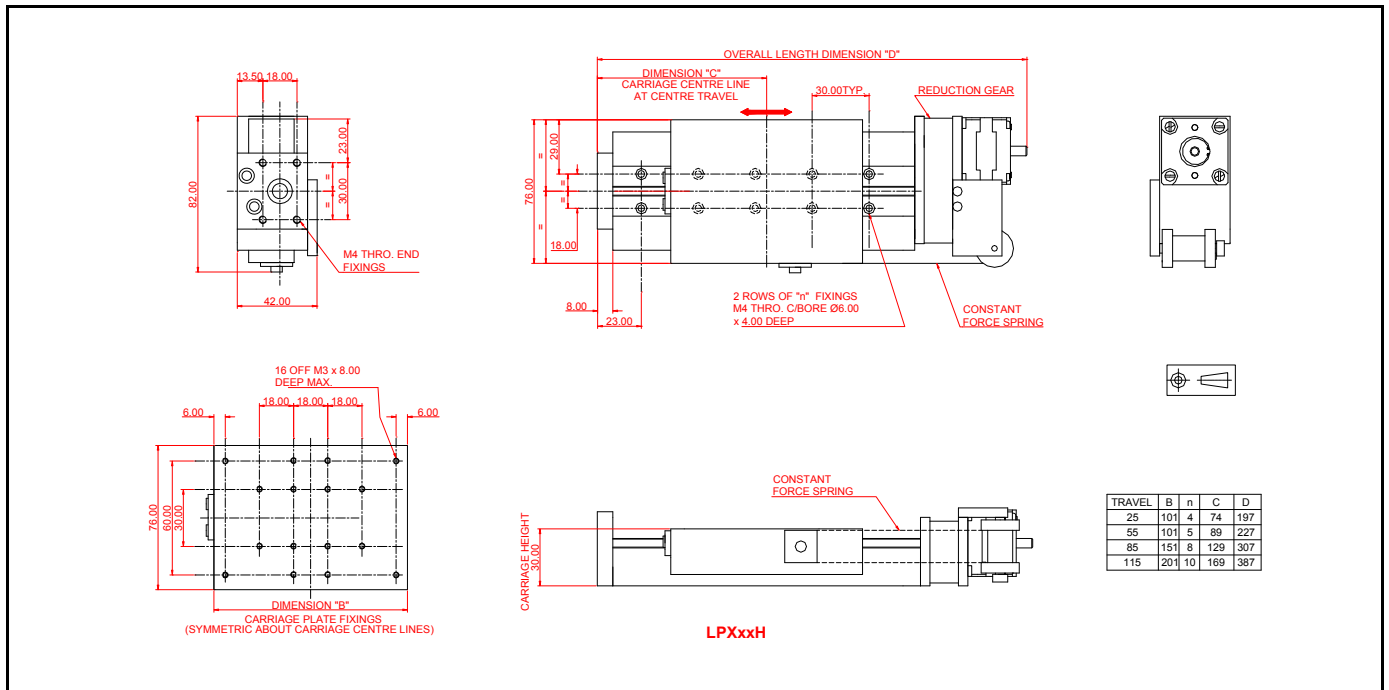


## UHV LOW-PROFILE LINEAR SAMPLE TRANSPORTERS, MODELS LPXxxL and LPXxxH

These mechanisms provide translation for loads of up to several tens of kilograms. They are generally similar to the AML LPV series, but use crossed-roller guides. They have very high rigidity, which is necessary where several transporters are stacked for compound motion or where offset loads are present. Options on resolution are offered. They are manufactured to order, so that design variations can be incorporated at modest cost.



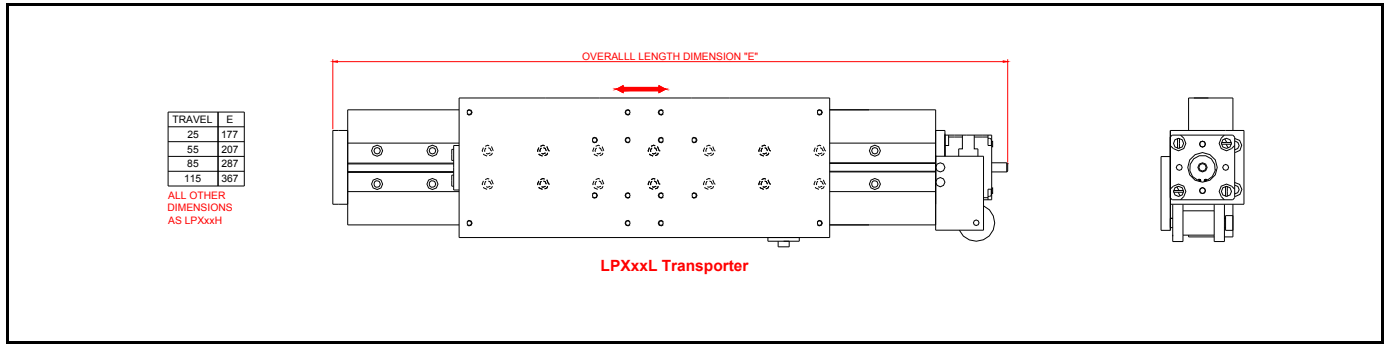
The green (first) specification figure refers to LPXxxH, shown above, and the red (second) figure to LPXxxL, shown overleaf.

