JENNY SCIENCE

moving precisely, within tight space

Version from
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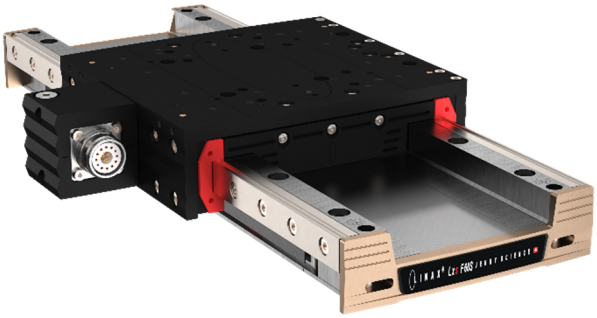
Creator
Marcel Mehr, Development

Datasheet LINAX® F60S



Lxs F60S, s = shuttel

Lxu F60S, u = universal

Highlights

Absolute measuring system
magnetical 1 µm or optical 1 µm / 100 nm

Single cable solution
Reduces wiring effort

Compact dimensions, high precision
with Position Accuracy up to ± 0.5 µm

Peak forces from 180N
High cycle rates with velocities up to 4m/s due to the linear motor

Forceteq® basic/pro force control
Force limitation, force monitoring with XENAX® Xvi servo controller

Functional Safety, TÜV certified
SIL 2, PL d, CAT 3 with XENAX® Xvi servo controller

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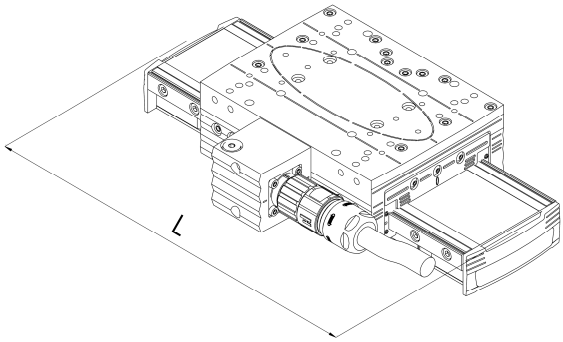
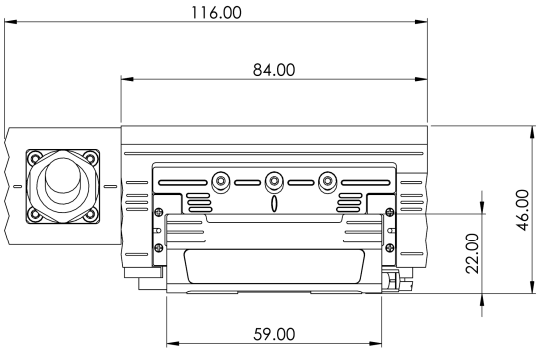
1 LINAX® Lxu F60S

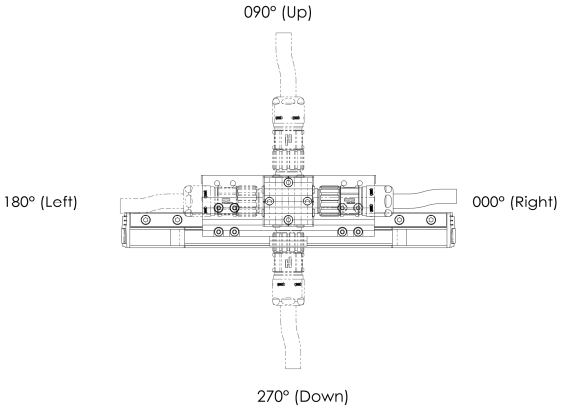
1.1 Dimensions Lxu F60S



LINAX® Lxu F60S	L [mm] *(in)*
Lxu 40F60S	170 *(6.69)*
Lxu 80F60S	210 *(8.26)*
Lxu 160F60S	290 *(11.41)*
Lxu 240F60S	370 *(14.56)*
Lxu 320F60S	450 *(17.71)*



1.2 Connector housing Lxu F60S



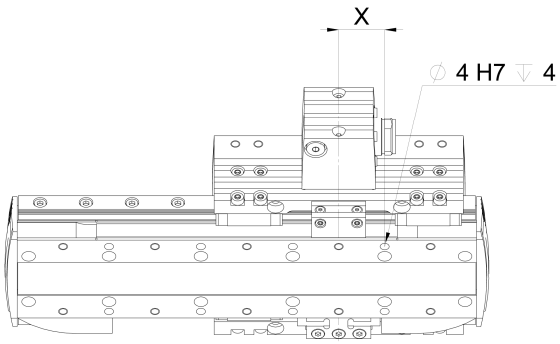
The connector housing is rotatable in 4 directions in a 90° pattern. The motor is supplied as standard with a “right-hand cable outlet” (with a view of the connector housing).

1.3 Absolute measuring system & zero position Lxu F60S

1.3.1 Reference run

A reference run is not required. With the absolute measuring system, the position is available immediately after switching on.

