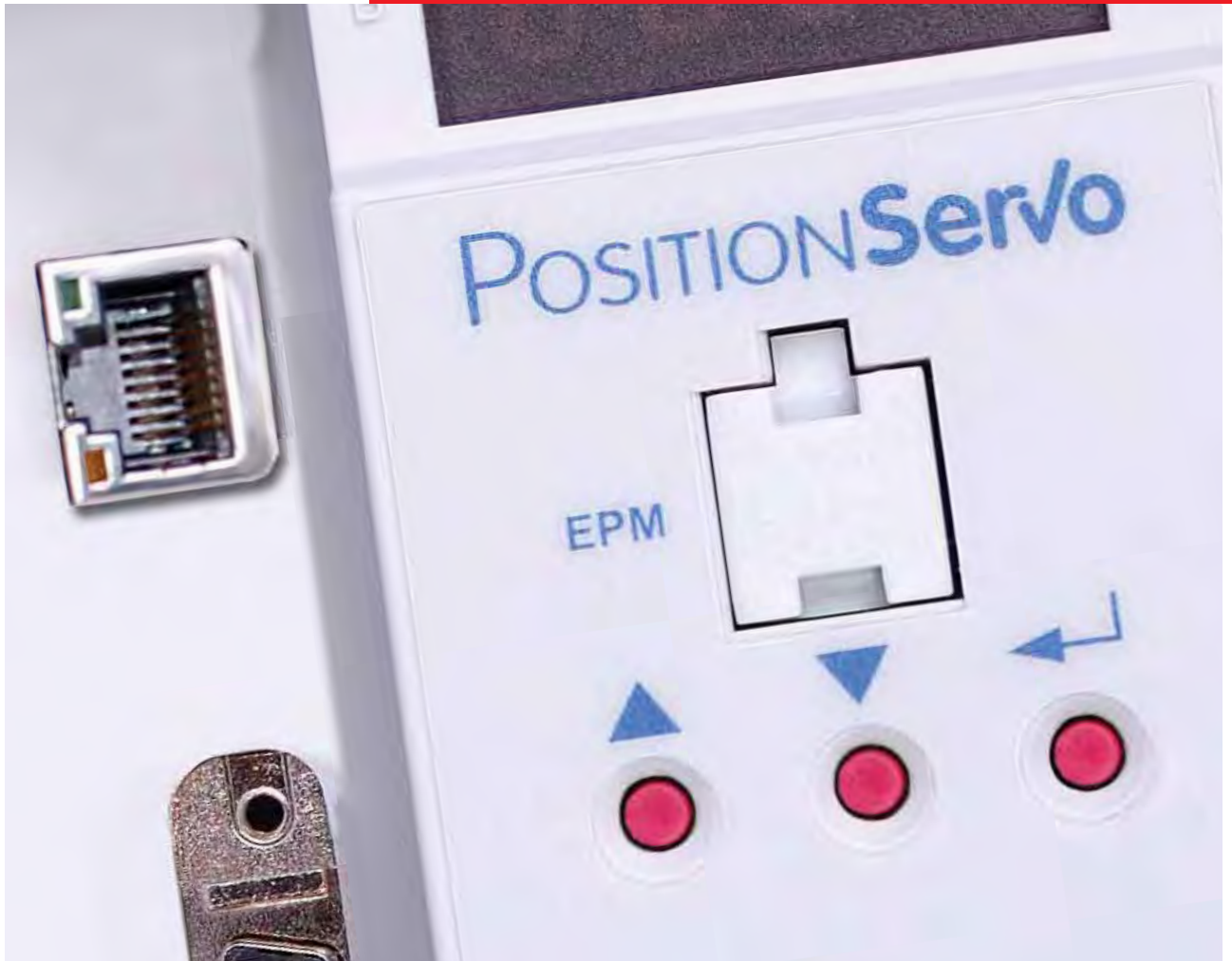


# PositionServo - Digital Servo Drive and Controller

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 customer base.

## 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 broad portfolio of innovative products covers very simple variable speed applications through complex motion control. Each product is positioned so that our customers pay only for the level of technology necessary for their particular 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.



