

## High-Load Linear Stage

High Performance, Drive Screw



### L-417

- Width 166 mm
- Travel range to 813 mm
- Precision ball screw
- Incremental or absolute linear encoder, various resolutions
- Precision recirculating ball bearings, load capacity to 450 N
- Covering strip on the side for protection against particles

### Powerful linear stage for use in demanding industrial applications

Precision ball screws, high-performance synchronous servo motors, heavy-duty recirculating ball bearings, and precision rotary and linear encoders enable continuous and reliable operation under high load. The optional holding brake allows use as Z axis. The ball screw can be relubricated from the outside without disassembling to ensure high reliability and long lifetimes. It is also possible to integrate into a customer's central lubrication system. The covering strip on the side and the purge air connector prevent contamination by particles.

### Pioneering design

The recirculating ball bearings of the L-417 series are designed for high load capacity and dynamics. The high resolution of the motors allows improved tracking performance, smaller tracking error, and improved settling times.

### Options

- Holding brake (L-417.xxxxxxB)
- Various rotary and linear encoders, absolute and incremental
- Versions with linear encoder with drag chain and connection box (L-417.xxxxxxE1).
- On request: Folded drivetrain with belt drive. This modification reduces the overall length.
- On request: Calibration and certification

### Synchronous servo motor

These motors have high positioning accuracy and high overload capacity over a large rotation speed range. High torque and low inertia ensure the high dynamics of the drives. The long lifetime, high performance, and robustness of these motors allow excellent results in industrial automation applications.

### Application fields

Laser cutting. Electronics production. AOI (Automatic Optical Inspection). Automation. Applications with high demands on dynamics, precision, smooth motion, short settling times, and low tracking errors.

## Specifications

Motion	L-417.05	L-417.09	L-417.13	L-417.17	Unit	Tolerance
Active axes	X	X	X	X		
Travel range	102	204	305	407	mm	
Pitch / yaw	±14	±19	±29	±35	μrad	max. +10%
Straightness / flatness	±2.5	±4	±6	±8	μm	max.
Velocity, unloaded	300	300	300	300	mm/s	max.
Positioning accuracy, uncalibrated	±6	±8	±10	±12	μm	max.

Motion	L-417.21	L-417.25	L-417.33	Unit	Tolerance
Active axes	X	X	X		
Travel range	508	610	813	mm	
Pitch / yaw	±40	±45	±50	μrad	max. +10%
Straightness / flatness	±9	±10	±12	μm	max.
Velocity, unloaded	300	300	300	mm/s	max.
Positioning accuracy, uncalibrated	±14	±16	±18	μm	max.

Encoder options	L-417.xx9232[B] basic option	L-417.xx9054[B]	Unit	Tolerance
Integrated sensor	Incremental rotary encoder	Absolute rotary encoder, multi-turn		
Sensor signal	A/B quadrature, RS-422	EnDat 2.1		
Sensor resolution	20000	8192	Cts./rev.	
Design resolution	0.25	0.6	μm	
Minimum incremental motion	1	2	μm	
Bidirectional repeatability	±1	±3	μm	Max.
Limit switches	Hall effect, N/C contact, 5 V, NPN	–		
Sensor connector	M23	M23		

Encoder options	L-417.xx9211E1[B]	L-417.xx9025E1[B]	Unit	Tolerance
Integrated sensor	Incremental linear encoder For additional rotary encoder, see basic option	Absolute-measuring linear encoder For additional rotary encoder, see basic option		
Sensor signal	Sin/cos, 1 V peak-peak, 20 μm signal period	EnDat 2.2		
Design resolution	–	0.001	μm	
Minimum incremental motion	50	50	Nm	Typ.
Bidirectional repeatability	±0.5	±0.5	μm	Max.
Limit switches	Hall effect, N/C contact, 5 V, NPN	–		
Sensor connector	M15	M15		