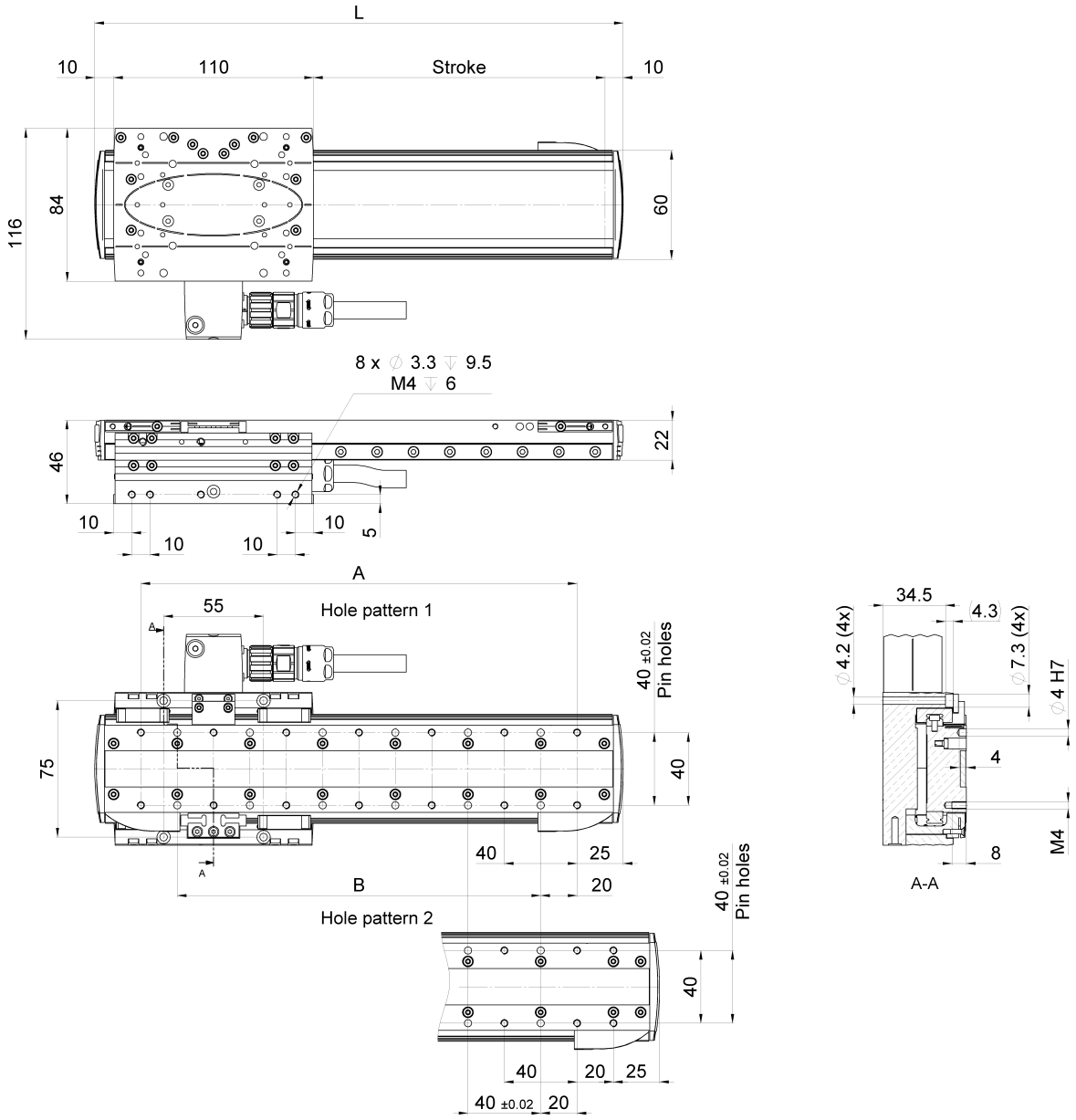
1.3.2 Position of mechanical hard stop



The mechanical stop is located approximately 1.5 mm from the zero position. The zero position is the point at which the centre of the slide is located. This is aligned with dimension X on the first pin hole.

LINAX® Lxu F60S	**L [mm]** *(in)*	**X [mm]** *(in)*
Lxu 40F60S	170 *(6.69)*	0
Lxu 80F60S	210 *(8.26)*	20 *(0.29)*
Lxu 160F60S	290 *(11.41)*	20 *(0.29)*
Lxu 240F60S	370 *(14.56)*	20 *(0.29)*
Lxu 320F60S	450 *(17.71)*	20 *(0.29)*

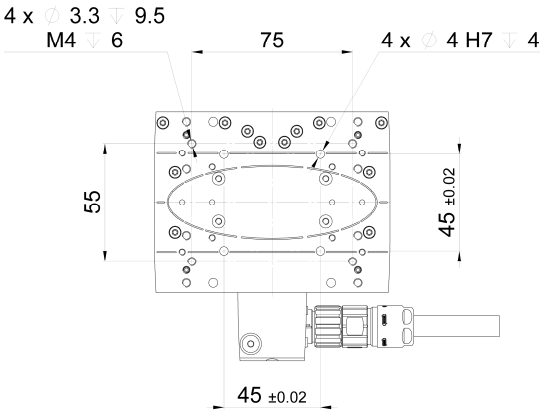
1.4 Installation dimensions Lxu 80F60S – Lxu 320F60S



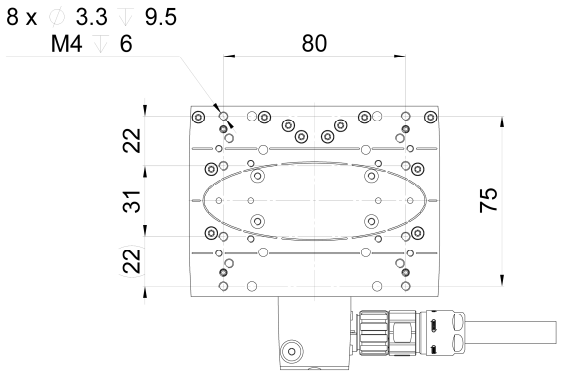
LINAX® Lxu F60S	Stroke [mm]	L [mm]	A [mm]	B [mm]	Hole pattern
Lxu 40F60S	40	170	80	40	2
Lxu 80F60S	80	210	160	120	1
Lxu 160F60S	160	290	240	200	1
Lxu 240F60S	240	370	320	280	1
Lxu 320F60S	320	450	400	360	1

