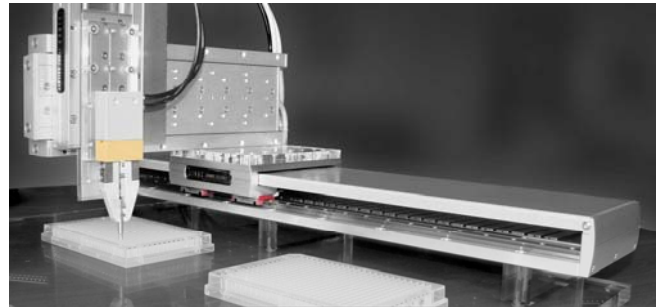


LINAX®

Compact linear axes in a modular system

Datasheets
Edition November 2007



Modular assembly concept

The patented monoblock design allows screw mounting through the motor block and creates a modular system from the individual LINAX® linear axes.

Strokes from 44-800mm
Glass scale, standard resolution
1µm, optional 100nm
integrated 3-phase
synchronous linear motor
Maximum driving forces from 12N-114N
Ready for start with XENAX® servo controllers

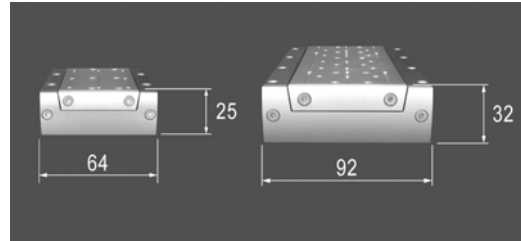
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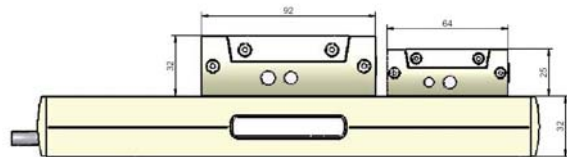
1 Type overview

1.1 LINAX® Lx compact with monoblock

The LINAX® Lx series is based on a monoblock with integrated guidance. Thereby, the coils and the measuring heads are stationary elements in the monoblock. There are no moving cables and thus no cable chain is necessary. This monoblock construction is optimal for strokes up to ca 250mm.



Type	Stroke	Force
Linax Lx 44F04	44mm	04/12N
Linax Lx 85F10	85mm	10/30N
Linax Lx 135F10	135mm	10/30N
Linax Lx 230F10	230mm	10/30N
Linax Lx 80F40	80mm	40/114N
Linax Lx 176F40	176mm	40/114N
Linax Lx 272F40	272mm	40/114N

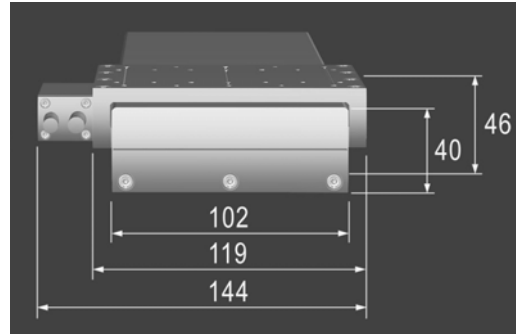


Configured as 3D robot
 X-axis Lx 272F40
 Y-axis Lx 230F10
 Z-axis Lx 44F04

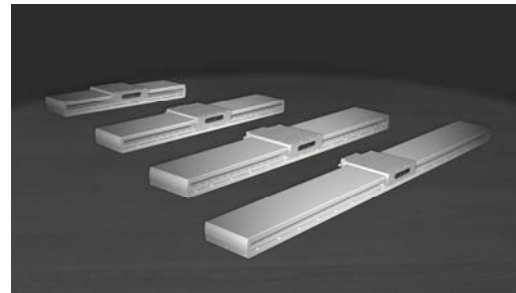


1.2 LINAX® Lxe for long stroke length

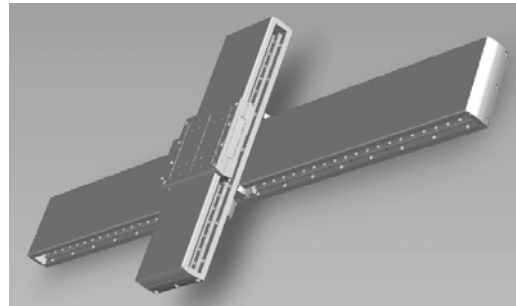
The LINAX® Lxe (extended) series is designed for long stroke lengths. The coils and the measuring heads are built into the movable carriage. The LINAX® Lxe series convinces once again through its very compact dimensions.



Type	Stroke	Force
Linax Lxe 250F40	250mm	40/114N
Linax Lxe 400F40	400mm	40/114N
Linax Lxe 550F40	550mm	40/114N
Linax Lxe 800F40	800mm	40/114N

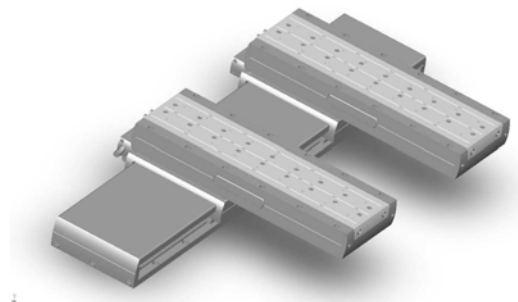


In the cross table configuration the lower LINAX® Lxe carriage has no top plate. The total height is only 86mm.



With the LINAX® Lxe one unit can be fitted with several carriages, each operating independently.

The picture shows a combination of Lxe 400F40 with 2 x Lx 176F40 as twin carriages.



2 Special Features

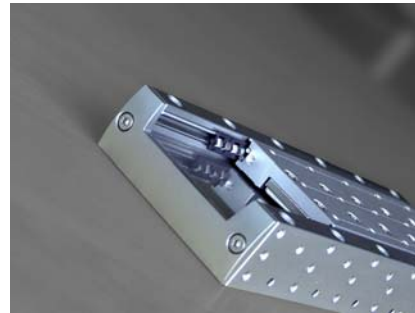
2.1 Monoblock construction with LINAX® Lx

Monoblock with two high-precision groove tracks to support the cross roll guidance.

Compact cross section of only 25 x 64mm for the 10N linear motor and 32 x 92mm for the 40N linear motor.

High stiffness, minimal weight travel plate.

High dynamics and at the same time excellent slow motion qualities.



2.2 Modular assembly

All LINAX® Linear axes have a multitude of modular threaded- and centering-holes for modular assembly devoid of inter plates.

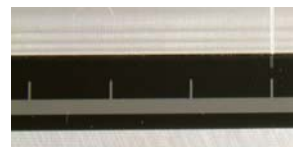
This saves space and costs.

This makes it possible to build up the most diverse types of individual cross tables or pick and place units.



