



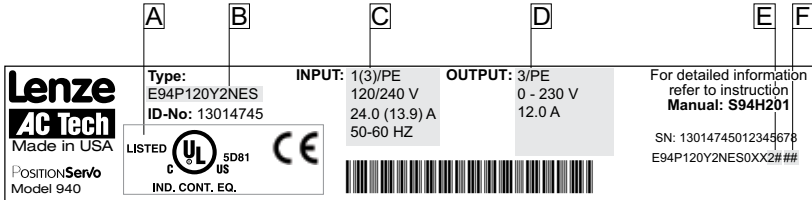
MotionView®
On Board

PositionServo with MVOB Mounting Instructions

About These Instructions

These mounting instructions pertain to the PositionServo drive with Hardware Version 2. Read both this document and the PositionServo User Manual (S94H201) in their entirety before operating or servicing a PositionServo drive. Observe all safety instructions.

Drive Identification Label



A	B	C	D	E	F
Certifications	Model Number	Input Ratings	Output Ratings	Hardware Version	Software Version

Package Contents

Scope of Supply	Important
1 Model PositionServo: Type E94P or E94R 1 Mounting Instructions (English) 1 MotionView CD ROM including: - configuration software - documentation	After reception of the delivery, immediately check whether the scope of supply matches the accompanying papers. Lenze-AC Tech does not accept any liability for deficiencies claimed subsequently. Claim: - visible transport damage immediately to the forwarder - visible deficiencies/incompleteness immediately to your Lenze representative.

Related Documents

The documentation listed herein contains information relevant to the operation of the PositionServo and MotionView OnBoard. To obtain the latest documentation, visit the Download/Technical Documentaion section of <http://www.lenze.com>.

Table 1: Reference Documentation

Document #	Description
S94H201	PositionServo (with MVOB) HW V2 User Manual
PM94H201	PositionServo (with MVOB) Programming Manual
P94MOD01	Position Servo ModBus RTU over RS485 ; Modbus TCP/IP
P94CAN01	PositionServo CANopen Communications Reference Guide
P94DVN01	PositionServo DeviceNet Communications Reference Guide
P94ETH01	PositionServo EtherNet/IP Communications Reference Guide
P94PFB01	PositionServo PROFIBUS Communications Reference Guide

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STOP!

BEFORE using the PositionServo drive, read the User Manual, S94H201 in its entirety.

The PositionServo User Manual, S94H201, can be found on the CD that came with this drive and in the Download/Technical documentation section of www.lenze.com.



Introduction

1 Introduction

1.1 Safety Information



DANGER!

Hazard of electrical shock! Circuit potentials are up to 480 VAC above earth ground. Avoid direct contact with the printed circuit board or with circuit elements to prevent the risk of serious injury or fatality. Disconnect incoming power and wait 60 seconds before servicing drive. Capacitors retain charge after power is removed.



STOP!

DO NOT connect incoming power to the output motor terminals (U, V, W)! Severe damage to the PositionServo will result. Check phase wiring (U, V, W) and thermal input (T1, T2) before powering up drive. If miswired, severe damage to the PositionServo will result.



STOP!

Use only 10 V (peak to peak) or less resolvers (P4). Use of higher voltage resolvers may result in feedback failure and damage to the drive.



WARNING!

Hazard of unintended operation! When the enable input remains asserted, the "Keep Alive" circuit (P5) will restart the motor upon restoration of mains power. If this action is not desired, then remove the enable input prior to re-application of input power.

1.2 Legal Regulations

Claim	Description		
Identification	Nameplate	CE Identification	Manufacturer
	Lenze controllers are unambiguously designated by the contents of the nameplate	In compliance with the EC Low-Voltage Directive	Lenze AC Tech Corporation 630 Douglas Street Uxbridge, MA 01569 USA
Application as directed	E94P or E94R servo controller • must only be operated under the conditions prescribed in these Instructions. • are components for: – Closed loop control of Velocity, Torque or Positioning applications with AC synchronous motors. – installation in a machine. – assembly with other components to form a machine. • are electric units for installation in control cabinets or similarly enclosed housing. • comply with the requirements of the Low-Voltage Directive. • are not machines for the purpose of the Machinery Directive. • are not to be used as domestic appliances, but only for industrial purposes. Drive systems with E94P or E94R servo inverters comply with the EMC Directive if they are installed according to the guidelines of CE-typical drive systems. can be used for: – operation on public and non-public mains – operation in industrial premises and residential areas. The user is responsible for the compliance of his application with the EC directives. Any other use shall be deemed as inappropriate!		
Liability	• The information, data, and notes in these instructions met the latest design and implementation of the drive at the time of publication. Claims on modifications referring to controllers that have already been supplied cannot be derived from the information, illustrations, and descriptions. • The specifications, processes and circuitry described in these instructions are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals. • The specifications in these Instructions describe the product features without guaranteeing them. • Lenze does not accept any liability for damage and operating interference caused by: – Disregarding the operating instructions – Unauthorized modifications to the controller – Operating errors – Improper working on and with the controller		
Warranty	Warranty conditions: refer to Lenze AC Tech Terms and Conditions of Sale, document TD03.		
Disposal	Material	Recycle	Dispose
	Metal	•	-
	Plastic	•	-
	Assembled PCB's	-	•