1.5 Hole pattern Lxu F60S

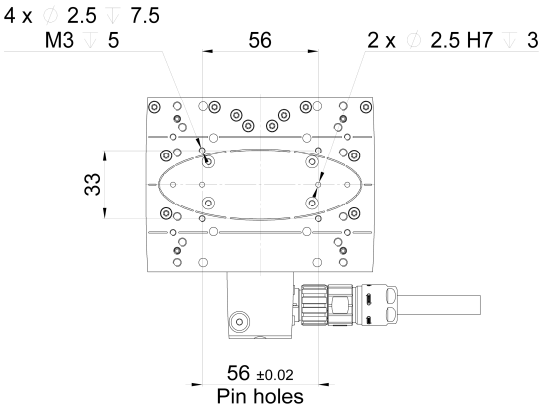
Cantilever with **Lxu F60/S** (back to back)



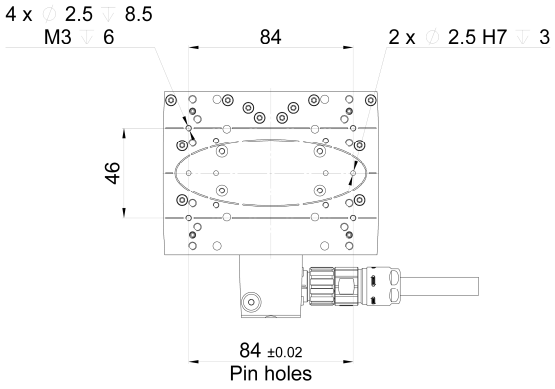
Portal with **Lxu F60/S** front flange



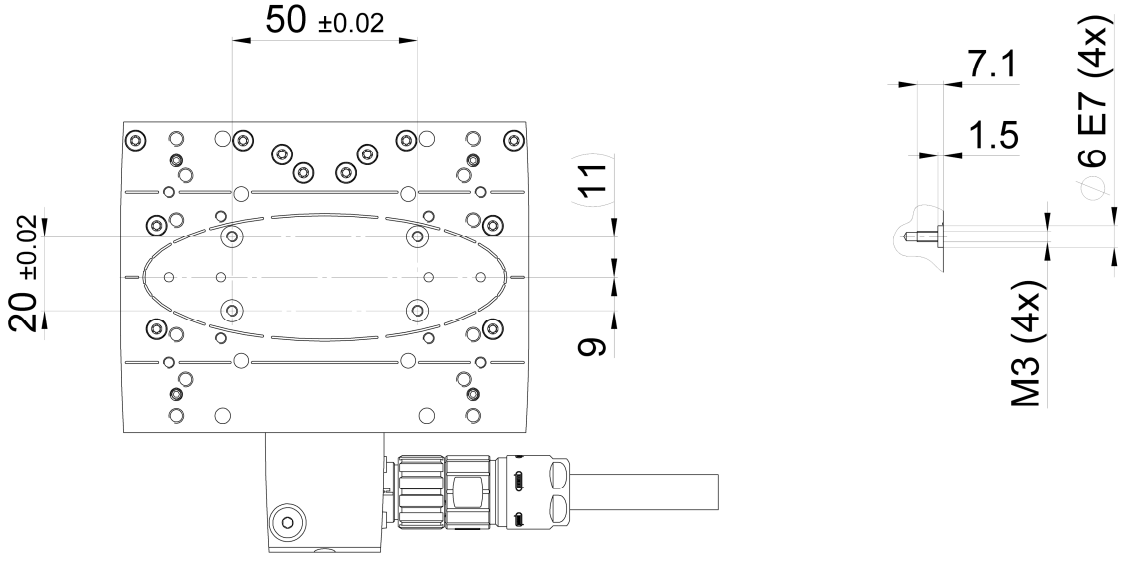
Cross table with **Lxc F08 / F10** monoblock



Cross table with **Lxc F40** monoblock



Cantilever with **Ex F20**



1.6 Precision Lxu F60S

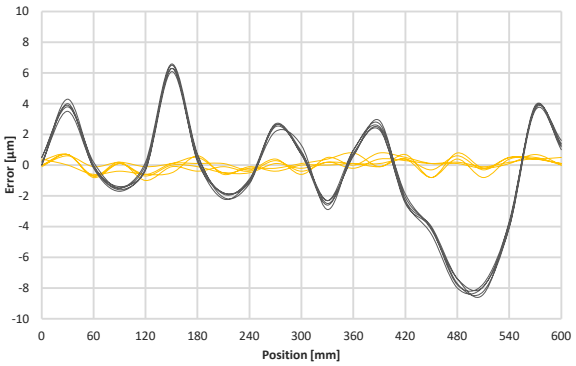
1.6.1 Absolute positioning

Measuring system	Bidirectional repeatability
1µm magnetic absolute	< ± 2.0µm
1µm optical absolute	< ± 1.5µm
100nm optical absolute	< ± 0.5µm

Measuring system	Length expansion measuring scale
1µm magnetic absolute	11.0µm
1µm optical absolute	10.6µm
100nm optical absolute	10.6µm

1.6.2 Correction table in XENAX® Xvi

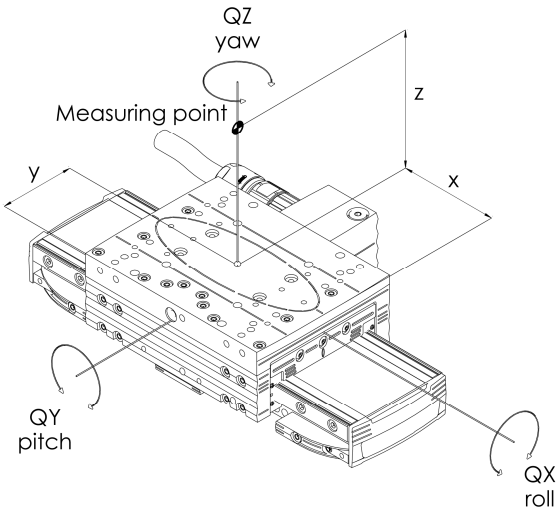
Measurement system 1µm optical, relevant measurement point 150mm above the scale



With an interferometer at the relevant measuring point, these position errors are captured in a tabular form. This correction table is then stored in the XENAX® Xvi Servocontroller. The positions are corrected according to this table, with linear interpolation of the intermediate positions.