2.3 No home sensor necessary

On the internal glass scale there is a second track line with distance coded reference marks. This allows the calculation of the absolute position after travelling over 2 marks, independent of the actual travel plate position. Thus no home sensor is necessary.





3 Performance data

3.1 General

Standard resolution glass scale	1µm / counter increment
Home position	With coded reference marks
Accuracy with XENAX® servo controller	±2µm
Optional high resolution glass scale	100nm / counter increment

3.2 LINAX® Lx F04 and Lx F10

LINAX	Lx 44F04	Lx 85F10	Lx 135F10	Lx 230F10
Stroke	44mm	85mm	135mm	230mm
Max. bus-voltage V _{DC}	75V	75V	75V	75V
Resistance phase-phase R ₂₀	1.0Ω	2.0Ω	2.0Ω	2.0Ω
Force constant K _F	1.5N/A	3N/A	3N/A	3N/A
Fn	04N	10N	10N	10N
F _{peak}	12N	30N	30N	30N
Minimal time for max. stroke	60ms	70ms	95ms	145ms
Acceleration a-max.	60m/s ²	85m/s ²	60m/s ²	45m/s ²
Velocity v-max.	1.5m/s	2.5m/s	2.8m/s	3.2m/s
Travel plate weight	130g	230g	320g	450g
Total weight	350g	650g	880g	1200g
Forced centering cross roll cage for highest dynamics.	optional	optional	optional	optional

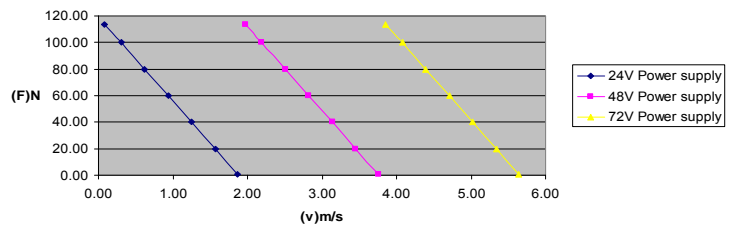
3.3 LINAX® Lx F40

LINAX	Lx 80F40	Lx 176F40	Lx 272F40
Stroke	80mm	176mm	272mm
Max. bus-voltage V _{DC}	75V	75V	75V
Resistance phase-phase R ₂₀	2.0Ω	2.0Ω	2.0Ω
Force constant K _F	9.5N/A	9.5N/A	9.5N/A
Fn	40N	40N	40N
F _{peak}	114N	114N	114N
Minimal time for max. stroke	60ms	100ms	140ms
Acceleration a-max.	100m/s ²	90m/s ²	75m/s ²
Velocity v-max.	2.5m/s	2.5m/s	2.5m/s
Travel plate weight	520g	750g	1050g
Total weight	1470g	2150g	2800g
Forced centering cross roll cage for highest dynamics.	standard	standard	standard

3.4 LINAX® Lxe F40

LINAX	Lxe 250F40	Lxe 400F40	Lxe 550F40	Lxe 800F40
Stroke	250mm	400mm	550mm	800mm
Max. bus-voltage V_{DC}	75V	75V	75V	75V
Resistance phase-phase R_{20}	2.0Ω	2.0Ω	2.0Ω	2.0Ω
Force constant K_F	9.5N/A	9.5N/A	9.5N/A	9.5N/A
F_n	40N	40N	40N	40N
F_{peak}	114N	114N	114N	114N
Acceleration a-max.	70m/s ²	70m/s ²	70m/s ²	70m/s ²
Carriage weight	980g	980g	980g	980g
Total weight	3080g	3850g	4620g	5900g
Rail wiping end panel for automatic cleaning	standard	standard	standard	standard

LINAX Lx F40, Lxe F40: Force, velocity



4 Mechanical accuracy

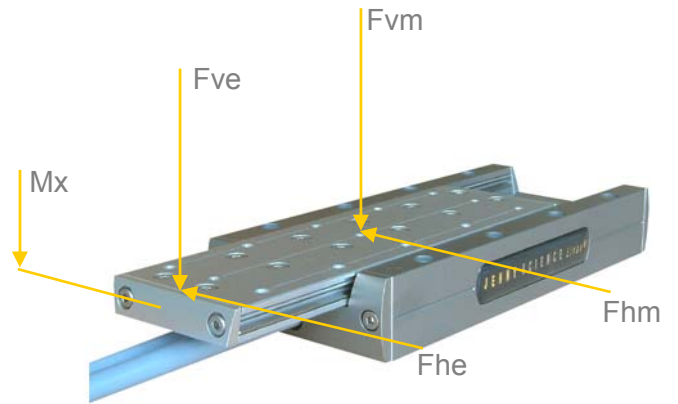
LINAX® linear axes are delivered with the following mechanical tolerances. The values are based on unloaded conditions.

LINAX Lx F04/F10	Lx 44F04	Lx 85F10	Lx 135F10	Lx 230F10
Vertical and horizontal running tolerances	10μm	12μm	15μm	20μm
Parallelism at centre of travel plate	20μm	25μm	30μm	35μm
Total height tolerance	± 0,1mm	± 0,1mm	± 0,1mm	± 0,1mm

LINAX Lx F40	Lx 80F40	Lx 176F40	Lx 272F40
Vertical and horizontal running tolerances	8μm	12μm	16μm
Parallelism at centre of travel plate	20μm	25μm	30μm
Total height tolerance	± 0,1mm	± 0,1mm	± 0,1mm

LINAX Lxe F40	Lxe 250F40	Lxe 400F40	Lxe 550F40	Lxe 800F40
Vertical and horizontal running tolerances	8μm	10μm	12μm	14μm
Total height tolerance	± 0,1mm	± 0,1mm	± 0,1mm	± 0,1mm

5 Load forces



LINAX Lx F04/F40 (C/Roller=130N)	Lx 44F04	Lx 85F10	Lx 135F10	Lx 230F10
Vertical-force, middle of travel plate Fvm	1040N	2340N	2860N	4160N
Vertical-force, end, roll-out Fve	113N	278N	310N	406N
Horizontal-force, middle of travel plate Fhm	520N	1170N	1430N	2080N
Horizontal-force, end, roll-out Fhe	56N	139N	155N	203N
Moment at longitudinal axis Mx	22Nm	50Nm	61Nm	88Nm

LINAX Lx F40 (C/Roller=410N)	Lx 80F40	Lx 176F40	Lx 272F40
Vertical-force, middle of travel plate Fvm	5740N	9020N	11890N
Vertical-force, end, roll-out Fve	653N	894N	1108N
Horizontal-force, middle of travel plate Fhm	2870N	4510N	5945N
Horizontal-force, end, roll-out Fhe	326N	447N	554N
Moment at longitudinal axis Mx	178Nm	280Nm	368Nm