## *PositionServo with programming capability, & even more features*

### PositionServo Servo drive/controller

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

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

**Model 940: Encoder-based PositionServo (E94P)**  
**Model 941: Resolver-based PositionServo (E94R)**

#### **Drive Features**

- Torque, velocity and step-and-direction control
- Electronic gearing
- Removable memory
- UL, cUL, CE(LVD & EMC)
- EN954-1 safety standard (optional)
- Two-year warranty

#### **Inputs/Outputs**

- 12/5 Programmable digital inputs/outputs
- 2/1 Programmable analog inputs/output

#### **Communication Features**

- Free MotionView software for configuration and programming
- TCP/IP Ethernet with RJ-45 connector
- CANopen and RS-485 Modbus RTU (optional)

#### **Programmability/Control**

- Up to 65k of memory
- 64-bit indexing (incremental, absolute, registration or segmented)
- "Real-time" Oscilloscope
- Linear or S-curve accel & decel
- Free DLL library
- Multiple free program examples

#### **Power Features**

##### **Standard Drives**

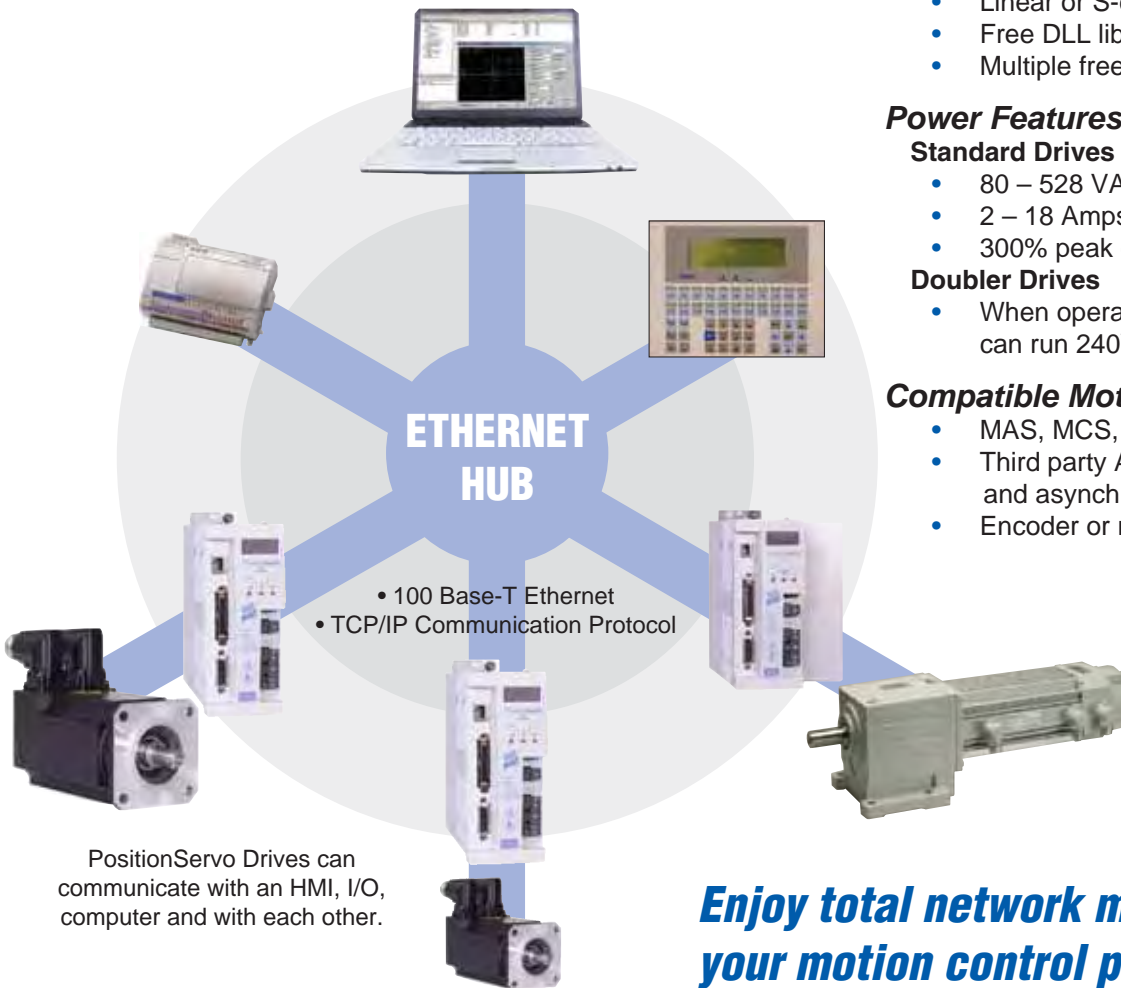
- 80 – 528 VAC input
- 2 – 18 Amps continuous rms current
- 300% peak current