1.3 Part Number Designation

Table 3: Drive Type Number

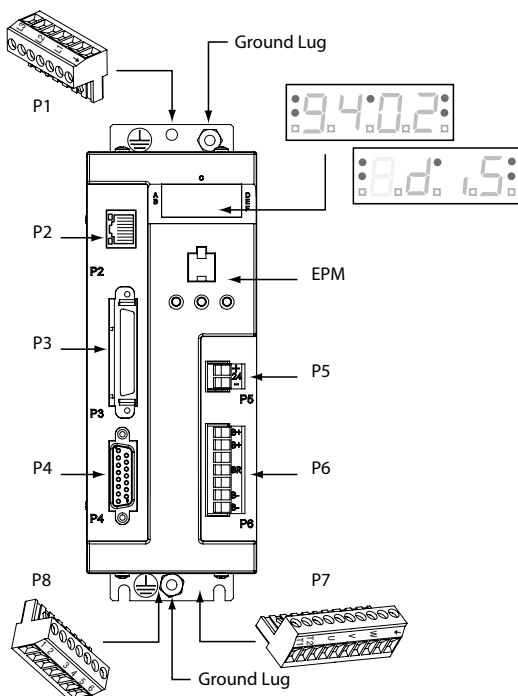
	E94	P	020	S	1	N	E	M
Electrical Products in the 94x Series								
P = PositionServo Model 940 with Encoder Feedback								
R = PositionServo Model 941 with Resolver Feedback								
Drive Rating in Amps:								
020 = 2 Amps 090 = 9 Amps								
040 = 4 Amps 100 = 10 Amps								
060 = 6 Amps 120 = 12 Amps								
080 = 8 Amps 180 = 18 Amps								
Input Phase:								
S = Single Phase Input only								
Y = Single or Three Phase Input								
T = Three Phase Input only								
Input Voltage:								
1 = 120 VAC Doubler (120V, 1~ in/ 240V, 3~ out)								
2 = 200/240 VAC								
4 = 400/480 VAC								
Line Filter:								
N = No Line Filter*								
F = Integrated Line Filter								
Secondary Feedback:								
E = Incremental Encoder								
R = Standard Resolver								
Safety Option:								
M = MotionView OnBoard, no ISO 13849-1 safety compliance								
S = MotionView OnBoard, with ISO 13849-1 safety compliance								

* For 3-phase EMC installation, model 940 EMC footprint/side mount filters are required.



Introduction

1.4 Drive Connectors



P1	Mains Power	3-pin or 4-pin removable terminal block
P2	Ethernet Port	RJ45 connector
P3	I/O Connector	50-pin SCSI connector
	- Buffered Encoder Output	A, B & Z channels with compliments (5V @ 20mA)
	- Digital Inputs	11 programmable plus 1 dedicated (5-24V)
	- Digital Outputs	4 programmable plus 1 dedicated (5-24V @ 100mA)
	- Analog Input	2 differential; ± 10 VDC (12-bits each)
	- Analog Output	1 single ended; ± 10 VDC (10-bit)
	- Position Reference Input	Step & Direction or Master Encoder (TTL)
P4	Encoder Feedback (E94P drive)	15-pin D-shell connector
P4	Resolver Feedback (E94R drive)	9-pin D-shell connector
P5	24VDC Power "Keep Alive"	2-pin removable terminal block
P6	Regen and Bus Power	5-pin removable terminal block
P7	Motor Power	6-pin removable terminal block
P8	ISO 13849 Safety Circuit (Option)	6-pin removable terminal block



2 Technical Data

2.1 Electrical Characteristics

Single-Phase Models									
Type ⁽¹⁾	Mains Voltage ⁽²⁾	1~ Mains Current (doubler)	1~ Mains Current (Std.)	Rated Output Current ⁽⁵⁾	Peak Output Current ⁽⁶⁾	Output Power at Rated Output Current (8kHz) ⁽⁸⁾	Leakage Current	Power Loss at Rated Output Current (8kHz) ⁽⁵⁾	Power Loss at Rated Output Current (16 kHz) ⁽⁵⁾
		A	A	A	A	kVA	mA	W	W
E94_020S1N_~	120V ⁽³⁾ or 240V ⁽⁴⁾	9.7	5.0	2.0	6	0.8	>3.5	19	21
E94_040S1N_~		15	8.6	4.0	12	1.7		29	30
E94_020S2F_~	120 / 240V ⁽⁴⁾ (80 V -0%...264 V +0%)	--	5.0	2.0	6	0.8		19	21
E94_040S2F_~		--	8.6	4.0	12	1.7		29	30
E94_080S2F_~		--	15.0	8.0	24	3.3		61	63
E94_100S2F_~		--	18.8	10.0	30	4.2		80	85
Single/Three-Phase Models									
Type ⁽¹⁾	Mains Voltage ⁽²⁾	1~ Mains Current	3~ Mains Current	Rated Output Current ⁽⁵⁾	Peak Output Current ⁽⁶⁾	Output Power at Rated Output Current (8kHz) ⁽⁸⁾	Leakage Current	Power Loss at Rated Output Current (8kHz) ⁽⁵⁾	Power Loss at Rated Output Current (16 kHz) ⁽⁵⁾
		A	A	A	A	kVA	mA	W	W
E94_020Y2N_~	120 / 240V ⁽⁴⁾ 1~ or 3~ (80 V -0%...264 V +0%)	5.0	3.0	2.0	6	0.8	>3.5	19	21
E94_040Y2N_~		8.6	5.0	4.0	12	1.7		29	30
E94_080Y2N_~		15.0	8.7	8.0	24	3.3		61	63
E94_100Y2N_~		18.8	10.9	10.0	30	4.2		80	85
E94_120Y2N_~		24.0	13.9	12.0	36	5.0		114	129
E94_180T2N_~	240V 3~ (180 V -0%...264 V +0%)	--	19.6	18.0	54	7.5		171	195
E94_020T4N_~	400 / 480V 3~ (320 V -0%...528 V +0%)	--	2.7	2.0	6	1.7		31	41
E94_040T4N_~		--	5.5	4.0	12	3.3		50	73
E94_060T4N_~		--	7.9	6.0	18	5.0		93	122
E94_090T4N_~		--	12.0	9.0	27	7.5		138	182