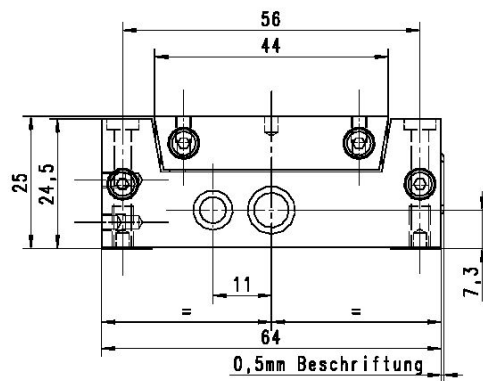
LINAX LxeF40 (C/Carriage=1690N)	Lxe xxxF40
Vertical-force, middle of carriage Fvm	6760N
Horizontal-force, middle of carriage Fhm	6760N
Moment at longitudinal axis Mx	256Nm

6 Dimensions

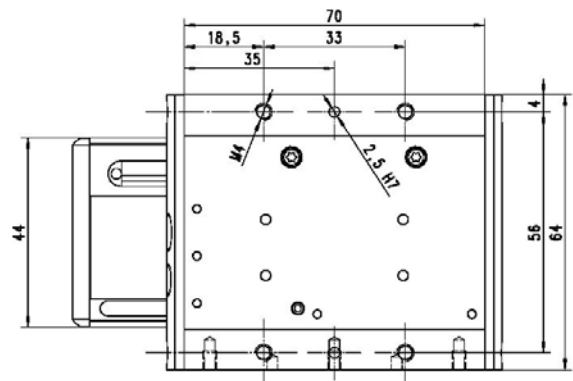
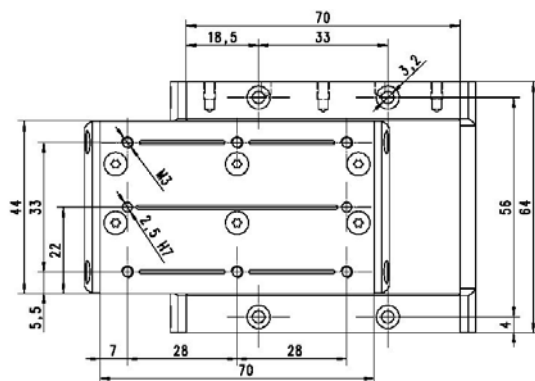
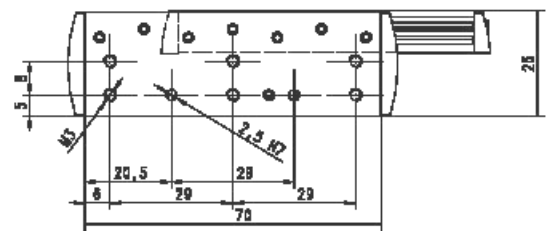
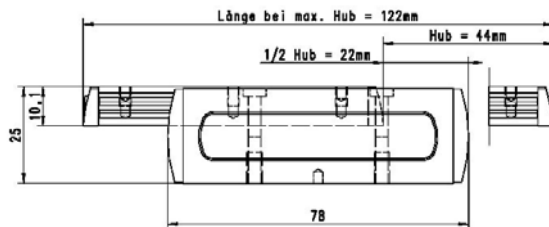
CAD Data from www.jennyscience.ch
 EASM for 3D eDrawings Viewer
 from SolidWorks®
 STEP and PDF



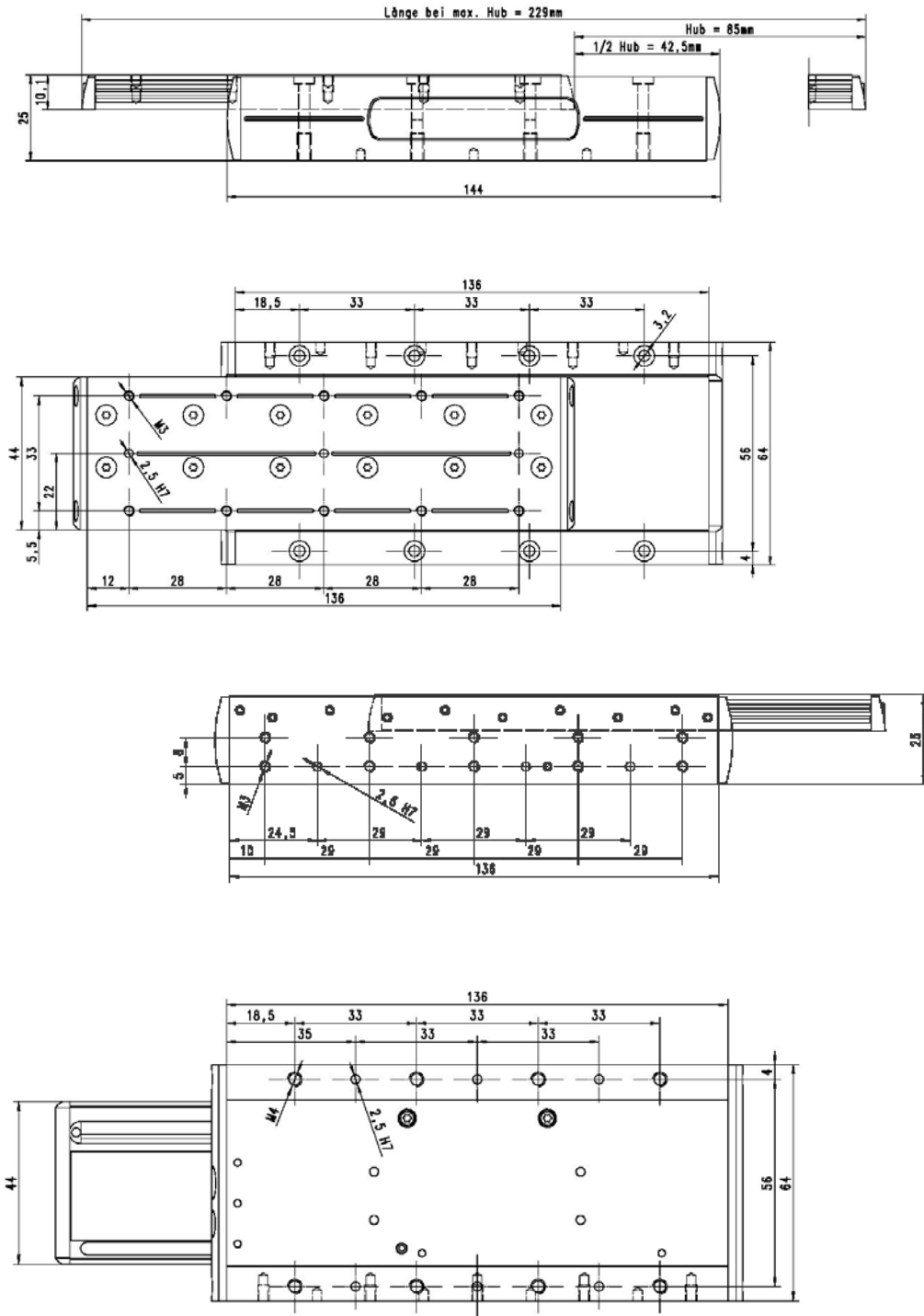
7 Lx 44F04, Lx85F10, Lx 135F10, Lx 230F10