- **Gray**, position errors measured at the relevant point of the setup, measurement system 1µm resolution optical

- **Yellow**, position error measured at the same point with correction using the correction table



1.6.3 Guidings of slider

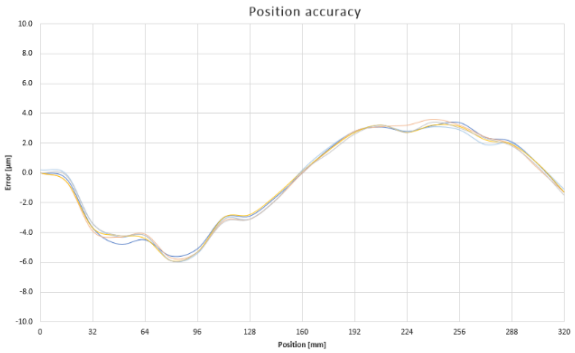
Ball bearing guides are used for the LINAX® Lxu linear motors. This guiding system is maintenance free for 20‘000km or five years as stated by the supplier.

The LINAX® Lxu linear motor axes are supplied with the following tolerances as standard. The specifications are based on unloaded condition.

Lxu F60S	Running Accuracy horizontal EYX [µm]	Running Accuracy vertical EZX [µm]	Tilt Error QX (roll) [arcsec]	Tilt Error QY (pitch) [arcsec]	Tilt Error QZ (yaw) [arcsec]	Tolerance Constr. Height [mm]
Lxu 40F60S	± 5	± 4	± 8	± 10	± 15	± 0.1
Lxu 80F60S	± 5	± 4	± 8	± 10	± 20	± 0.1
Lxu 160F60S	± 8	± 5	± 10	± 20	± 25	± 0.1
Lxu 240F60S	± 10	± 5	± 10	± 20	± 30	± 0.1
Lxu 320F60S	± 12	± 6	± 10	± 20	± 35	± 0.1

1.6.4 Typical measurement results out of series production

Position accuracy



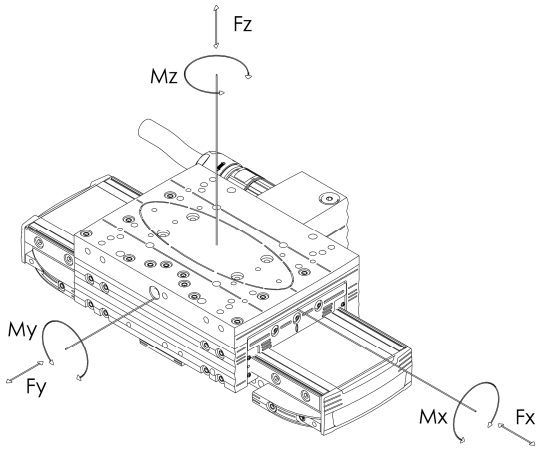
Resolution optical:	1 µm
Absolute accuracy:	± 5 µm
Repeatability forward:	0.6 µm
Repeatability backward:	0.7 µm
Repeatability bi-directional:	1.2 µm

Position accuracy 55mm over (Z) measuring system.

Tilt error

QX roll:	± 6.8 asec
QY pitch:	± 7.6 asec
QZ yaw:	± 15.2 asec

1.7 Stress values of guides Lxu F60S



LINAX® Lxu F60S	Maximum load
Mx	149 Nm
My	211 Nm
Mz	211 Nm
Fy	5400 N
Fz	5400 N

Besides adhering to the individual maximal loads, the following equation must comply if there are multiple forces and moments acting simultaneously on the linear motor:

$$\frac{|Fy|}{Fy\,max} + \frac{|Fz|}{Fz\,max} + \frac{|Mx|}{Mx\,max} + \frac{|My|}{My\,max} + \frac{|Mz|}{Mz\,max} \leq 1$$

1.8 Dynamics Lxu F60S

1.8.1 Slider in motion

Lxu F60S	Stroke [mm]	Force nom./peak [N]	Speed v.max [m/s] 24V/48V/72V	Acceleration a-max [m/s²]	Min. time/stroke @48V [ms]	Mass slider [g]	Weight compen sation [g]	Mass total [g]
Lxu 40F60S	40	60 / 180	0.8/2.2/2.2	120	45	950	360	1700
Lxu 80F60S	80	60 / 180	0.8/2.4/3.0	120	60	950	360	1900
Lxu 160F60S	160	60 / 180	0.8/2.4/4.1	120	80	950	590	2200
Lxu 240F60S	240	60 / 180	0.8/2.4/4.1	120	100	950	820	2600
Lxu 320F60S	320	60 / 180	0.8/2.4/4.1	120	120	950	N/A	2900