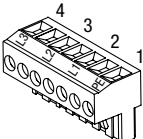
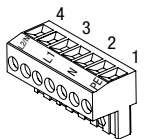
- (1) The first " _ " equals "P" for the 940 encoder based drive or "R" for the 941 resolver based drive.
The second " _ " equals "E" for incremental encoder (E94P drive) or "R" for the standard resolver (E94R drive).
The last digit " _ " equals "M" for MV OnBoard and no ISO 13849-1 circuit or "S" for MV OnBoard plus the ISO 13849-1 circuit.
- (2) Mains voltage for operation on 50/60 Hz AC supplies (48 Hz -0% ... 62Hz +0%).
- (3) Connection of 120VAC (70 V ... 132 V) to input power terminals L1 and N on these models doubles the voltage on motor output terminals U-V-W for use with 230VAC motors.
- (4) Connection of 120VAC or 240VAC to input power terminals L1 and L2 on these models delivers an equal voltage as maximum to motor output terminals U-V-W allowing operation with either 120VAC or 230VAC motors.
- (5) Drive rated at 8kHz Carrier Frequency. Derate Continuous current by 17% at 16kHz.
- (6) Peak RMS current allowed for up to 2 seconds. Peak current rated at 8kHz. Derate by 17% at 16kHz.
- (7) Derate rated output current and peak output current by 2.5% for every °C above 40°C up to 55°C maximum.
- (8) At 240 VAC line input for drives with suffixes "S1N", "S2F", "Y2N". At 480 VAC line input for drives with suffixes "T4N".
- The output power is calculated from the formula: output kVA = $[(\sqrt{3}) \times U_L \times I_{Lmax}] / 1000$
 - The actual output power (kW) depends on the motor in use due to variations in motor rated voltage, rated speed and power factor, as well as actual max operating speed and desired overload capacity.
 - Typical max continuous power (kW) for PM servo motors run 50-70% of the kVA ratings listed.



Technical Data

2.2 Connections and I/O

2.2.1 P1 - Input Power (Mains) Connection

Standard Models				Doubler Models			
Pin	Name	Function		Name	Function		
1	PE	Protective Earth (Ground)		PE	Protective Earth (Ground)		
2	L1	AC Power in		N	AC Power Neutral (120V Doubler only)		
3	L2	AC Power in		L1	AC Power in		
4	L3	AC Power in (3~ models only)		L2/N	AC Power in (non-doubler operation)		

Type	Fuse			PE			L1, L2, L3		
	EN 60204		UL	UL			UL		
									
	[A] 1~/3~	[A] 1~/3~	[A] 1~/3~	[mm²] [AWG]	[mm] [in]	[Nm] [lb-in]	[mm²] [AWG] 1~/3~	[mm] [in]	[Nm] [lb-in]
E94_020S1N_~	M20/M10	C20/C10	20/10	2.5 14	6 0.25	0.5 4.5	2.5/2.5 14/14	6 0.25	0.5 4.5
E94_040S1N_~	M32/M20	C32/C20	30/20	4 12			4/2.5 12/14		
E94_020S2F_~	M20	C20	20	2.5 14	6 0.25	0.5 4.5	2.5 14	6 0.25	0.5 4.5
E94_040S2F_~	M20	C20	20	4 12			4 12		
E94_080S2F_~	M32	C32	32	6 10			6 10		
E94_100S2F_~	M40	C40	40	10					
E94_020Y2N_~	M20/M16	C20/C16	20/15	2.5 14	6 0.25	0.5 4.5	2.5/2.5 14/14	6 0.25	0.5 4.5
E94_040Y2N_~	M20/M16	C20/C16	20/15	4 12			4/2.5 12/14		
E94_080Y2N_~	M32/M20	C32/C20	30/20	6 10			6/2.5 10/14		
E94_100Y2N_~	M32/M20	C32/C20	30/20	6 10			6/4 10/12		
E94_120Y2N_~	M50/M32	C50/C32	50/30	6 10					
E94_180T2N_~	M40	C40	40	6 10			6 10		
E94_020T4N_~	M10	C10	10	2.5 14	6 0.25	0.5 4.5	2.5 14	6 0.25	0.5 4.5
E94_040T4N_~	M10	C10	10						
E94_060T4N_~	M20	C20	20						
E94_090T4N_~	M25	C25	25						

- Installations with high fault current due to large supply mains may require a type D circuit breaker.
- UL Class CC or T fast-acting current-limiting type fuses, 200,000 AIC, preferred. Bussman KTK-R, JNN, JJS or equivalent.
- Thermal-magnetic type breakers preferred.



WARNING!

The PositionServo drive runs on phase-to-phase voltage. For the standard drive, either a delta or wye transformer may be used for 3-phase input. However, for reinforced insulation of user accessible I/O circuits, each phase voltage to ground must be less than or equal to 300VAC rms. This means that the power system must use center grounded wye secondary configuration for 400/480VAC mains.



STOP!

For the E94_020S1N_~ and E94_040S1N_~ doubler models, do NOT apply 240VAC to the N and L1 terminals. Severe damage to the drive will result.



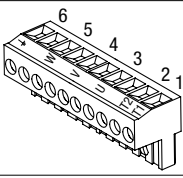
2.2.2 P7 - Output Power Connection



STOP!

DO NOT connect incoming power to the output motor terminals (U, V, W)! Severe damage to the PositionServo will result. Check phase wiring (U, V, W) and thermal input (T1, T2) before powering up drive. If miswired, severe damage to the PositionServo will result.