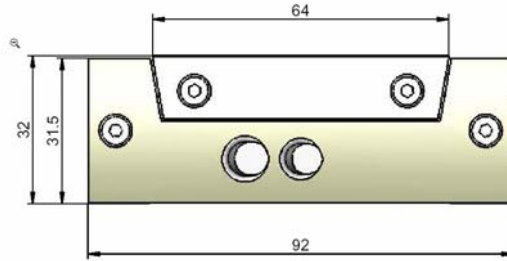
7.1 LINAX® Lx 44F04



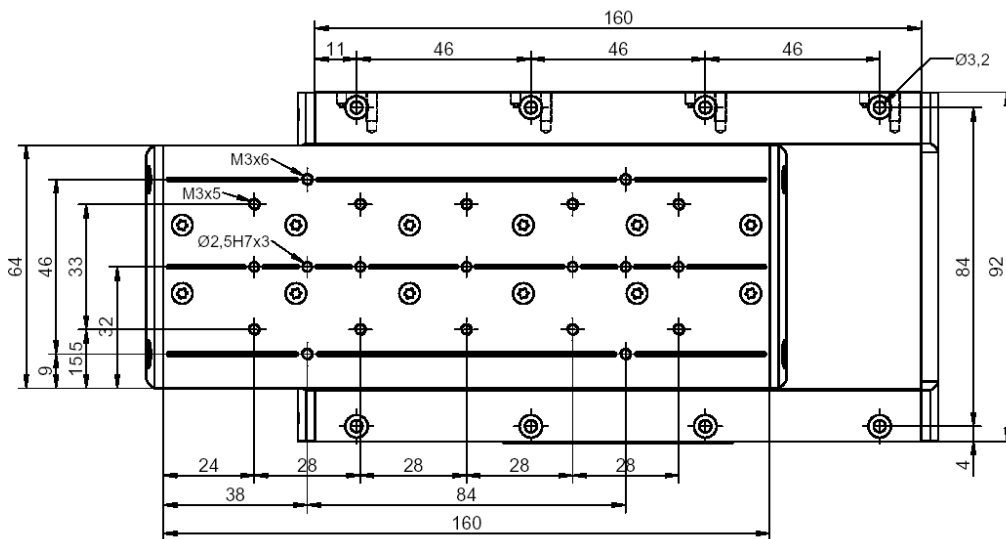
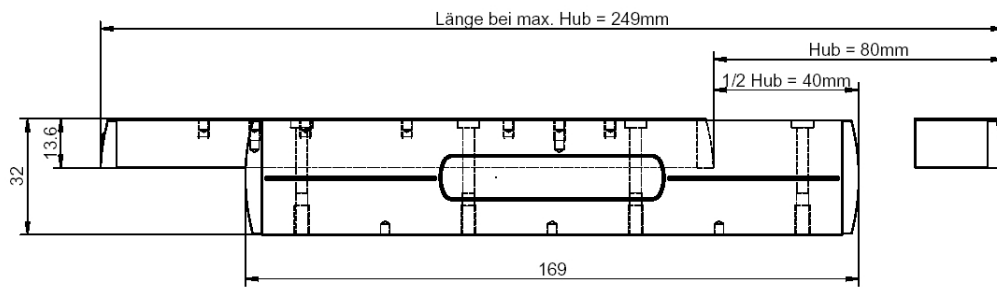
7.2 LINAX® Lx 85F10

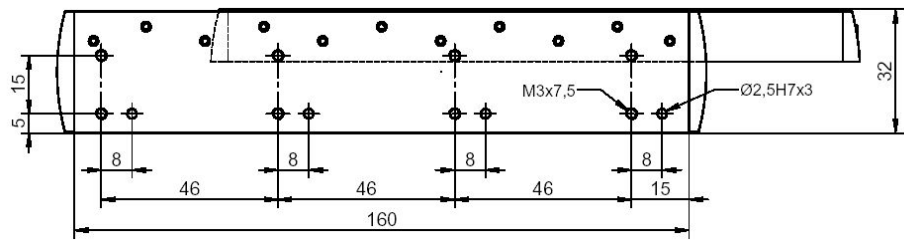
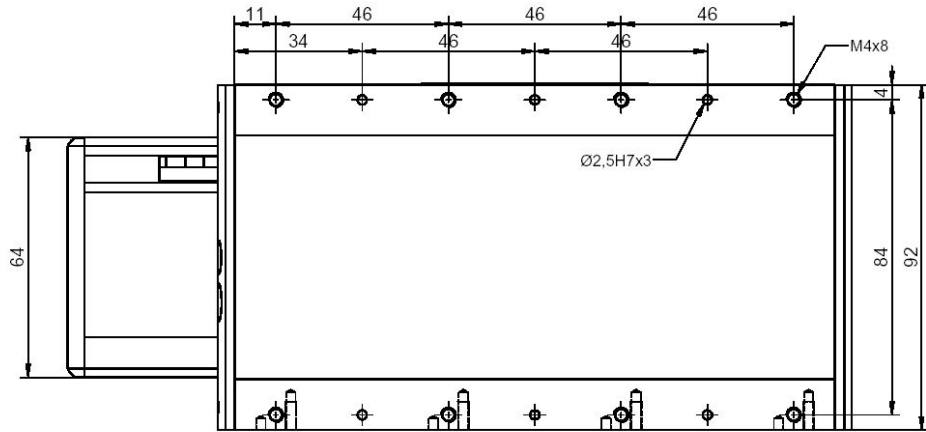