All values only valid with XENAX® Xvi and 20% S-Curve

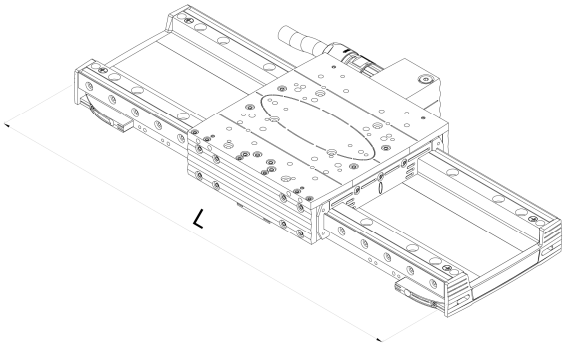
1.8.2 Base plate in motion

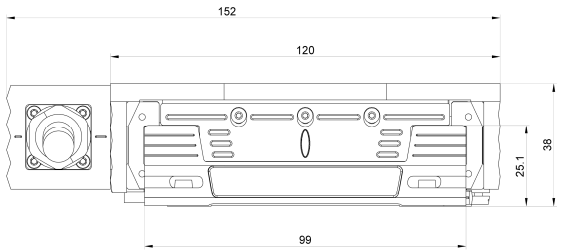
Lxu F60S	Stroke [mm]	Force nom./peak [N]	Speed v.max [m/s] 24V/48V/72V	Acceleration a-max [m/s²]	Min. time/stroke @48V [ms]	Mass Base plate [g]	Weight compen sation [g]	Mass total [g]
Lxu 40F60S	40	60 / 180	0.8/2.4/2.4	140	45	750	360	1700
Lxu 80F60S	80	60 / 180	0.8/2.4/3.0	120	60	950	360	1900
Lxu 160F60S	160	60 / 180	0.8/2.4/3.8	95	100	1250	590	2200
Lxu 240F60S	240	60 / 180	0.8/2.4/4.1	80	135	1550	820	2600
Lxu 320F60S	320	60 / 180	0.8/2.4/4.1	65	175	1950	N/A	2900

All values only valid with XENAX® Xvi and 20% S-Curve

2 LINAX® Lxs F60S

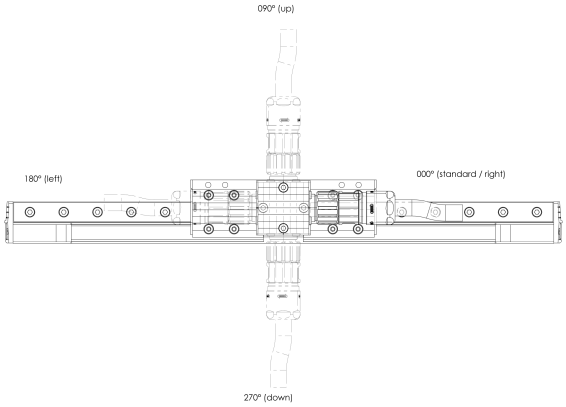
2.1 Dimension Lxs F60S





LINAX® Lxs F60S	L [mm] *(in)*
Lxs 160F60S	290 *(7.48)*
Lxs 200F60S	330 *(12.99)*
Lxs 320F60S	450 *(17.71)*
Lxs 400F60S	530 *(20.86)*
Lxs 520F60S	650 *(25.59)*
Lxs 600F60S	730 *(28.74)*
Lxs 800F60S	930 *(36.61)*
Lxs 1000F60S	1130 *(44.48)*
Lxs 1200F60S	1330 *(52.36)*
Lxs 1600F60S	1730 *(68.11)*

2.2 Connector housing Lxs F60S



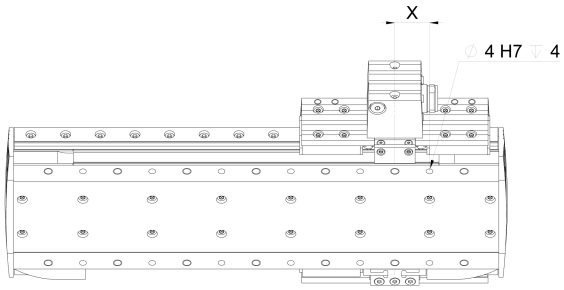
The connector housing is rotatable in 4 directions in a 90° pattern. The motor is supplied as standard with a “right-hand cable outlet” (with a view of the connector housing).

2.3 Absolute measuring system & zero position Lxs F60S

2.3.1 Reference run

A reference run is not required. With the absolute measuring system, the position is available immediately after switching on.

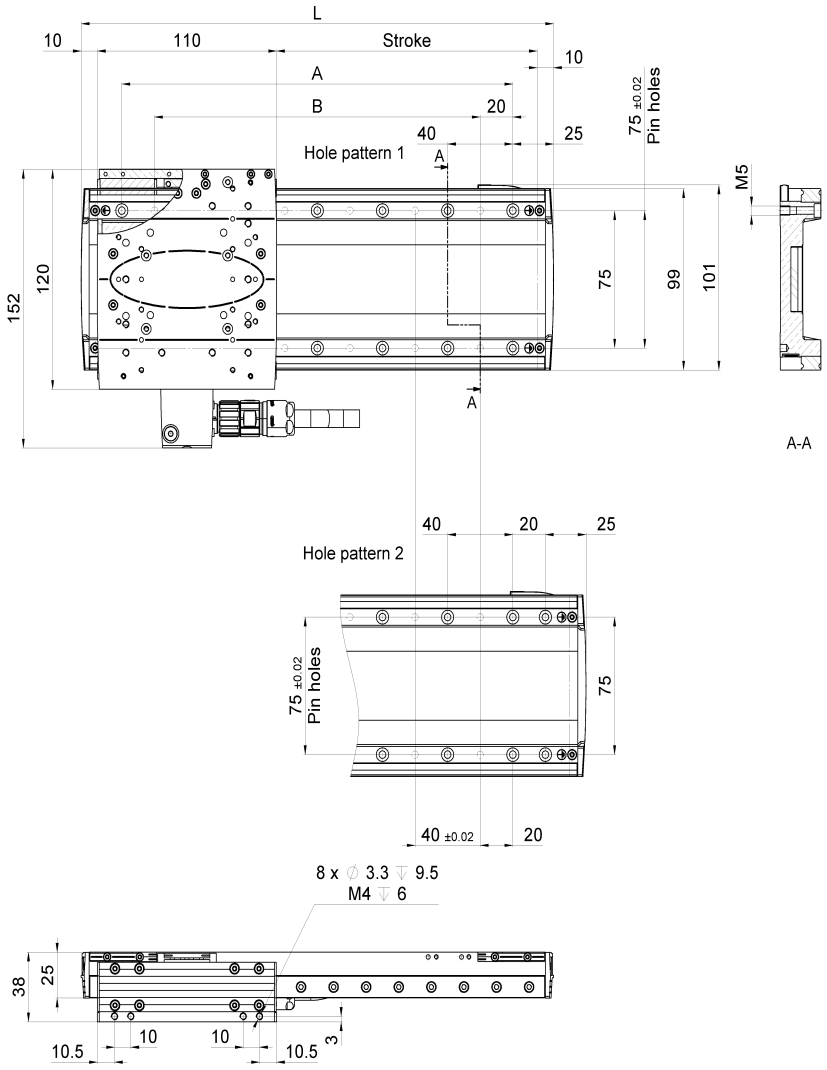
2.3.2 Position of mechanical hard stop



The mechanical stop is located approximately 1.5 mm from the zero position. The zero position is the point at which the centre of the slide is located. This is aligned with dimension X on the first pin hole.