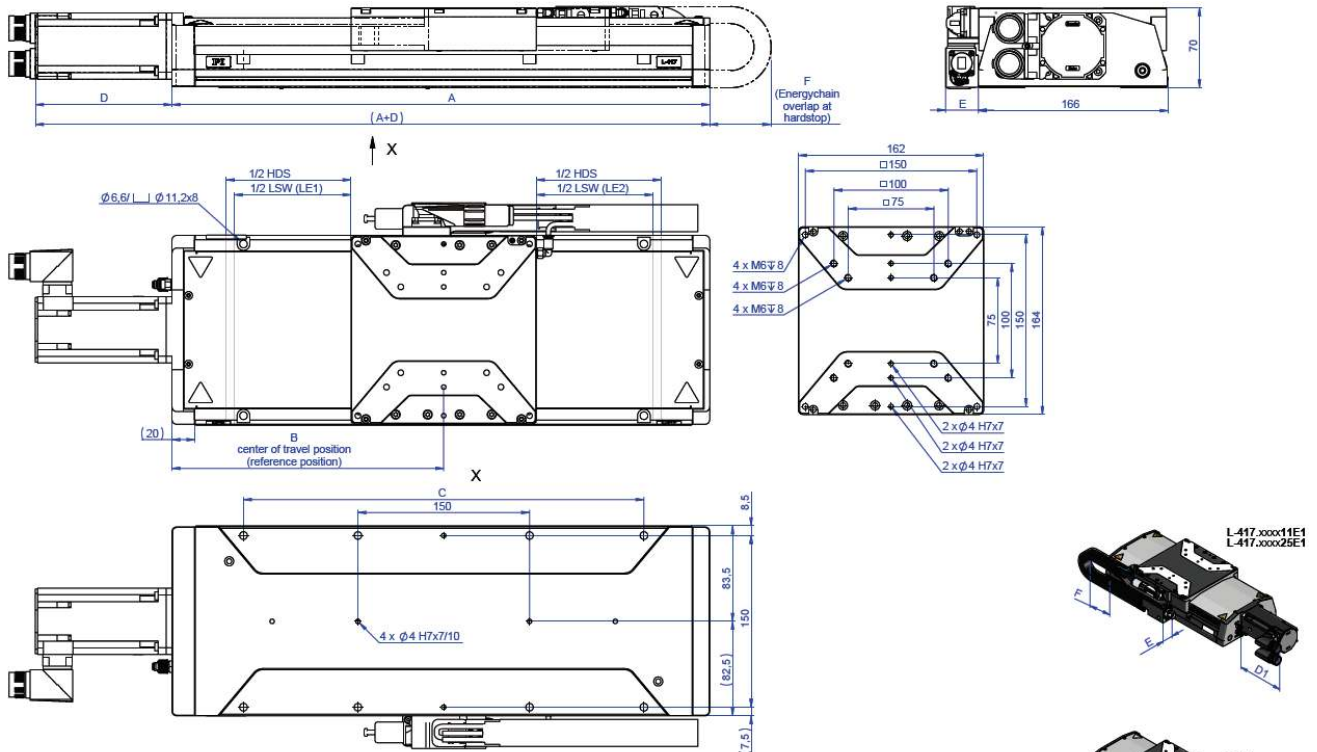
Mechanical properties	L-417.xxxxxx	L-417.xxxxxxB	Unit	Tolerance
Guide type	Recirculating ball bearing	Recirculating ball bearing		
Drive screw type	Ball screw	Ball screw		
Holding brake	–	Electromagnetic safety brake		
Drive screw pitch	5	5	mm	
Push/pull force, power on	700	700	N	max.
Holding force, power off	–	500	N	typ.
Load capacity in Z	450	450	N	max.
Permissible lateral force	250	250	N	max.
Permissible torque in $\theta_x$	40	40	N·m	max.
Permissible torque in $\theta_y$	30	30	N·m	max.
Permissible torque in $\theta_z$	40	40	N·m	max.