##### **Doubler Drives**

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

#### **Compatible Motors**

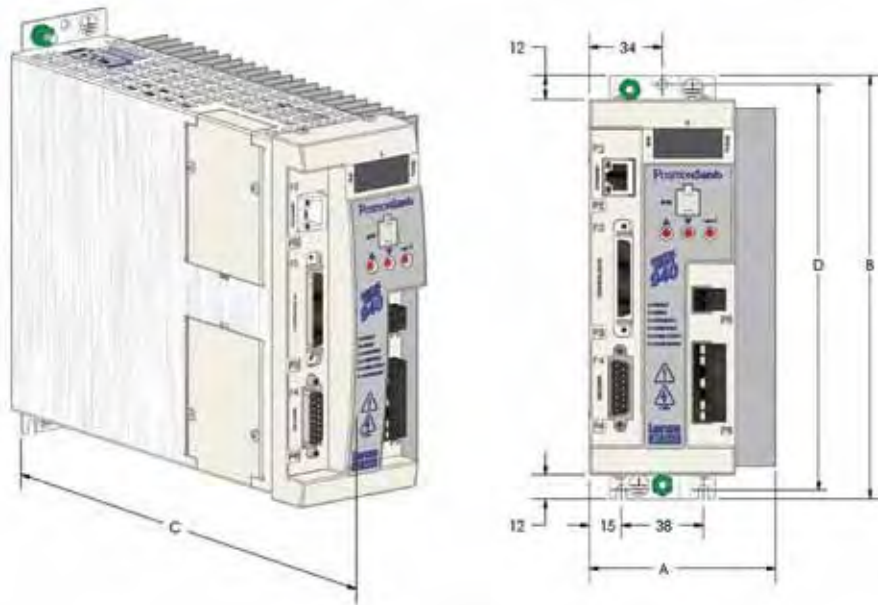
- MAS, MCS, MUS and MCA Series
- Third party AC permanent magnet synchronous and asynchronous induction motors
- Encoder or resolver feedback



# PositionServo | Specifications

Continuous Current (rms)	2A	4A	6A	8A	9A	10A	12A	18A
<b>Drive Input Voltage</b> 80-264 VAC, 1Ø or 3Ø w/out EMC Filter*	E94_020Y2N	E94_040Y2N		E94_080Y2N			E94_120Y2N	E94_180T2N (3Ø only)
80-264 VAC, 1Ø w/integrated EMC Filter	E94_020S2F	E94_040S2F		E94_080S2F		E94_100S2F		
320-528 VAC, 3Ø w/out EMC Filter*	E94_020T4N	E94_040T4N	E94_060T4N		E94_090T4N			
45-264 VAC Input, 1Ø 240 VAC Output w/out EMC Filter*	E94_020S1N	E94_040S1N						
Input Frequency	48 - 62 Hz							
24V Keep Alive	24VDC +/-20%							
<b>*External Filter Options</b>	Footprint E94ZF04T4A1	Footprint E94ZF07T4A1	Sidemount E94ZF12T4A1	Footprint E94ZF15T4A1	Sidemount E94ZF12T4A	Footprint E94ZF15T4A2	Sidemount (1Ø) E94ZF24S2A1	
<b>Drive Output</b>								
Continuous Power @ 240VAC	800 Watts	1.7 kW	5.0 kW @ 480 VAC	3.3 kW	7.5 kW @ 480 VAC	4.2 kW	5.0 kW	7.5 kW
Peak Current (rms) Overload**	6 Amps	12 Amps	18 Amps	24 Amps	27 Amps	30 Amps	36 Amps	54 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							
<b>Performance</b>	Encoder-based Drive Accuracy: +/- 1 Encoder Count Resolver-based Drive Accuracy: +/- 1.32 Arc-Minutes (14-bit resolution) Commutation: Sinusoidal							
Servo Output								
<b>Torque Operation Mode</b>	Reference: +/- 10VDC, 16-bit; scalable Torque Range: 100:1 Update rate: 32 µs							
<b>Velocity Operation Mode</b>	Reference: +/- 10VDC, scalable Regulation: +/- 1RPM Update rate: 255 µs Speed Range: 5000:1 with 4096 ppr encoder							
<b>Position Operation Mode</b> (Step/Direction and Electronic Gearing)	Reference: 0 to 2 MHz, PWM input, scalable Minimum Pulse Width: 500 nanoseconds Update rate: 255 µs							
<b>Inputs/Outputs</b> 12 Digital Inputs 1 Dedicated Digital Input 4 Digital Outputs 1 Dedicated Digital Output 2 Analog Inputs 1 Analog Output Encoder Input Optional Resolver Input	5-24VDC, optically isolated 5-24VDC, optically isolated 5-24VDC @ 100mA, optically isolated open collector 5-24VDC @ 100mA, optically isolated open collector +/- 10V differential, 16-bit +/- 10V single-ended, 10-bit Up to 2MHz (1 encoder input standard, 1 additional optional) 12 – bit resolution							
<b>Communications</b> Standard Optional	RJ-45 Standard Ethernet Interface TCP/IP, RS485 @ 38.4 kBPS (addressable to 32 devices) PPP or Modbus RTU Slave, CANopen 250/500/1000 kBPS							
<b>Standards</b>	UL, cUL, CE(LVD & EMC) EN954-1 Safety Standard (Optional)							