LINAX® Lxs F60S	**L [mm]** *(in)*	**X [mm]** *(in)*
Lxs 160F60S	290 *(7.48)*	20 *(0.29)*
Lxs 200F60S	330 *(12.99)*	0
Lxs 320F60S	450 *(17.71)*	20 *(0.29)*
Lxs 400F60S	530 *(20.86)*	20 *(0.29)*
Lxs 520F60S	650 *(25.59)*	0
Lxs 600F60S	730 *(28.74)*	0
Lxs 800F60S	930 *(36.61)*	20 *(0.29)*
Lxs 1000F60S	1130 *(44.48)*	0
Lxs 1200F60S	1330 *(52.36)*	20 *(0.29)*
Lxs 1600F60S	1730 *(68.11)*	20 *(0.29)*

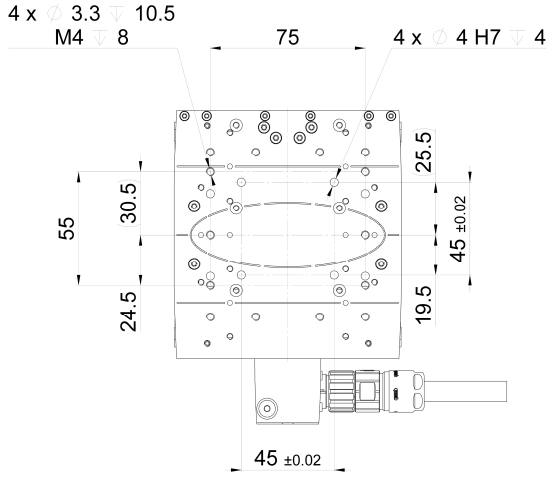
2.4 Installation dimensions Lxs 160F60S – Lxs 1600F60S



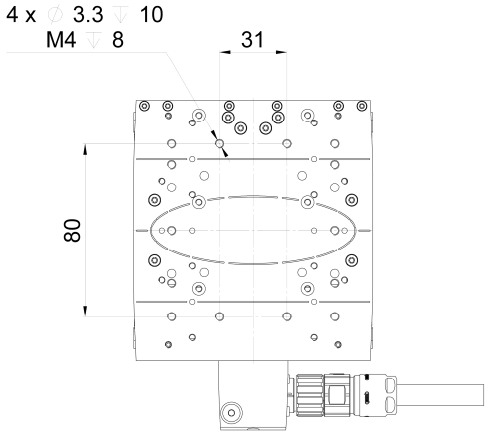
LINAX® Lxs F60S	Stroke [mm]	L [mm]	A [mm]	B [mm]	Hole pattern
Lxs 160F60S	160	290	240	200	1
Lxs 200F60S	200	330	240	200	2
Lxs 320F60S	320	450	400	360	1
Lxs 400F60S	400	530	480	440	1
Lxs 520F60S	520	650	560	520	2
Lxs 600F60S	600	730	640	600	2
Lxs 800F60S	800	930	880	840	1
Lxs 1000F60S	1000	1130	1040	1000	2
Lxs 1200F60S	1200	1330	1280	1240	1
Lxs 1600F60S	1600	1730	1680	1640	1

2.5 Hole pattern Lxs F60S

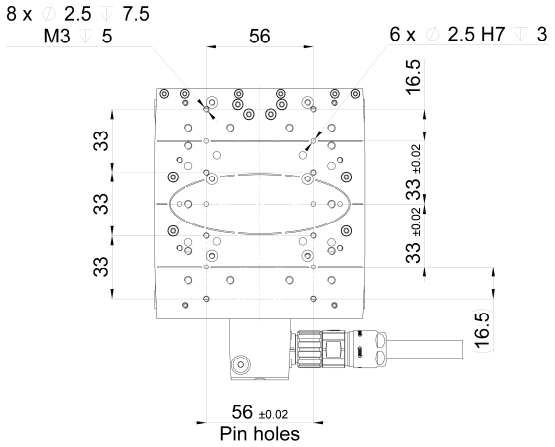
Cantilever with **Lxu F60/S** (back to back)



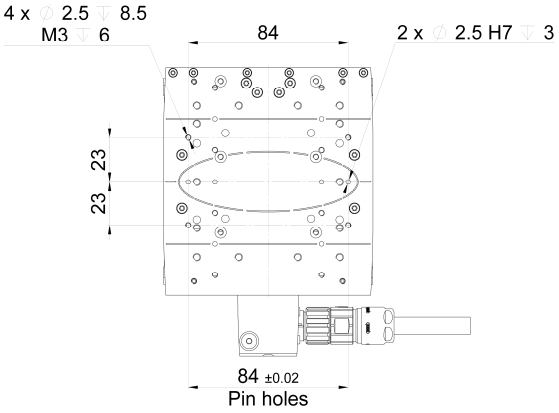
Portal with **Lxu F60/S** front flange



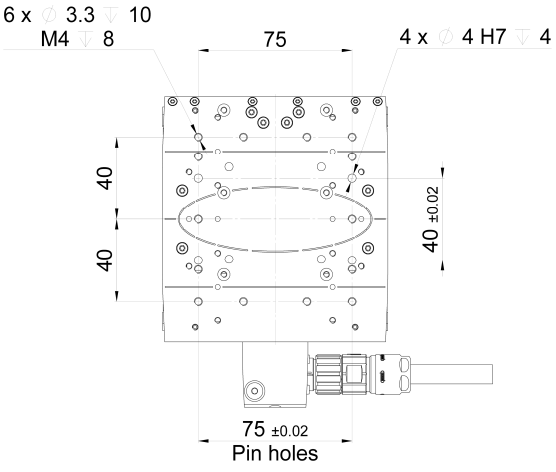
Cross table with **Lxc F08 / F10** monoblock