Drive properties	L-417.xx9	Unit	Tolerance
Drive type	Synchronous servo motor		
Intermediate circuit voltage, effective	320	V DC	max.
Peak torque	2.76	N·m	typ.
Nominal torque	0.7	N·m	typ.
Peak current, RMS	10.9	A	typ.
Nominal current, RMS	2.73	A	typ.
Torque constant, RMS	0.32	N·m/A	typ.
Resistance phase-phase	5.22	$\Omega$	typ.
Inductance phase-phase	9.7	mH	typ.
Back EMF phase-phase	20.4	V/kRPM	max.
Number of pole pairs	3		

Miscellaneous	L-417	Unit	Tolerance
Material	Aluminum, black anodized stainless steel		
Overall mass	L-417.05 (102 mm travel range): 9.3 L-417.09 (204 mm travel range): 10.8 L-417.13 (305 mm travel range): 12.2 L-417.17 (407 mm travel range): 13.7 L-417.21 (508 mm travel range): 15.1 L-417.25 (610 mm travel range): 16.5 L-417.33 (813 mm travel range): 19.4	kg	±5 %
Moved mass	2.4	kg	±5 %
MTBF	20000	h	
Connector	M23 (motor) M23 (rotary encoder) Optional connection for linear encoder Fitting for purge air hose with outside diameter 4 mm Funnel-type grease nipple for spindle lubrication		
Limit switch connector	M8 8-pin		
Recommended controllers	G-901.R519 ACS modular controller		

Connecting cables are not in the scope of delivery and must be ordered separately.  
Ask about customized versions.

## Drawings / Images



BASIS MODELL	TRAVEL NOMINAL	LIMITSWITCH TO LIMITSWITCH LSW		HARDSTOP TO HARDSTOP HDS	A	B	C	D		
		L-417.xxx211E1x	L-417.xxx025E1x					D1	D2	L-417.xxx11E1x
		L-417.xxx2xx	L-417.xxx0xx					L-417.xxx000E1	L-417.xxx000E1B	L-417.xxx25E1x
L-417.05xxxx	102 (4")	102 - 105	-	109	365	185	150	119,5	153,5	28
L-417.08xxxx	204 (8")	204 - 207	-	214	470	237,5	150, 350	119,5	153,5	28
L-417.13xxxx	305 (12")	305 - 308	-	314	570	287,5	150, 350	119,5	153,5	28
L-417.17xxxx	407 (16")	407 - 410	-	419	675	340	150, 350, 550	119,5	153,5	28
L-417.21xxxx	508 (20")	508 - 511	-	519	775	390	150, 350, 550	119,5	153,5	28
L-417.25xxxx	610 (24")	610 - 613	-	619	875	440	150, 350, 550, 750	119,5	153,5	28
L-417.33xxxx	813 (32")	813 - 816	-	824	1080	542,5	150, 350, 550, 750, 950	119,5	153,5	28

L-417, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.



*L-417 with 813 mm travel range, linear encoder and holding brake.*

## Ordering Information

### **L-417.059025E1**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, synchronous servo motor, to 320 V

### **L-417.059025E1B**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, holding brake, synchronous servo motor, to 320 V

### **L-417.059054**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., synchronous servo motor, to 320 V

### **L-417.059054B**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., holding brake, synchronous servo motor, to 320 V

### **L-417.059211E1**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, synchronous servo motor, to 320 V

### **L-417.059211E1B**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, holding brake, synchronous servo motor, to 320 V

### **L-417.059232**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., synchronous servo motor, to 320 V

#### **L-417.059232B**

High-load linear stage, 102 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., holding brake, synchronous servo motor, to 320 V

#### **L-417.099025E1**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, synchronous servo motor, to 320 V

#### **L-417.099025E1B**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, holding brake, synchronous servo motor, to 320 V

#### **L-417.099054**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., synchronous servo motor, to 320 V

#### **L-417.099054B**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., holding brake, synchronous servo motor, to 320 V

