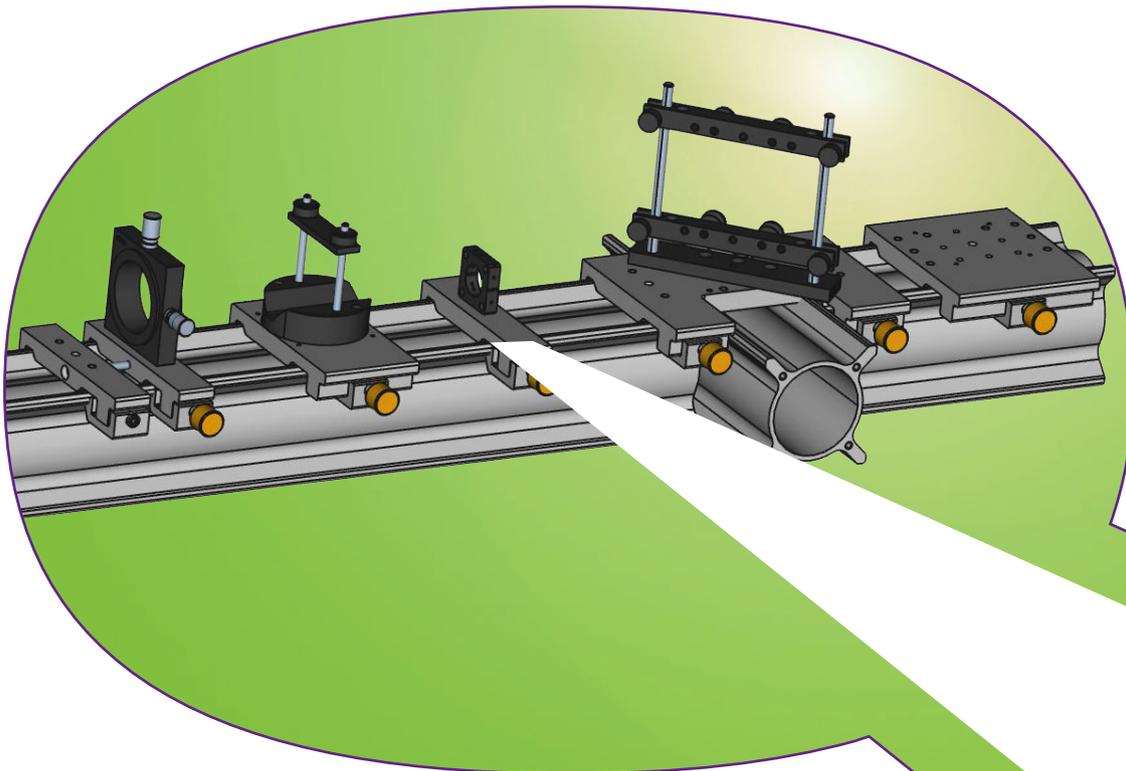


# LINOS X 95 System

## Products and Applications



## Company Profile

Qioptiq, an Excelitas Technologies Company, designs and manufactures photonic products and solutions that serve a wide range of markets and applications in the areas of medical and life sciences, industrial manufacturing, defense and aerospace, and research and development.

Qioptiq benefits from having integrated the knowledge and experience of Avimo, Gsänger, LINOS, Optem, Pilkington, Point Source, Rodenstock, Spindler & Hoyer and others. In October 2013,

Qioptiq was acquired by Excelitas Technologies Corp., a global technology leader focused on delivering innovative, customized solutions to meet the lighting, detection and other high-performance technology needs of OEM customers. The combined companies have approximately 5,500 employees in North America, Europe and Asia, serving customers across the world.

Visit [www.qioptiq.com](http://www.qioptiq.com) and [www.excelitas.com](http://www.excelitas.com) for more information.