- ◆ Travels 25, 55, 85 or 115, custom to 175mm.
- ◆ Resolution 1 $\mu$ m or 4 $\mu$ m per step.
- ◆ Repeatability better than 0.2 or 1 $\mu$ m.
- ◆ Traverses up to 4 or 12mm/sec.
- ◆ Backlash negligible. See notes overleaf.
- ◆ Axial load <10kg or <3kg at mid-speed.  
Normal load (e.g. sample weight with carriage in horizontal plane) <50kg. Load moment <20Nm.
- ◆ Roll, pitch and yaw <25 $\mu$ radians, unloaded.  
Straightness of travel <1.3 $\mu$ m/100mm, unloaded.
- ◆ Roll compliance 5 $\mu$ radians/Nm, pitch and yaw compliance 2 $\mu$ radians/Nm, see notes overleaf.  
Normal load compliance 0.1 $\mu$ m/N.
- ◆ Replaces AML LPV for larger loads and rigidity.
- ◆ Carriage height 30mm. Overall height 42mm.
- ◆ Directly stackable for XYZ with no additional hardware. AML LPV, CRS etc. also stack directly.
- ◆ Can be used in any orientation.
- ◆ UHV - compatible materials and construction. Aluminium alloy, non-magnetic stainless-steel, aluminium bronze. Running surfaces are dissimilar materials or suitably coated.
- ◆ May be customised (width, materials, fixings etc.) at low cost.
- ◆ Suitable for use below  $1 \times 10^{-10}$  mBar.
- ◆ Bakeable to 200 $^{\circ}$ C (limited by motor).
- ◆ Gamma radiation - hard to  $1 \times 10^9$  Rad ( $1 \times 10^7$  Sv/Gy) with C14.1R motor.

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# AML

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PRINCIPAL SPECIFICATIONS.	LPXxxH	LPXxxL
Resolution	1µm	4µm
Repeatability	0.2µm	1µm
Unloaded speed, lubricated @ I <sub>p</sub> = 1A, motion horizontal	>4mm sec <sup>-1</sup> ( 4 kHz )	>12mm sec <sup>-1</sup> ( 3 kHz)
Recommended loaded speed in UHV, baked, any orientation	<0.8mm sec <sup>-1</sup> ( 1kHz)	<2 mm sec <sup>-1</sup> ( 500Hz)
Axial load force @ 500Hz, I <sub>p</sub> = 1A	10kg	3kg
Total weight 25mm	1.2kg	1.0kg
Carriage weight	0.30kg	0.30kg
Overall length	197.1mm	177.1mm
Total weight 55mm	1.35kg	1.15kg
Carriage weight	0.30kg	0.30kg
Overall length	227.1mm	207.1mm
Total weight 85mm	1.80kg	1.60kg
Carriage weight	0.45kg	0.45kg
Overall length	307.1mm	287.1mm
Total weight 115mm	2.20kg	2.0kg
Carriage weight	0.60kg	0.60kg
Overall length	387.1mm	367.1mm

**BACKLASH.** Backlash in the gearbox of LPXxxH is controlled by special gearing and is negligible. Backlash between the nut and leadscrew and axial float in the bearings is controlled by a constant-force spring and is much less than the resolution. If the transporter is used for motion with a significant vertical component (>30°), the load provided by the carriage weight is sufficient to eliminate backlash and the spring can be removed. In these cases mount with the motor at the top. Since speeds are low, acceleration forces are negligible.

**ROLL COMPLIANCE.** Multiple-axis mechanisms can produce varying roll moments about the bottom transporter. The LPX carriage will deflect about the roll axis at 5µradian per Nm. To achieve this performance the transporter must be fixed to an extremely rigid, flat baseplate, using all of the base fixings. For longer transporters fixed only by the central holes, the roll compliance will increase steadily by two or three times toward the ends of travel, due to twisting of the base.

Where LPV transporters are stacked on LPX arrange that the LPX has the shorter travel for economy of cost and space.

For loads with larger moments, weights or forces these designs can be adapted at low cost.

**VERNIER STOP.** These transporters may be driven to vernier stops at the limits of their travel and stalled without damage. See AML Application Note No.31 for a description of vernier stops.

**STACKED MECHANISMS.** For 3-axis motion mount the stage moving the load vertically on top of the others to avoid adding their weight to its load.

**Ordering information:**

- e.g. **LPX25H** Low-Profile Transporter, 'X', 25mm, 1µm res.
- e.g. **LPX115L** Low-Profile Transporter, 'X', 115mm, 4µm res.  
add suffix G for Nytorr®5200 lubrication (at > 1 x 10<sup>-9</sup> mBar)\*\*  
\*\* consult AML for other custom features.
- C14.1** UHV Stepper Motor
- C14.1R** UHV Stepper Motor ( Radiation-hard )

A C14.1 motor must be ordered with each transporter. The motor and mechanism will be supplied assembled together and tested.

**Related Products:**

- SMD2** Dual UHV Compatible Stepper Motor Drive.
- MLF18xx** Feedthroughs, leads and in-vacuum connectors.

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