#### **L-417.099211E1**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, synchronous servo motor, to 320 V

#### **L-417.099211E1B**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, holding brake, synchronous servo motor, to 320 V

#### **L-417.099232**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., synchronous servo motor, to 320 V

#### **L-417.099232B**

High-load linear stage, 204 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., holding brake, synchronous servo motor, to 320 V

#### **L-417.139025E1**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, synchronous servo motor, to 320 V

#### **L-417.139025E1B**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, holding brake, synchronous servo motor, to 320 V

#### **L-417.139054**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., synchronous servo motor, to 320 V

#### **L-417.139054B**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., holding brake, synchronous servo motor, to 320 V

#### **L-417.139211E1**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, synchronous servo motor, to 320 V

#### **L-417.139211E1B**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, holding brake, synchronous servo motor, to 320 V

## **L-417.139232**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., synchronous servo motor, to 320 V

## **L-417.139232B**

High-load linear stage, 305 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., holding brake, synchronous servo motor, to 320 V

## **L-417.179025E1**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, synchronous servo motor, to 320 V

## **L-417.179025E1B**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, holding brake, synchronous servo motor, to 320 V

## **L-417.179054**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., synchronous servo motor, to 320 V

## **L-417.179054B**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., holding brake, synchronous servo motor, to 320 V

## **L-417.179211E1**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, synchronous servo motor, to 320 V

## **L-417.179211E1B**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, holding brake, synchronous servo motor, to 320 V

## **L-417.179232**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., synchronous servo motor, to 320 V

## **L-417.179232B**

High-load linear stage, 407 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., holding brake, synchronous servo motor, to 320 V

## **L-417.219025E1**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, synchronous servo motor, to 320 V

## **L-417.219025E1B**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, holding brake, synchronous servo motor, to 320 V

## **L-417.219054**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., synchronous servo motor, to 320 V

## **L-417.219054B**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., holding brake, synchronous servo motor, to 320 V

## **L-417.219211E1**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, synchronous servo motor, to 320 V

#### **L-417.219211E1B**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, holding brake, synchronous servo motor, to 320 V

#### **L-417.219232**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., synchronous servo motor, to 320 V

#### **L-417.219232B**

High-load linear stage, 508 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., holding brake, synchronous servo motor, to 320 V

#### **L-417.259025E1**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, synchronous servo motor, to 320 V

#### **L-417.259025E1B**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, holding brake, synchronous servo motor, to 320 V

#### **L-417.259054**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., synchronous servo motor, to 320 V

#### **L-417.259054B**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., holding brake, synchronous servo motor, to 320 V

#### **L-417.259211E1**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, synchronous servo motor, to 320 V

#### **L-417.259211E1B**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, holding brake, synchronous servo motor, to 320 V

#### **L-417.259232**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., synchronous servo motor, to 320 V

#### **L-417.259232B**

High-load linear stage, 610 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., holding brake, synchronous servo motor, to 320 V

#### **L-417.339025E1**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, synchronous servo motor, to 320 V

#### **L-417.339025E1B**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, absolute linear encoder with EnDat 2.2 signal transmission, 1 nm sensor resolution, drag chain, holding brake, synchronous servo motor, to 320 V

#### **L-417.339054**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., synchronous servo motor, to 320 V

#### **L-417.339054B**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, absolute rotary encoder (multi-turn) with EnDat 2.1 signal transmission, 8192 counts/rev., holding brake, synchronous servo motor, to 320 V



**L-417.339211E1**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, synchronous servo motor, to 320 V

**L-417.339211E1B**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, incremental linear encoder with sin/cos signal transmission, 20 µm signal period, drag chain, holding brake, synchronous servo motor, to 320 V

**L-417.339232**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., synchronous servo motor, to 320 V

**L-417.339232B**

High-load linear stage, 813 mm travel range, 166 mm width, 450 N load capacity, incremental rotary encoder with A/B quadrature signal transmission, 20000 counts/rev., holding brake, synchronous servo motor, to 320 V