# PositionServo | Dimensions & Environment Ratings



Dimensions					
Type	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)
E94_020S1N_X	67	190	190	182	1.1
E94_040S1N_X	69	190	190	182	1.2
E94_020S2F_X	67	190	235	182	1.3
E94_040S2F_X	69	190	235	182	1.5
E94_080S2F_X	88	190	235	182	1.9
E94_100S2F_X	103	190	235	182	2.2
E94_020Y2N_X	67	190	190	182	1.3
E94_040Y2N_X	69	190	190	182	1.5
E94_080Y2N_X	95	190	190	182	1.9
E94_120Y2N_X	67	190	235	182	1.5
E94_180T2N_X	67	242	235	233	2.0
E94_020T4N_X	69	190	190	182	1.5
E94_040T4N_X	95	190	190	182	1.9
E94_060T4N_X	67	190	235	182	1.4
E94_090T4N_X	67	242	235	233	2.0

### PART NUMBER KEY

**P** = Model 940 Encoder-based drive      **X** = Standard drive  
**R** = Model 941 Resolver-based drive      **S** = EN954-1 safety compliant

**E94P020Y2NEX**

**E** = Incremental encoder (must have E94P drive)  
**R** = Standard resolver (must have E94R drive)

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

## Command Set

Below is a list of the PositionServo command set. Each command often has a sub-set of commands for program flexibility.

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

## Pick and Place Program Example

```

;***** HEADER *****
;Title: Pick and Place example program
;Author: Product Manager
;Description: This is a simple program that picks up a part,
; moves it to a set position and drops it

;***** I/O List *****
; Input A1 - not used
; Input A2 - not used
; Input A3 - Enabled
; Input A4 - not used
; Input B1 - not used
; Input B2 - not used
; Input B3 - not used
; Input B4 - not used
; Input C1 - not used
; Input C2 - not used
; Input C3 - not used
; Input C4 - not used
; Output 1 - Pick Arm
; Output 2 - Gripper
; Output 3 - not used
; Output 4 - not used

;***** Initialize and Set Variables *****
UNITS = 1
ACCEL = 75
DECEL = 75
MAXV = 10
APOS = 0
;***** Events *****
;Set Events handling here

;***** Main Program *****
RESET_DRIVE:
WAIT UNTIL IN_A3 ;Wait until the Enable switch is made before continuing
ENABLE ;Enable the Drive
PROGRAM_START:
MOVEP 0 ;Move to Pick position
OUT1 = 1 ;Turn on output 1 on to extend Pick arm
WAIT TIME 1000 ;Delay 1 sec to extend arm
OUT2 = 1 ;Turn on output 2 to Engage gripper
WAIT TIME 1000 ;Delay 1 sec to Pick part
OUT1 = 0 ;Turn off output 1 to Retract Pick arm
MOVEP 100 ;Move to Place position
OUT1 = 1 ;Turn on output 1 on to extend Pick arm
WAIT TIME 1000 ;Delay 1 sec to extend arm
OUT2 = 0 ;Turn off output 1 to Disengage gripper
WAIT TIME 1000 ;Delay 1 sec to Place part
OUT1 = 0 ;Retract Pick arm
GOTO PROGRAM_START
END

;***** Sub-Routines *****
; Enter Sub-Routine code here

;***** Fault Handler Routine *****
; Enter Fault Handler code here
ON FAULT
ENDFAULT
    
```