Pin	Terminal	Function
1	T1	Thermistor (PTC) Input
2	T2	Thermistor (PTC) Input
3	U	Motor Power Out
4	V	Motor Power Out
5	W	Motor Power Out
6	⊥ PE	Protective Earth (Chassis Ground)



Type	T1, T2			U, V, W			PE		
	[mm ²] [AWG]	[mm] [in]	[Nm] [lb-in]	[mm ²] [AWG]	[mm] [in]	[Nm] [lb-in]	[mm ²] [AWG]	[mm] [in]	[Nm] [lb-in]
E94_020S1N_~	0.8 18	6	0.5 4.5	1.5 16	6	0.5 4.5	1.5 16	6	0.5 4.5
E94_040S1N_~	0.8 18	0.25	0.5 4.5	1.5 16	0.25	0.5 4.5	1.5 16	0.25	0.5 4.5
E94_020S2F_~	0.8 18	6 0.25	0.5 4.5	1.5 16	6 0.25	0.5 4.5	1.5 16	6 0.25	0.5 4.5
E94_040S2F_~	0.8 18			1.5 16			1.5 16		
E94_080S2F_~	0.8 18			2.5 14			2.5 14		
E94_100S2F_~	0.8 18			2.5 14			2.5 14		
E94_020Y2N_~	0.8 18	6 0.25	0.5 4.5	1.5 16	6 0.25	0.5 4.5	1.5 16	6 0.25	0.5 4.5
E94_040Y2N_~	0.8 18			1.5 16			1.5 16		
E94_080Y2N_~	0.8 18			2.5 14			2.5 14		
E94_120Y2N_~	0.8 18			2.5 14			2.5 14		
E94_180T2N_~	0.8 18	6 0.25	0.56-0.79 5.0-7.0	6.0 10	6 0.25	0.56-0.79 5.0-7.0	6.0 10	6 0.25	0.56-0.79 5.0-7.0
E94_020T4N_~	0.8 18			1.5 16			1.5 16		
E94_040T4N_~	0.8 18			1.5 16			1.5 16		
E94_060T4N_~	0.8 18			2.5 14			2.5 14		
E94_090T4N_~	0.8 18			2.5 14			2.5 14		



NOTE: Terminals T1 and T2 are used for motors with a thermistor only.

The PositionServo does not provide motor over-temperature protection. The user may connect a KTY motor thermal sensor to the drive as detailed in section 4.1.1 and 4.5.2 of manual S94H201 if necessary to satisfy NEC requirements.



NOTE

Encoder cables manufactured by Lenze AC Tech use 18 AWG wire for the T1 and T2 connectors. Customer-manufactured cables may use a different AWG wire for the T1 and T2 connectors.

2.2.3 P2 - Ethernet Communications Port

Pin	Name	Function
1	+ TX	Transmit Port (+) Data Terminal
2	- TX	Transmit Port (-) Data Terminal
3	+ RX	Receive Port (+) Data Terminal
4	N.C.	
5	N.C.	
6	- RX	Receive Port (-) Data Terminal
7	N.C.	
8	N.C.	

P2

ETHERNET

P2





Technical Data

2.2.4 P3 - Controller I/O

Pin	Name	Function		Pin	Name	Function
1	MA+	Master Encoder A+ / Step+ input		26	IN_A_COM	Digital input group A COM terminal
2	MA-	Master Encoder A- / Step- input		27	IN_A1	Digital input A1
3	MB+	Master Encoder B+ / Direction+ input		28	IN_A2	Digital input A2
4	MB-	Master Encoder B- / Direction- input		29	IN_A3	Digital input A3
5	GND	Drive Logic Common		30	IN_A4	Digital input A4
6	5+	+5V output (max 100mA)		31	IN_B_COM	Digital input group B COM terminal
7	BA+	Buffered Encoder Output: Channel A+		32	IN_B1	Digital input B1
8	BA-	Buffered Encoder Output: Channel A-		33	IN_B2	Digital input B2
9	BB+	Buffered Encoder Output: Channel B+		34	IN_B3	Digital input B3
10	BB-	Buffered Encoder Output: Channel B-		35	IN_B4	Digital input B4
11	BZ+	Buffered Encoder Output: Channel Z+		36	IN_C_COM	Digital input group C COM terminal
12	BZ-	Buffered Encoder Output: Channel Z-		37	IN_C1	Digital input C1
13		no connection		38	IN_C2	Digital input C2
14		no connection		39	IN_C3	Digital input C3
15		no connection		40	IN_C4	Digital input C4
16		no connection		41	RDY+	Ready output Collector
17		no connection		42	RDY-	Ready output Emitter
18		no connection		43	OUT1-C	Programmable output #1 Collector
19		no connection		44	OUT1-E	Programmable output #1 Emitter
20	AIN2+	Positive (+) of Analog signal input		45	OUT2-C	Programmable output #2 Collector
21	AIN2-	Negative (-) of Analog signal input		46	OUT2-E	Programmable output #2 Emitter
22	ACOM	Analog common		47	OUT3-C	Programmable output #3 Collector
23	AO	Analog output (max 10 mA)		48	OUT3-E	Programmable output #3 Emitter
24	AIN1+	Positive (+) of Analog signal input		49	OUT4-C	Programmable output #4 Collector
25	AIN1-	Negative (-) of Analog signal input		50	OUT4-E	Programmable output #4 Emitter

Digital Input A3

For the drive to function, an ENABLE input must be wired to the drive, and should be connected to IN_A3, (P3.29), which is, by the default the ENABLE input on the drive. This triggering mechanism can either be a switch or an input from an external PLC or motion controller. The input can be wired either sinking or sourcing. The Enable circuit will accept 5-24V control voltage.