1877



Rodenstock  
founded

1898



Spindler & Hoyer  
founded

1966

Pilkington PE  
Ltd. founded,  
which later  
becomes  
THALES Optics

1969



Gsänger  
Optoelektronik  
founded

1984



Optem  
International  
founded

1991



Point Source  
founded

1996



LINOS founded  
through the merger  
of Spindler & Hoyer,  
Steeg & Reuter  
Präzisionsoptik,  
Franke Optik and  
Gsänger Optoelektronik



# Content

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Flat Rail System FLR 95	16 - 17
Questions and Answers	18 - 20
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2000



Rodenstock  
Präzisionsoptik  
acquired  
by LINOS

2001



AVIMO Group  
acquired  
by THALES

2005

Qioptiq  
founded as  
THALES sells  
High Tech  
Optics Group

2006 / 2007



Qioptiq acquires  
LINOS and Point Source  
as "members of the  
Qioptiq group"

2010



The new Qioptiq  
consolidates all  
group members  
under one brand

2013



Qioptiq is acquired by  
Excelitas Technologies



# X 95 Profile System

The X 95 Profile System includes both profiles and carriers, and is a versatile construction system for optics and precision mechanics. It is particularly well suited as an optical bench, or for table and framework structures.

- Hollow extrusions with cruciform arrangement of longitudinal ribs
- For assembling tables or framework structures and large scale optical benches
- Allows assembling of three-dimensional structures
- Smooth-gliding carriers equipped with spring-loaded clamps
- Fabricated from anodized aluminum

## Your benefit

- Lightweight, modular and robust construction system
- Quick and easy setup
- Short lead times guaranteed
- Compatible to other LINOS systems

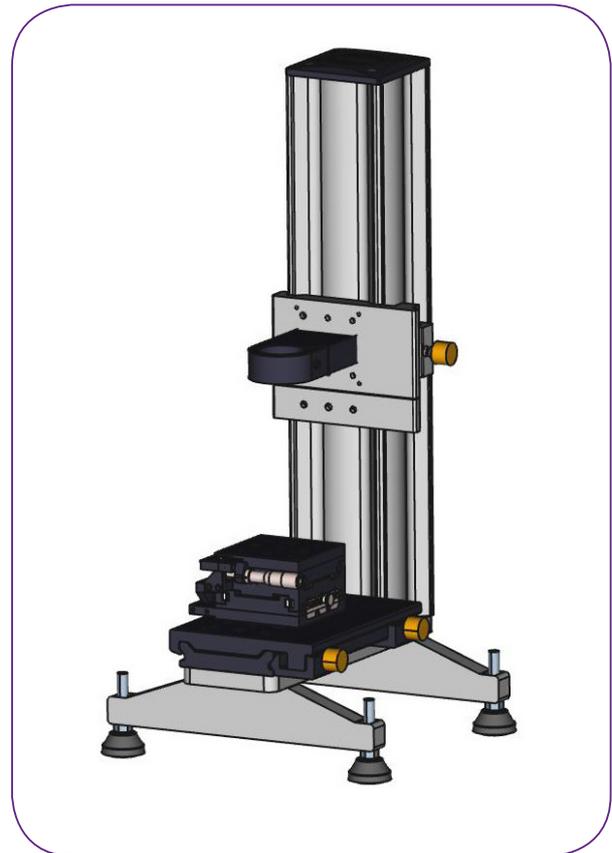


## Special features:

Modularity allows construction of a multitude of tailored designs. Components can easily be combined with other components from our Q-shop portfolio.

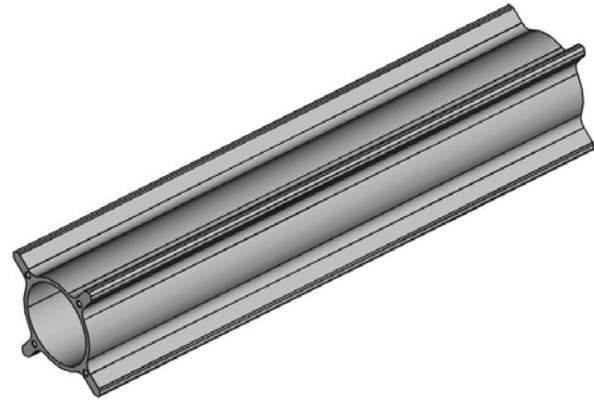
## Ideal areas of application:

Extremely stable system for research, production, and education.