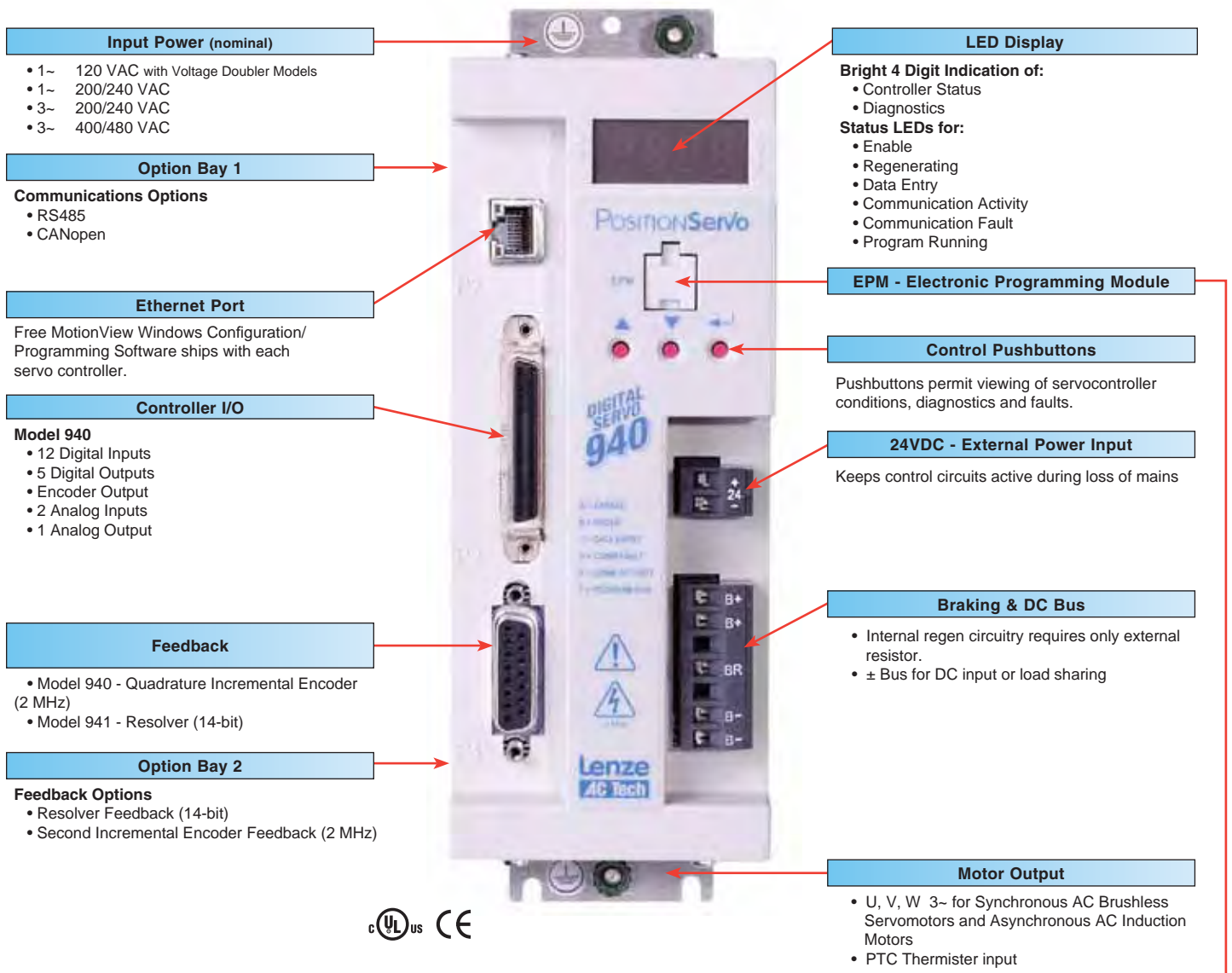
### Command Flexibility

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

For Example:

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

# PositionServo | Connections



## 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.