Digital and Analog I/O Ratings

I/O	Scan Times	Linearity	Temperature Drift	Offset	Current	Input Impedance	Voltage Range
Units	µs	%	%	%	mA	Ohm	VDC
Digital Inputs ⁽¹⁾	512				Depend on load	2.4 k	5-24
Digital Outputs	512				100 max	N/A	30 max
Analog Inputs	512	± 0.013	0.1% per °C rise	± 0 adjustable	Depend on load	47 k	± 10
Analog Outputs	512		0.1% per °C rise	± 0 adjustable	10 max	N/A	± 10

- (1) Inputs do not have scan time. Their values are read directly by indexer program statement.
De-bounce time is programmable and can be set as low as 0. Propagation delay is typically 20 us



2.2.5 P4 - Motor Feedback

Type	Pin	Name	Function
E94P	1	EA+	Encoder Channel A+ Input
	2	EA-	Encoder Channel A- Input
	3	EB+	Encoder Channel B+ Input
	4	EB-	Encoder Channel B- Input
	5	EZ+	Encoder Channel Z+ Input
	6	EZ-	Encoder Channel Z- Input
	7	GND	Drive Logic Common/Encoder Ground
	8	SHLD	Shield
	9	PWR	Encoder supply (+5VDC)
	10	HA-	Hall Sensor A- Input
	11	HA+	Hall Sensor A+ Input
	12	HB+	Hall Sensor B+ Input
	13	HC+	Hall Sensor C+ Input
	14	HB-	Hall Sensor B- Input
	15	HC-	Hall Sensor C- Input

P4

ENCODER

Pin	Name	Function
1	Ref +	Resolver reference connection
2	Ref -	
3	N/C	No Connection
4	Cos+	Resolver Cosine connections
5	Cos-	
6	Sin+	Resolver Sine connections
7	Sin-	
8	PTC+	Motor PTC Temperature Sensor
9	PTC-	

P4

RESOLVER

2.2.6 P5 - 24 VDC Back-up Power Input

Pin	Name	Function				
			[mm ²] [AWG]	[mm] [in]	[Nm] [lb-in]	
1	+24 VDC	Positive 24 VDC Input (500mA)	1.5 16	6 0.25	0.5 4.5	
2	Return	24V power supply return				



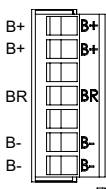
WARNING!

Hazard of unintended operation! When the enable input remains asserted, the “Keep Alive” circuit will restart the motor upon restoration of mains power. If this action is not desired, then remove the enable input prior to re-application of input power.



Technical Data

2.2.7 P6 - Braking Resistor and DC Bus

Pin	Terminal	Function							
			[mm ²] [AWG]	[mm] [in]	[Nm] [lb-in]				
1	B+	Positive DC Bus / Brake Resistor	2.5* 14	6* 0.25	0.5* 4.5	B+			
2	B+					B+			
3	BR	Brake Resistor				BR			
4	B-	Negative DC Bus				B-			
5	B-					B-			
* For E94_120Y2N_~ and E94_180T2N_~ models use:			4 12	6 0.25	0.5 4.5				

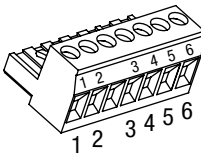
2.2.8 P8 - ISO 13849 Safety Circuit (Option)



STOP!

BEFORE using P8, read the COMPLETE DETAILED INSTRUCTIONS for the ISO 13849-1 Safety Circuit in Section 4.1.8 of manual S94H201 (PositionServo Users Manual on the accompanying CD and www.lenzeamericas.com).

If installed, the ISO 13849-1 Safety Circuit connector, P8, is located on the bottom of the PositionServo. P8, a 6-pin quick-connect terminal block. This option provides additional inputs to disable the drive output so that the drive cannot cause torque to be generated in the motor. This safety function known as "Safe Torque Off" meets the requirements of the following standard: ISO 13849-1 Safety of Machinery, Safety-related Parts of Control Systems, Category (Cat.) 3, Performance Level (PL) d and Safety Integrity Level (SIL) 2, per EN 61800-5-2 2007.

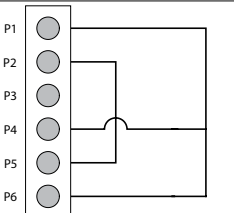
Pin	Name	Function				
			[mm ²] [AWG]	[mm] [in]	[Nm] [lb-in]	
1	Bypass Voltage	ISO 13849-1 Bypass Voltage (+24VDC)	1.5 16	6 0.25	0.5 4.5	
2	Bypass COM	ISO 13849-1 Bypass Common				
3	Safety Status	ISO 13849-1 Safety Status				
4	Safety Input1	ISO 13849-1 Safety Input 1 (+24VDC to Enable)				
5	Safety COM	ISO 13849-1 Safety Common				
6	Safety Input2	ISO 13849-1 Safety Input 2 (+24VDC to Enable)				



WARNING!

The drive is supplied from the factory with the ISO 13849-1 safety circuit enabled. The drive is not operational until +24V is present at terminals 4 and 6. For the proper safety connections, refer to the "Connection of Two Safety Circuits with External +24V Supply" diagram. Under certain applications when safety connections are not required the drive may be operated with the safety circuit disabled. The diagram below illustrates how to bypass the safety circuit.

Wiring Diagram to Bypass ISO 13849-1 Safety Circuit

Pin	Name	Function	
1	Bypass Voltage	ISO 13849-1 Bypass Voltage (+24VDC) ^{*1}	
2	Bypass COM	ISO 13849-1 Bypass Common ^{*1}	
3	Safety Status	ISO 13849-1 Safety Status	
4	Safety Input1	ISO 13849-1 Safety Input 1 (+24VDC to Enable) ^{*2}	
5	Safety COM	ISO 13849-1 Safety Common ^{*2}	
6	Safety Input2	ISO 13849-1 Safety Input 2 (+24VDC to Enable) ^{*2}	

^{*1} – This voltage must under no circumstances be used to supply the ISO 13849-1 Safety circuits (terminals 3 to 6). This voltage is intended only for use in bypassing (disabling) the ISO 13849-1 circuits should they not be required.

^{*2} – A Separate +24VDC supply providing reinforced isolation (SELV or PELV), must be supplied to operate these inputs. This supply should not be floating but should be referenced within 20V peak of PE at the drive.



WARNING!