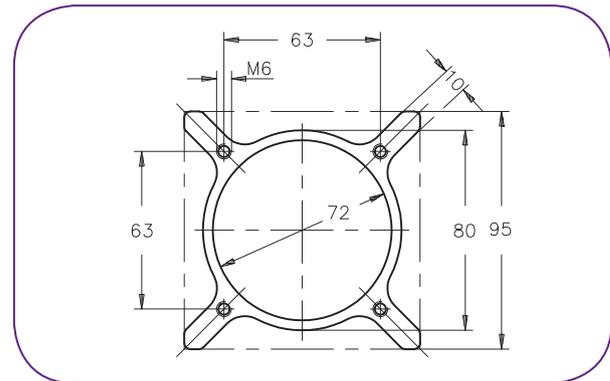


## Profile X 95

An X 95 profile is a hollow, cylindrical aluminum profile with four lateral ridges which reinforce the system and also hold the carriers. These ridges increase the torque of inertia and torsional strain considerably. Four threaded bore holes on the profile end planes provide fastening options for connectors, carriers or caps. The X 95 profiles are available in many standard lengths. Custom lengths of up to 3 m can be supplied on request.



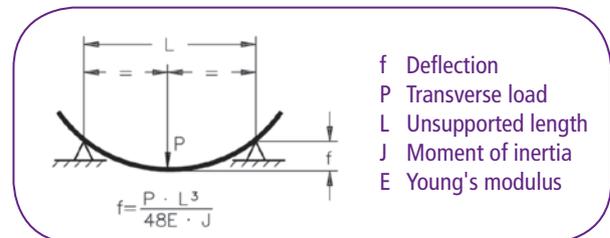
- Allows assembling of three-dimensional structures
- For assembling tables or framework structures or robust optical benches
- Hollow extrusions with cruciform arrangement of longitudinal ribs
- Smooth-gliding carriers equipped with spring-loaded clamps
- Easy assembling



05

## Specifications

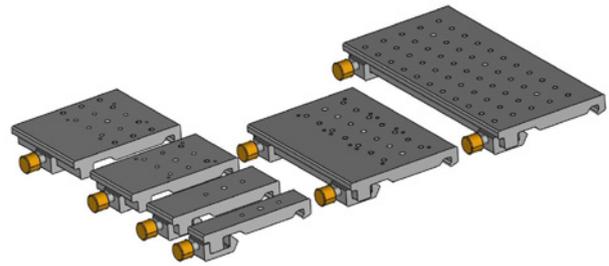
- Anodized aluminum
- Moments of inertia  $J_x / J_{\Delta} \sim 220 \times 10^4 \text{ mm}^4$
- Torsional stress  $J_0 \sim 1.2 \text{ kg cm}^2$  per cm length
- Young's modulus  $E \sim 70 \text{ kN/mm}^2$
- Tolerance warpage 0.5 mm/m
- Tolerance twist 0.6 mm/m



Item Title	Length (mm)	Length (feet)	Weight (kg)	Part No.
Profile X 95- 250	250	0.82	1.4	G026102000
Profile X 95- 500	500	1.64	2.7	G026105000
Profile X 95- 640	640	2.10	3.4	G026106000
Profile X 95- 750	750	2.46	4.1	G026107000
Profile X 95- 1000	1000	3.28	5.4	G026110000
Profile X 95- 1500	1500	4.92	8.1	G026115000
Profile X 95- 2000	2000	6.56	10.8	G026120000
Profile X 95- 2500	2500	8.20	13.5	G026125000
Profile X 95- 3000	3000	9.84	16.2	G026125300
Profile X 95- Custom	Custom	Custom		On request

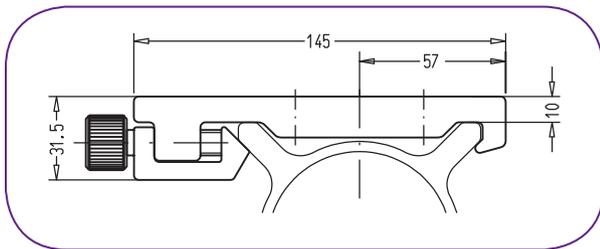
## Carriers X 95

The Carriers X 95 can be utilized to mount components onto an X 95 profile. A Teflon film on the bottom side allows a smooth gliding of the carriers on the X 95 rails and therefore provides a precise adjustment. The thumb screws enable a flexible locking and unlocking of the carrier's position without additional tools. The carriers are available with or without hole pattern either with black or with colorless anodizing.