8 Lx 80F40, Lx176F40, Lx 272F40

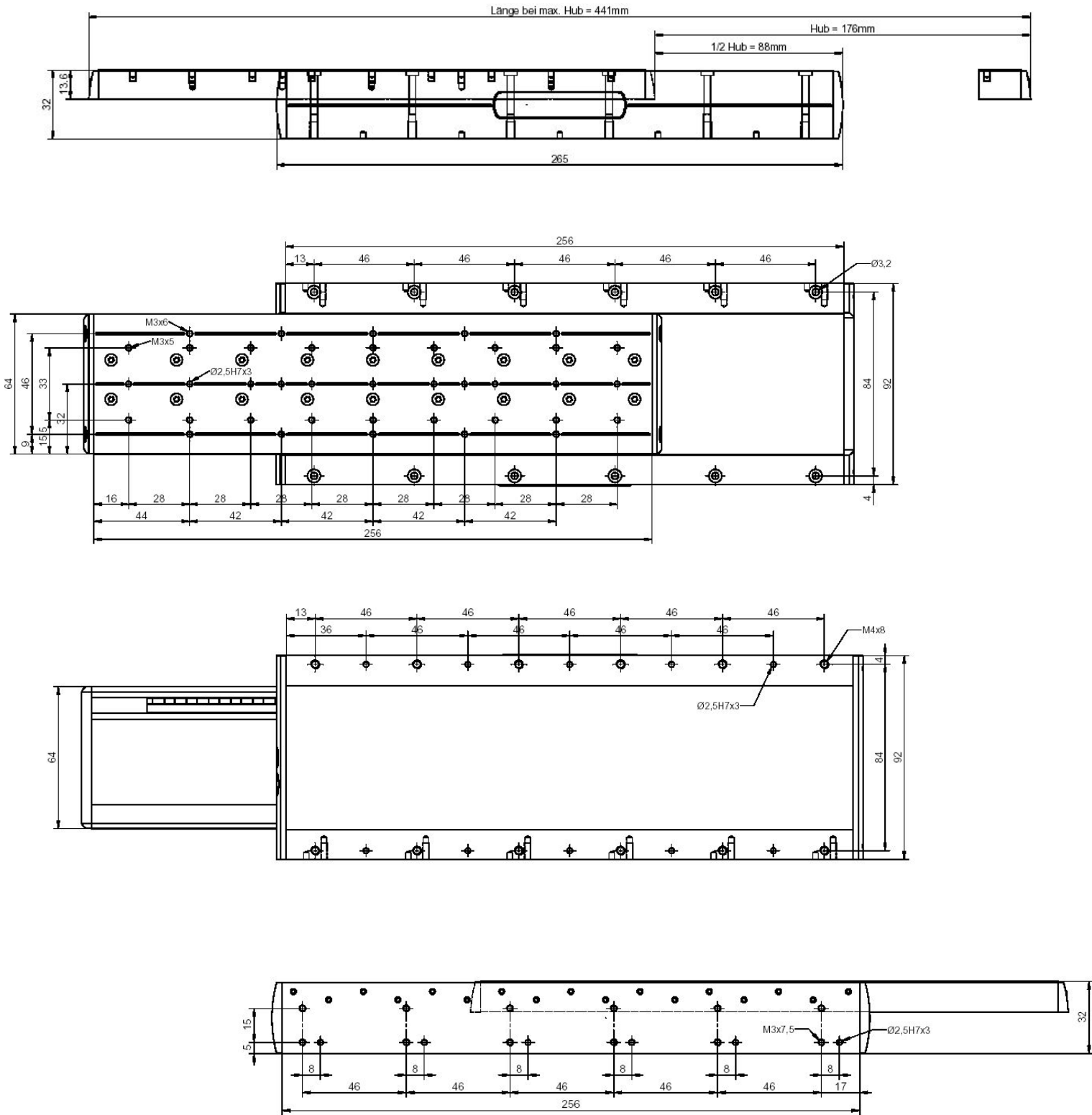


8.1 LINAX® Lx 80F40

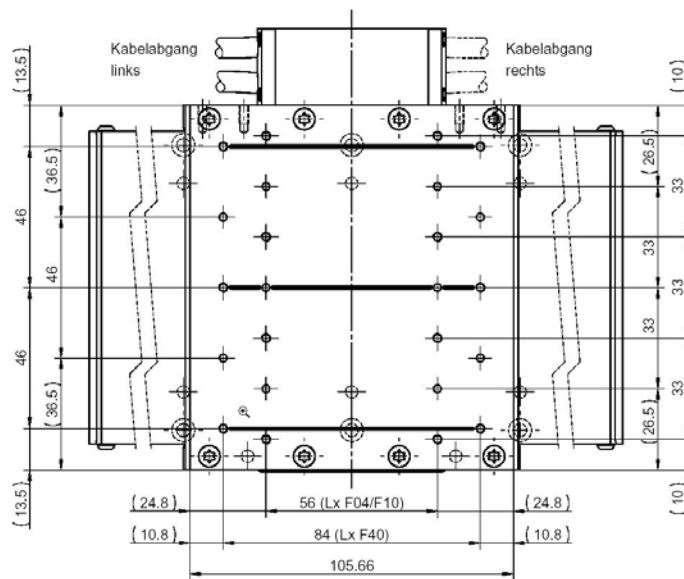
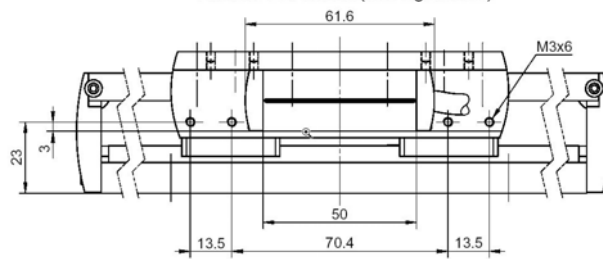
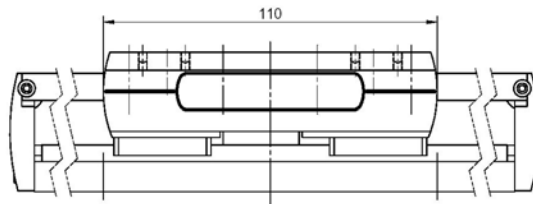
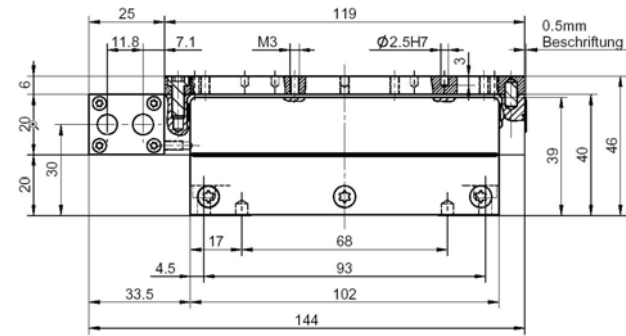