It is required that all information contained within this ISO 13849-1 standard be observed when implementing any part of this safety circuit functionality with the PositionServo drive.



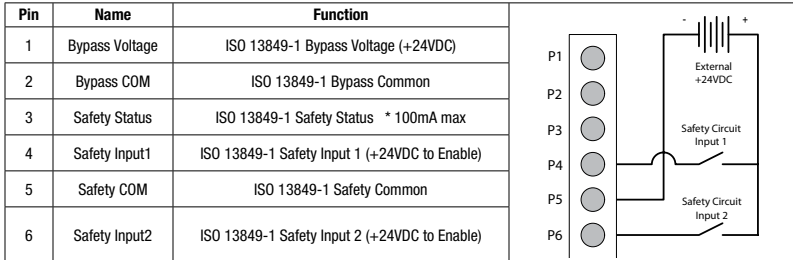
STOP!

This is only partial information on the ISO 13849-1 Safety Circuit. BEFORE using P8, read the COMPLETE DETAILED INSTRUCTIONS for the ISO 13849-1 Safety Circuit in Section 4.1.8 of manual S94H201 (PositionServo Users Manual on the accompanying CD and www.lenzeamericas.com).

Due to ISO 13849-1 regulations, a separate +24VDC external dedicated safety power supply must be provided to the drive Safety circuits. The bypass +24V supply is intended for bypass purposes only and must not be used as the control voltage to these circuits.

Installation and Connection

Connection of Two Safety Circuits with External +24V Supply



Evaluation and Testing of the ISO 13849-1 Safety Circuit

As part of the regulations for ISO 13849-1 safety circuit provision must be made for the user to periodically test the safety circuits and that testing should be capable of identifying a single fault. The PositionServo drive uses the safety status output (Pin 3) in conjunction with the display of the drive to allow the testing of the safety circuits.

The safety status output becomes active to indicate partial or full enable of the safety input circuits 1 and 2. If safety input 1 or safety input 2 or both inputs are on then the safety status output will become active. The safety status output must be connected to some visible indication for the operator to reference during test of the circuit.

As well as being used to test the correct operation of the safety circuits the safety status output can be used as an indicator that the drive has been placed in the fully shut down condition (all safety circuits off). For example, if both Safety Inputs have been Deactivated, the Safety Status is also Deactivated. If one of the Safety Inputs signals failed to call for a shutdown, or if one of the Safety Circuits failed to shut down, the Safety Status signal remains Asserted to alert the operator to the problem.

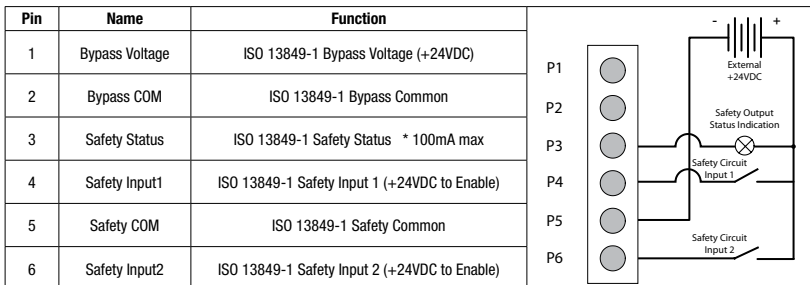
The procedure for testing the ISO 13849-1 safety circuit and the identification of a single fault on the system is given below. The safety status output should be connected to a visible indicator (such as a lamp or LED) so the operator can interpret its condition.



NOTE

Customer must size load so as not to pull more than 100mA.

Safety Output Status Indication





3 Installation

**DANGER!**

Hazard of electrical shock! Circuit potentials are up to 480 VAC above earth ground. Avoid direct contact with the printed circuit board or with circuit elements to prevent the risk of serious injury or fatality. Disconnect incoming power and wait 60 seconds before servicing drive. Capacitors retain charge after power is removed.

**STOP!**

- The PositionServo must be mounted vertically for safe operation and to ensure enough cooling air circulation.
- Printed circuit board components are sensitive to electrostatic fields. Avoid contact with the printed circuit board directly. Hold the PositionServo by its case only.
- Protect the drive from dirt, filings, airborne particles, moisture, and accidental contact. Provide sufficient room for access to the terminal block.
- Mount the drive away from any and all heat sources. Operate within the specified ambient operating temperature range. Additional cooling with an external fan may be required in certain applications.
- Avoid excessive vibration to prevent intermittent connections
- DO NOT connect incoming (mains) power to the output motor terminals (U, V, W)! Severe damage to the drive will result.
- Do not disconnect any of the motor leads from the PositionServo drive unless (mains) power is removed. Opening any one motor lead may cause failure.
- Control Terminals provide basic isolation (insulation per EN 61800-5-1). Protection against contact can only be ensured by additional measures, e.g., supplemental insulation.
- Do not cycle mains power more than once every 2 minutes. Otherwise damage to the drive may result.

**WARNING!**

For compliance with EN 61800-5-1, the following warning applies.

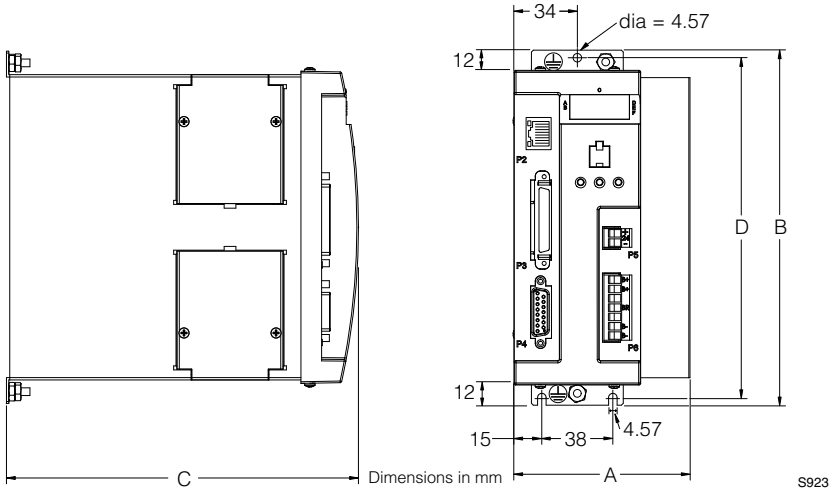
This product can cause a d.c. current in the protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product.