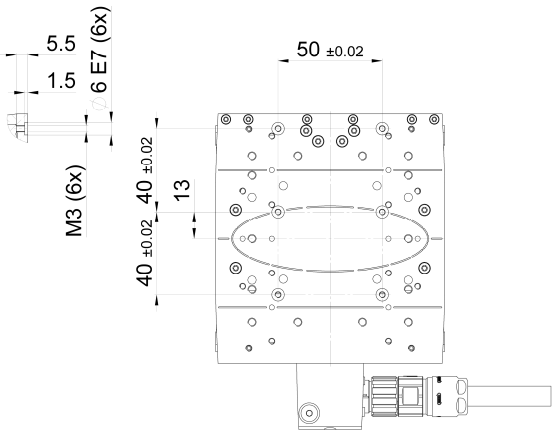
Cross table with **Lxc F40** monoblock



Cross table with **Lxs F60** ground plate



Cantilever with **Ex F20**



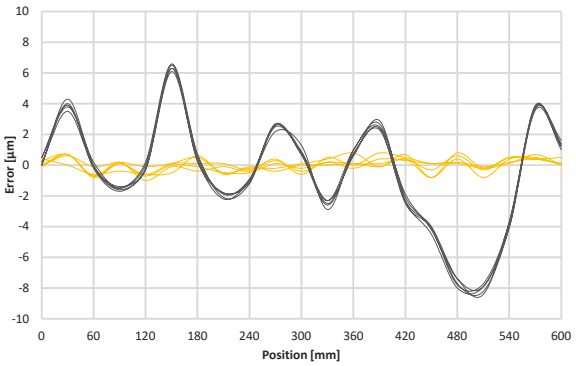
2.6 Precision Lxs F60S

2.6.1 Absolute positioning

Measuring system	Bidirectional repeatability
1µm magnetic absolute	< ± 2.0µm
1µm optical absolute	< ± 1.5µm
100nm optical absolute	< ± 0.5µm

Measuring system	Lenght expansion measuring scale
1µm magnetic absolute	11.0µm
1µm optical absolute	10.6µm
100nm optical absolute	10.6µm

Measurement system 1µm optical, relevant measurement point 150mm above the scale

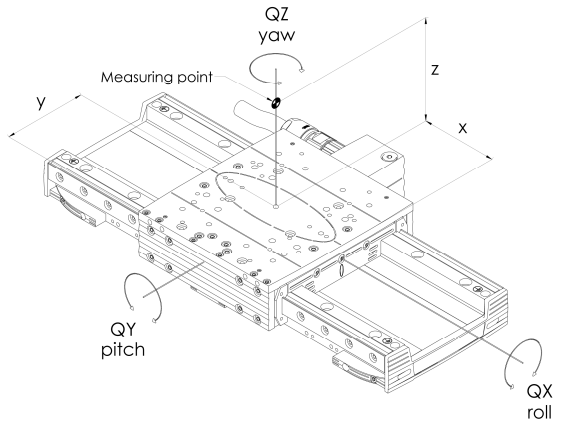


2.6.2 Correction table in XENAX® Xvi

With an interferometer at the relevant measuring point, these position errors are captured in a tabular form. This correction table is then stored in the XENAX® Xvi Servocontroller. The positions are corrected according to this table, with linear interpolation of the intermediate positions.

- **Gray**, position errors measured at the relevant point of the setup, measurement system 1µm resolution optical

- **Yellow**, position error measured at the same point with correction using the correction table



2.6.3 Guidings of slider

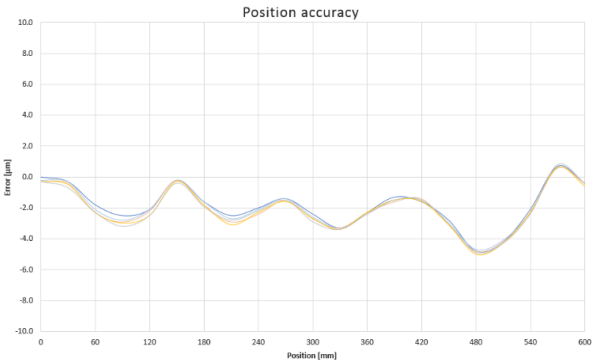
Ball bearing guides are used for the LINAX® Lxs linear motors. This guiding system is maintenance free for 20'000km or five years as stated by the supplier.

The LINAX® Lxs linear motor axes are supplied with the following tolerances as standard. The specifications are based on unloaded condition.

Lxs F60S	Running Accuracy horizontal EYX [µm]	Running Accuracy vertical EZX [µm]	Tilt Error QX (roll) [arcsec]	Tilt Error QY (pitch) [arcsec]	Tilt Error QZ (yaw) [arcsec]	Tolerance Constr. Height [mm]
Lxs 160F60S	± 5	± 3	± 5	± 10	± 10	± 0.1
Lxs 200F60S	± 5	± 3	± 5	± 10	± 10	± 0.1
Lxs 320F60S	± 8	± 4	± 15	± 20	± 15	± 0.1
Lxs 400F60S	± 10	± 4	± 15	± 20	± 15	± 0.1
Lxs 520F60S	± 10	± 4	± 20	± 20	± 20	± 0.1
Lxs 600F60S	± 10	± 5	± 20	± 20	± 20	± 0.1
Lxs 800F60S	± 10	± 7	± 25	± 25	± 25	± 0.1
Lxs 1000F60S	± 12	± 8	± 30	± 25	± 25	± 0.1
Lxs 1200F60S	± 13	± 9	± 30	± 25	± 25	± 0.1
Lxs 1600F60S	± 16	± 12	± 35	± 30	± 30	± 0.1