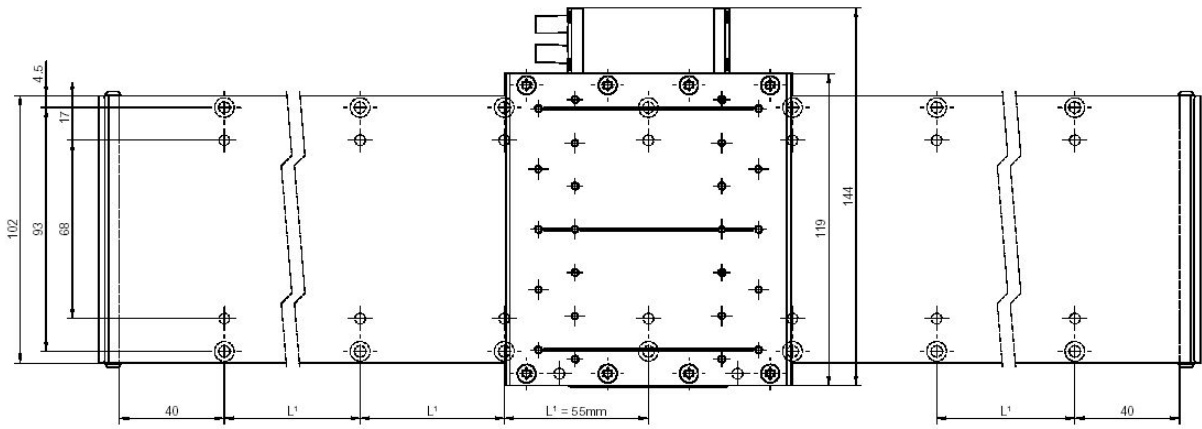


8.2 LINAX® Lx 176F40

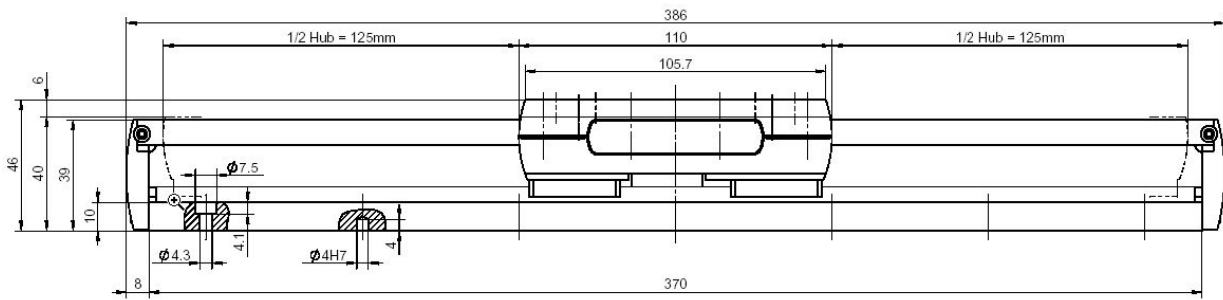


9 Lxe 250F40, Lxe 400F40, Lxe 550F40
Lxe 800F40

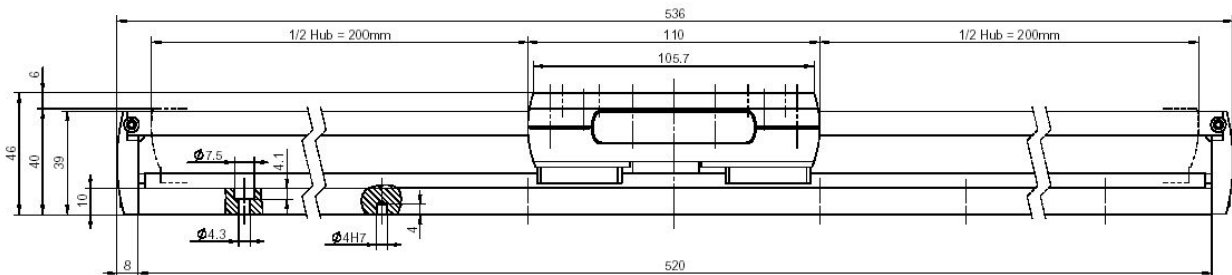




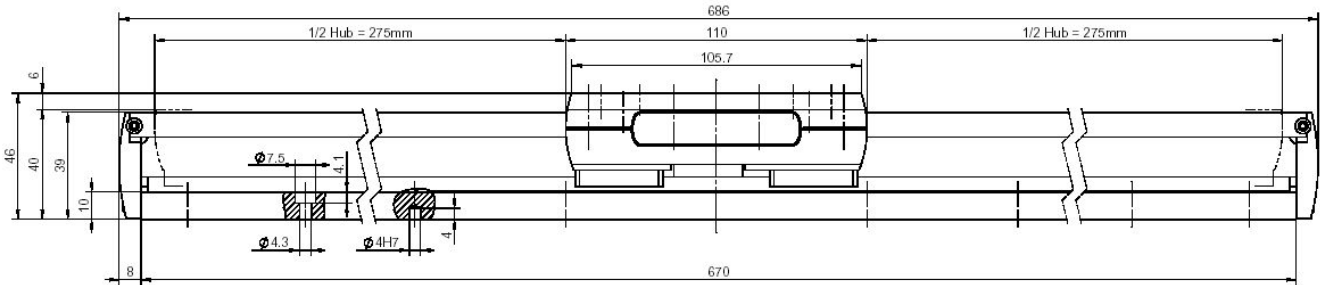
9.1 LINAX® Lx 250F40



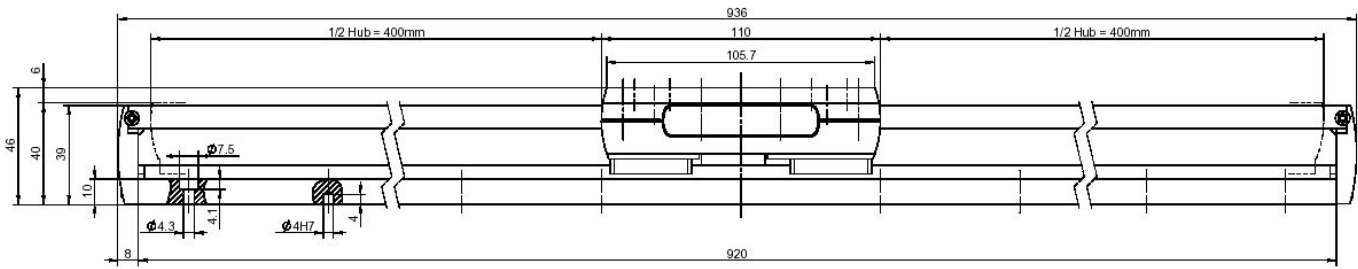
9.2 LINAX® Lx 400F40



9.3 LINAX® Lx 550F40



9.4 LINAX® Lx 800F40



10 Mass compensation

The LINAX® Lx 85F10, Lx 80F40 and Lx 176F40 are available with vertical mass compensation.