**UL INSTALLATION INFORMATION**

- Suitable for use on a circuit capable of delivering not more than 200,000 rms symmetrical amperes, at the maximum voltage rating marked on the drive.
- Use Class 1 wiring with minimum of 75°C copper wire only.
- Shall be installed in a pollution degree 2 macro-environment.
- The PositionServo does not provide motor over-temperature protection. The user may connect a KTY motor thermal sensor to the drive as detailed in section 4.1.1 and 4.5.2 of manual S94H201 if necessary to satisfy NEC requirements.



3.1 PositionServo Dimensions



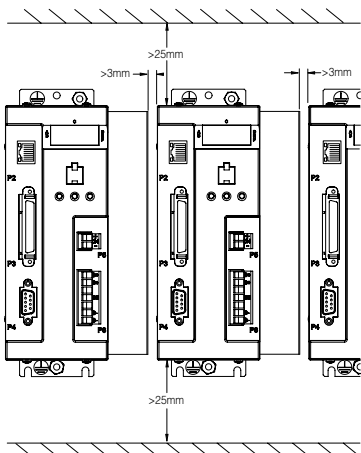
Type ⁽¹⁾	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg)
E94_020S1N_~	68	190	190	182	1.1
E94_040S1N_~	69	190	190	182	1.2
E94_020S2F_~	68	190	235	182	1.3
E94_040S2F_~	69	190	235	182	1.5
E94_080S2F_~	87	190	235	182	1.9
E94_100S2F_~	102	190	235	182	2.2
E94_020Y2N_~	68	190	190	182	1.3
E94_040Y2N_~	69	190	190	182	1.5
E94_080Y2N_~	95	190	190	182	1.9
E94_100Y2N_~	114	190	190	182	2.2
E94_120Y2N_~	68	190	235	182	1.5
E94_180T2N_~	68	242	235	233	2.0
E94_020T4N_~	68	190	190	182	1.5
E94_040T4N_~	95	190	190	182	1.9
E94_060T4N_~	68	190	235	182	1.4
E94_090T4N_~	68	242	235	233	2.0

- (1) The first "_" equals "P" for the Model 940 encoder based drive or "R" for the Model 941 resolver based drive.
 The second "_" equals "E" for incremental encoder (must have E94P drive) or "R" for the standard resolver (must have E94R drive).
 The last digit "~" equals "M" for MV OnBoard and no ISO 13849-1 circuit or "S" for MV OnBoard plus the ISO 13849-1 circuit.



Installation

3.2 Clearance for Cooling Air Circulation



Additional Clearance is required:

- for side mount and rear mount AC line filters
- if there are other accessories installed
- for cables and wires connected to the top, front and bottom of the drive
- when the drive is mounted adjacent to noise sensitive equipment or clean wire ways

3.3 Shielding and Grounding

- Use single-point grounding (SPG) for panel-mounted controls.
- Tie the SPG for all enclosures to earth ground at the same point.
- Individually connect the system ground and equipment grounds for all panel-mounted enclosures to the SPG for that panel using 14 AWG (2.5 mm²) or larger wire.
- Ground the chassis to the mounting. Use 14 AWG (2.5 mm²) or larger wire to join the enclosure to earth ground.
- Install a lock washer between the enclosure and ground terminal. For maximum contact between the terminal and enclosure, remove paint in a minimum radius of 0.25 in (6 mm) around the screw hole of the enclosure.
- Ground the shielded cable at both the drive end and at the motor end.
- If the PositionServo drive continues to pick up noise after grounding the shield, add an AC line filtering device and/or an output filter (between the drive and servo motor).

EMC

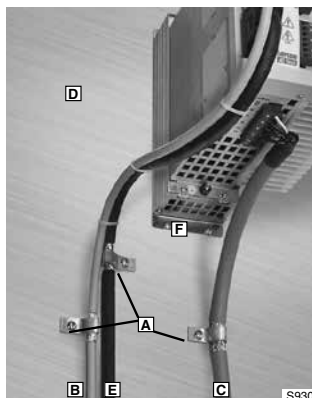
Compliance with EN 61800-3:2004 In a domestic environment this product may cause radio interference. The user may be required to take adequate measures

Noise emission

Drive Models ending in the suffix "2F" are in compliance with class A limits according to EN 55011 if installed in a control cabinet and the motor cable length does not exceed 10m. Models ending in "N" will require an appropriate line filter.

- [A] Screen clamps
- [B] Control cable
- [C] Low-capacitance motor cable
(core/core < 75 pF/m, core/screen < 150 pF/m)
- [D] Earth grounded conductive mounting plate
- [E] Encoder/Resolver Feedback Cable
- [F] Footprint or Sidemount Filter (optional)

Installation according to EMC Requirements





3.4 Electrical Installation

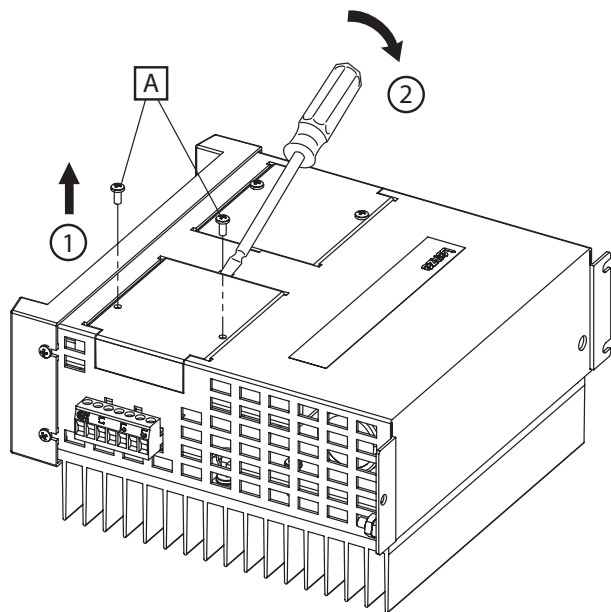
These are quick connect instructions only. Consult PositionServo User Manual S94H201 for full connection details.