2.6.4 Typical measurement results out of series production

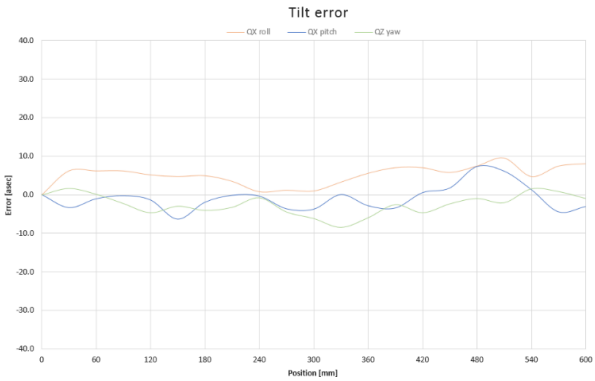
Position accuracy



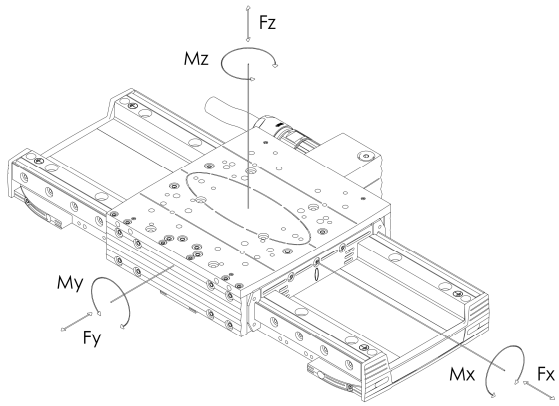
Resolution optical:	1 µm
Absolute accuracy:	± 3 µm
Repeatability forward:	0.7 µm
Repeatability backward:	0.7 µm
Repeatability bi-directional:	1.3 µm

Position accuracy 55mm over (Z) measuring system.

Tilt error



QX roll:	± 4.7 asec
QY pitch:	± 6.9 asec
QZ yaw:	± 5.1 asec



2.7 Stress values of guides Lxs F60S

LINAX® Lxs F60S	Maximum load
Mx	243 Nm
My	211 Nm
Mz	211 Nm
Fy	5400 N
Fz	5400 N

Besides adhering to the individual maximal loads, the following equation must comply if there are multiple forces and moments acting simultaneously on the linear motor:

$$\frac{|Fy|}{Fy\,max} + \frac{|Fz|}{Fz\,max} + \frac{|Mx|}{Mx\,max} + \frac{|My|}{My\,max} + \frac{|Mz|}{Mz\,max} \leq 1$$

2.8 Dynamics Lxs F60S

Lxs F60S	Stroke [mm]	Force nom./peak [N]	Speed v.max [m/s] 24V/48V/72V	Acceleration a-max [m/s²]	Min. time/stroke @48V [ms]	Min. time/stroke @72V [ms]	Mass slider [g]	Mass total [g]
Lxs 160F60S	160	60 / 180	0.8/2.4/4.1	120	95	80	1000	2600
Lxs 200F60S	200	60 / 180	0.8/2.4/4.1	120	110	90	1000	2800
Lxs 320F60S	320	60 / 180	0.8/2.4/4.1	120	160	120	1000	3400
Lxs 400F60S	400	60 / 180	0.8/2.4/4.1	120	195	140	1000	3900
Lxs 520F60S	520	60 / 180	0.8/2.4/4.1	120	240	165	1000	4500
Lxs 600F60S	600	60 / 180	0.8/2.4/4.1	120	280	185	1000	5000
Lxs 800F60S	800	60 / 180	0.8/2.4/4.1	120	360	235	1000	6000
Lxs 1000F60S	1000	60 / 180	0.8/2.4/4.1	120	440	285	1000	7200
Lxs 1200F60S	1200	60 / 180	0.8/2.4/4.1	120	520	335	1000	8400
Lxs 1600F60S	1600	60 / 180	0.8/2.4/4.1	120	685	435	1000	10800

All values only valid with XENAX® Xvi and 20% S-Curve

3 Safety und enviroment

3.1 Safety together with XENAX® Servocontroller

EN 61000-6-2:2005 Electromagnetic compatibility (EMC), Immunity for industrial environments	EMC Immunity Testing, Industrial Class A
EN 61326-3-1	Immunity for Functional Safety
IFA:2012	Functional safety of power drive systems
EN 61326-1, EN 61800-3, EN 50370-1	Electrostatic discharges ESD, Electromagnetic Fields, Fast electric transients Bursts, radio frequency common mode
EN 61000-6-3:2001 Electromagnetic compatibility (EMC), Emission standard for residential, commercial and light-industrial environments	EMC Emissions Testing, Residential Class B
EN 61326-1, EN61800-3, EN50370-1	Radiated EM Field, Interference voltage
IFA:2012	Functional safety of power drive systems

3.2 Enviroment conditions

Storage and transport	No storage outside. Storage rooms have to be well-ventilated and dry. Storage temperature from -25°C bis +55°C
Operating temperature	5°C -50°C environment, after 40°C performance reduction
Operating humidity	10-90% non-condensing
Cooling	No external cooling needed. Dynamics can possibly be increased by mounting the slider case on a thermoconductive ground plate.
Protection	IP 40

3.3 Notes MRL 2006/42/EG

- Danger for persons with medical Implants due to magnetic fields

- Surfaces may become hot, up to 85°C
- Lubrication only with non-toxic lubricants, verify safety data sheet
- Noise level up to 70 dB(A)

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Jenny Science AG
Sandblatte 11
CH-6026 Rain, Schweiz

Tel. +41 (0) 41 255 25 25

www.jennyscience.com
info@jennyscience.ch