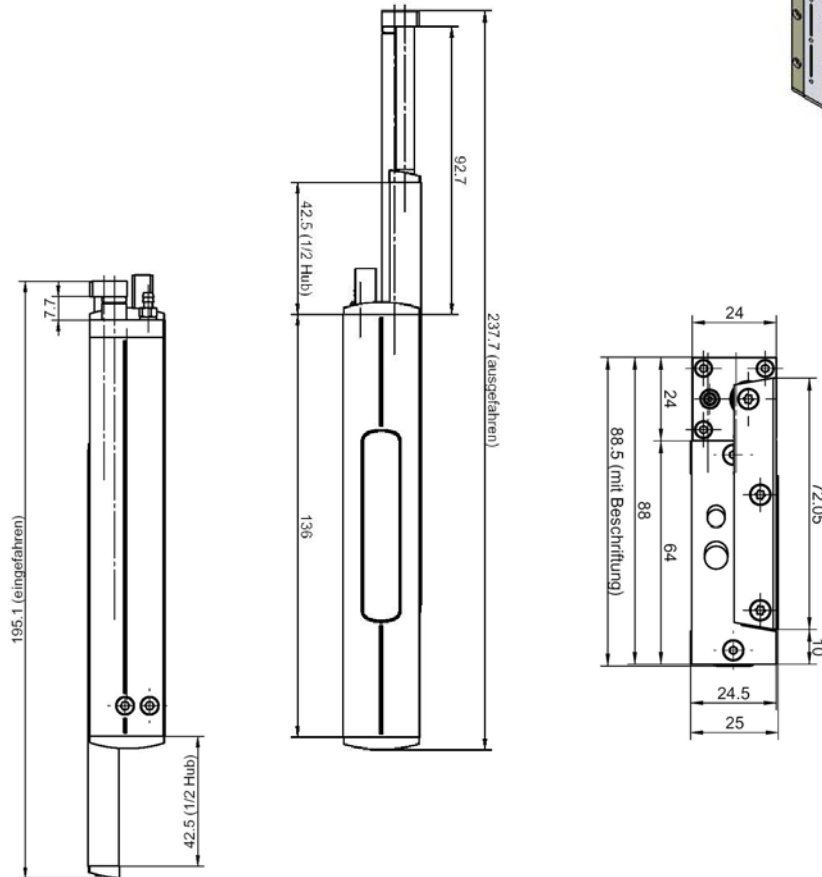
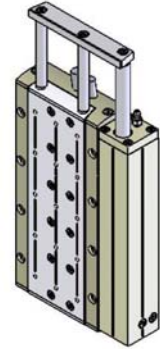
When the linear motors are installed in a vertical direction two problems have to be solved. On the one hand, the linear motor must hold the mass permanently, this consumes power which is then no longer available for the dynamic movement. On the other hand, the mass falls down in the case of power failure.

With a brake, the falling down could be prevented, but the power drain still remains. Therefore, the solution with the mass compensation cylinder is advantageous. The force can be adjusted very simply with the pressure control valve. If the mass is balanced, the linear motor stops at the current position in the case of power failure. If the mass is lightly overcompensated, then the linear motor travels upwards in the case of power failure.

The expansion volume for a linear characteristic force curve already exists with the LINAX® mass compensation. Just connect compressed air and adjust the compensation force with the pressure control valve, that's all. The system consumes no compressed air.