Step	Action	Description
1	Connect the Drive's Ethernet port P2 to your PC's Ethernet port.	PC/Laptop Drive
2	Apply power to the drive and wait until "diS" shows on the display.	
3	Confirm that the PC and the drive have the correct IP setting. (S94H201, section 6.2.2).	
4	Launch MotionView software on your computer via a web browser.	
5	From the main toolbar select [Connect]	
6	In the Connect dialog box, click [Discover] to ping the network for any drives. If a drive is located the address will appear in the dialog box. If no address appears then you can type the IP address in. The default address for the drive is 192.168.124.120. Click [Connect] to connect to the drive	
7	Once connected, the drive name and identifier are displayed in the upper left-hand corner of the Parameter Window.	

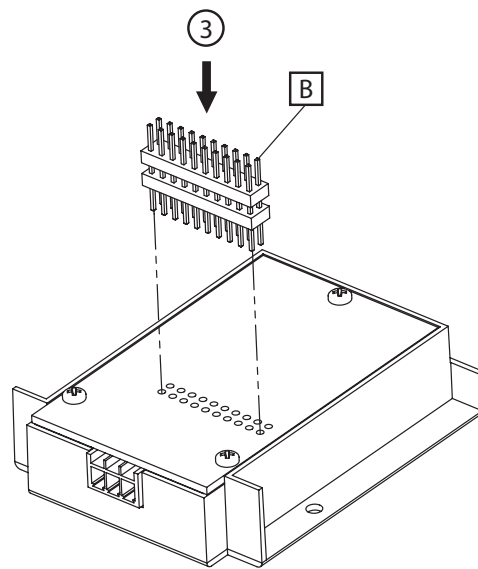
Lenze Americas Corporation • Lenze AC Tech Corporation
630 Douglas Street • Uxbridge, MA 01569 • USA
Sales: (800) 217-9100 • Service (508) 278 9100
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P94MI01D



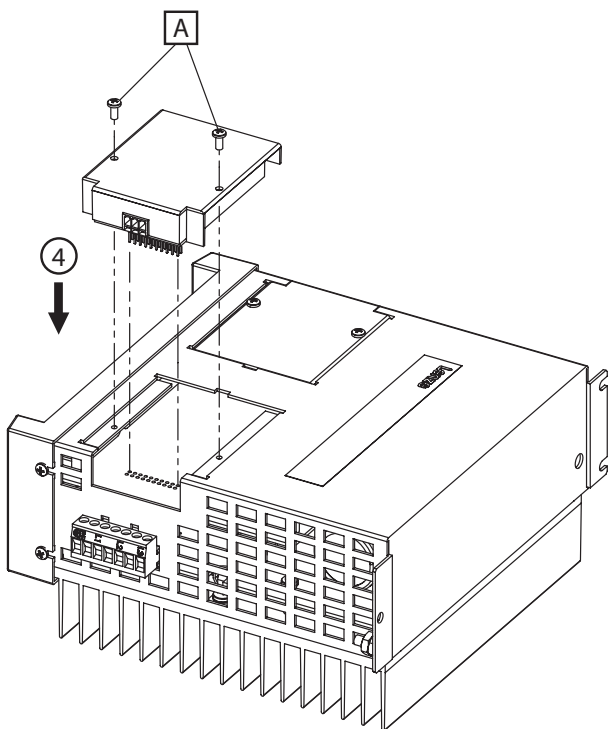
- ENGLISH** 940/941 Option Bay 1 Installation: Communications Options
DEUTSCH 940/941 Wechselschacht 1 installation: Kommunikationsmodule
FRANÇAIS 940/941 Installation du module optionnel 1 : option de communications
ITALIANO 940/941 Installazione moduli opzionali 1: opzioni di comunicazione
ESPAÑOL 940/941 Compartimiento opcional 1 Instalación: Opciones de comunicaciones



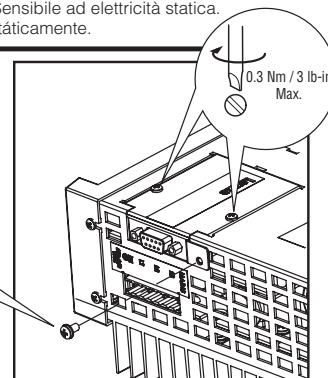
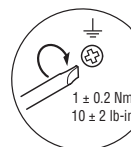
Disconnect power, wait 3 minutes
 Schalten Sie die Stromversorgung ab und warten Sie 3 Minuten
 Débranchez l'alimentation, et attendez 3 minutes
 Togliere l'alimentazione, attendere 3 minuti
 Desconecte el suministro de corriente, espere 3 minutos



Observe handling precautions. Electrostatic sensitive.
 Beobachten Sie die Anweisungen zur Handhabung. Elektrostatisch gefährdete Bauteile.
 Manipulez avec précaution. Éléments électrostatiques sensibles.
 Osservare le precauzioni di manipolazione. Sensibile ad elettricità statica.
 Manipular con precaución. Sensible electrostáticamente.



E94ZAPFB1



E94ZACAN1
 E94ZARS41
 E94ZADVN1
 E94ZAETH1