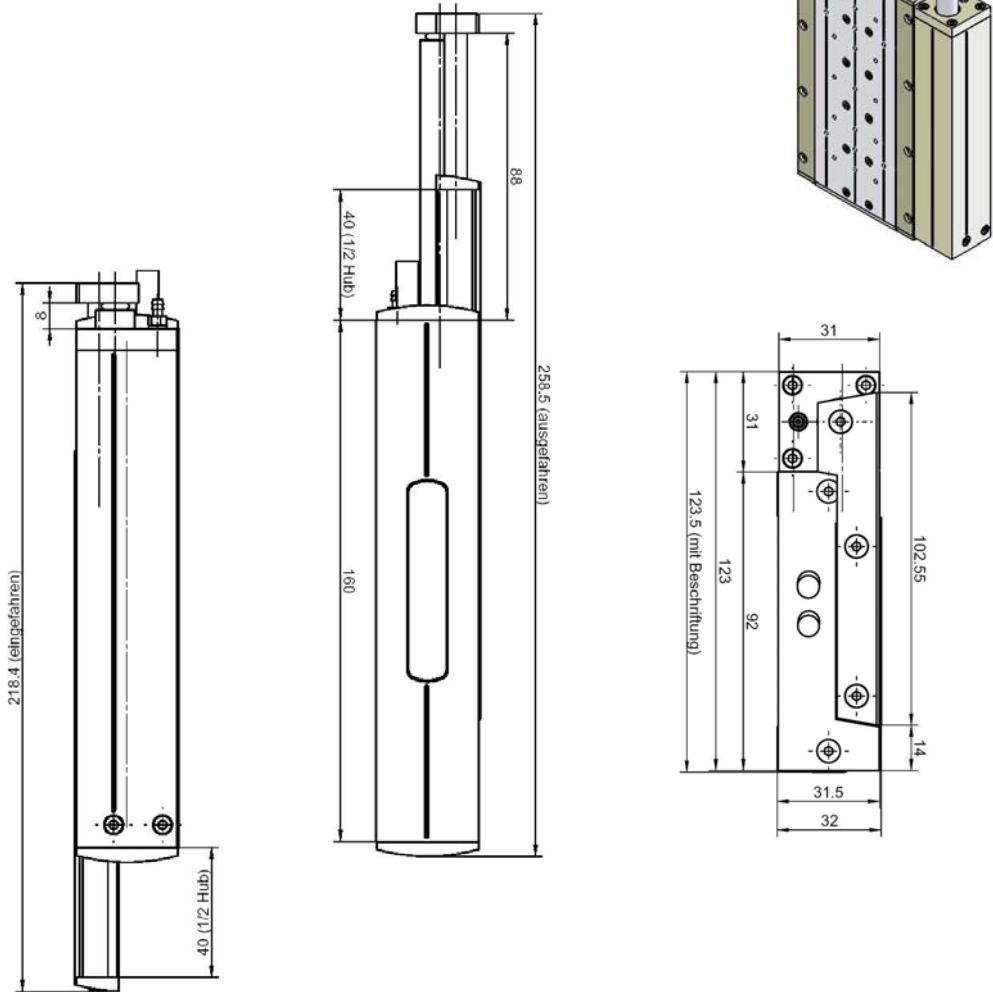
10.1 Mass compensation Lx 85F10

Maximum mass of compensation
3kg, at 6 bar



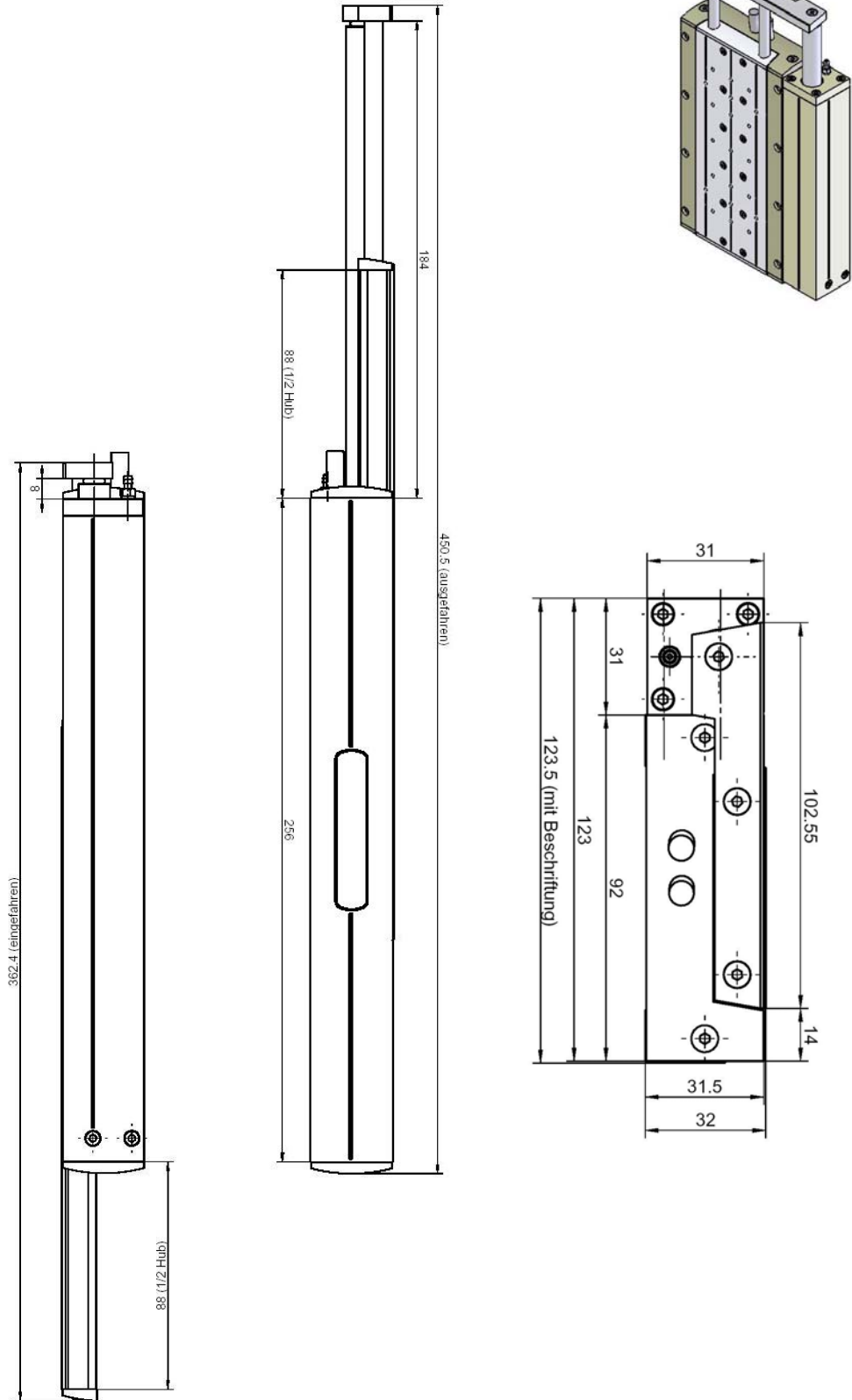
10.2 Mass compensation Lx 80F40

Maximum mass of compensation
6 kg, at 6bar



10.3 Mass compensation Lx 176F40

Maximum mass of compensation
6 kg, at 6bar



11 Connecting cables

11.1 Pin assignment, motor cable

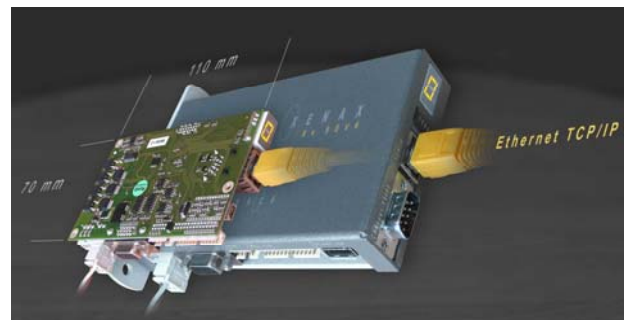
Wire identification	Wago 3,5mm Art. 734-103	Connections LINAX®
1 (white)	1	U
2 (brown)	2	V
3 (green)	3	W

11.2 Pin assignment, encoder cable

Colour DIN 47100	HD D-Sub 15 Pol	Signals LINAX®
white	1	GND
brown	2	5V
green	3	A
yellow	4	A*
grey	5	B
pink	6	B*
blue	7	Z
red	8	Z*
black	9	Test*
violet	11	TMP* / Scale*
grey/pink	13	I ² C_SCL
red/blue	15	I ² C_SDA

Our XENAX® servo controllers first identify the LINAX® type via the I²C bus. Thereby the stroke is recognized and the setup of the motor parameters will be carried out automatically. Additionally, the coil temperature of the LINAX® will be observed constantly via the I²C bus.

The Z / Z* signals are the distance coded reference marks on the glass scale. By travelling over 2 marks anywhere on the scale, the XENAX® servo controller calculates the actual travel plate position (absolute) automatically.



How can you find the home (zero) position with motor controllers from “other suppliers”? After power on, move the travel plate towards the cable connections up to the mechanical stop (i.e. with current limitation). Change the moving direction, the first detected reference mark is the home position on the glass scale. We recommend setting this point as the zero position. Afterwards move with absolute position values only.

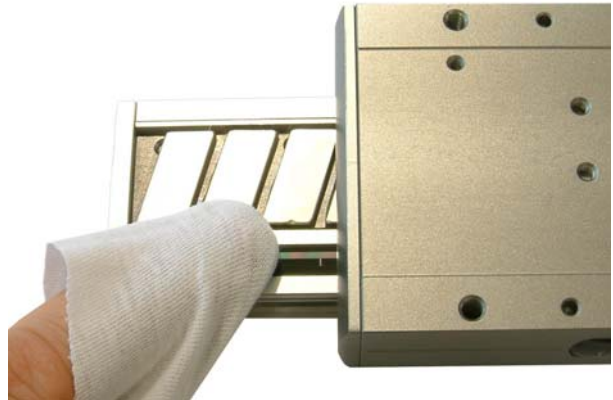
Important: With motor controllers from “other suppliers” monitor the pin 11 signal TMP* constantly to 5V. Should it be 0V, the coil has exceeded 80°C. Switch off the power stage immediately.

11.3 Glass scale LINAX®

With the independent security double-scanning read head the optical measuring system has a high insensitivity to dirt. To improve this reliability further, we recommend cleaning the glass scale following installation.

Use a cloth and a degreasing, non-abrasive, cleaning liquid, e.g. clear, cleaning petrol from a chemist.

Move the travel plate of LINAX® to a mechanical stop. This exposes the "dirty" area on the underside for cleaning. Afterwards move the travel plate to the other mechanical stop and clean the other side.



LINAX® View of underside

Notes

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Information in this instruction manual is subject to change.

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