- Anvil/clamping screw locking mechanism
- Spring-loaded clamps
- Teflon-coated surfaces
- With or without hole pattern
- Anodized black or colorless
- Ø 6.6 mm center bore for posts or similar devices
- M4 mounting threads, 63 mm hole pattern
- M6 threaded hole for top mounting, 25 mm hole pattern
- Bottom mounting with counterbored holes for M4 screws, 25 mm hole pattern

06



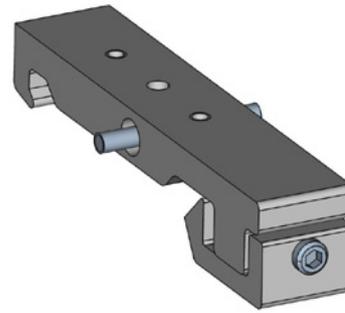
### Standard Plus

All parts are also available without hole pattern.

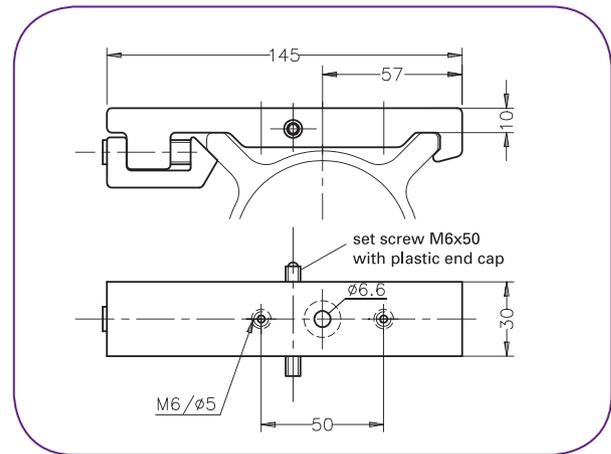
Item Title	Width (B) / mm	Width (B) / inch	Anodized	Part No.
Carrier X 95- 30 colorless	30	1.18	Colorless	G026420000
Carrier X 95- 30 black	30	1.18	Black	G026519000
Carrier X 95- 50 colorless	50	1.97	Colorless	G026421000
Carrier X 95- 50 black	50	1.97	Black	G026521000
Carrier X 95- 80 colorless	80	3.15	Colorless	G026422000
Carrier X 95- 80 black	80	3.15	Black	G026522000
Carrier X 95- 120 colorless	120	4.72	Colorless	G026423000
Carrier X 95- 120 black	120	4.72	Black	G026523000
Carrier X 95- 200 colorless	200	7.87	Colorless	G026428000
Carrier X 95- 200 black	200	7.87	Black	G026528000
Carrier X 95- 300 colorless	300	11.81	Colorless	G026429000
Carrier X 95- 300 black	300	11.81	Black	G026529000

### Carrier Positioner X 95

The Carrier Positioner X 95 allows the fine alignment of another carrier within a range of 20 mm by pushing it via a plastic tipped screw to the desired position. In addition it can be utilized to mount the Double Leg (G026310000) to an X 95 profile.



- For fine aligning the position of an X 95 carrier (travel: up to 20 mm)
- Ø 6.6 mm center bore for posts or similar devices
- M6 threaded holes for top mounting
- Bottom mounting with counterbored holes for M4 screws, 50 mm hole pattern



07

Item Title	Width (B) / mm	Width (B) / inch	Anodized	Part No.
Carrier Positioner colorless	30	1.18	Colorless	G026426000
Carrier Positioner black	30	1.18	Black	G026526000

#### Selection Guide

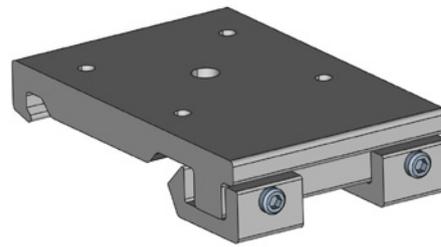
Please view chapter "Mounts and Posts" for a complete range of compatible components, such as:

- *Optic and Object holder*
- *Plate holder and Mounting plates*
- *Posts and Columns*

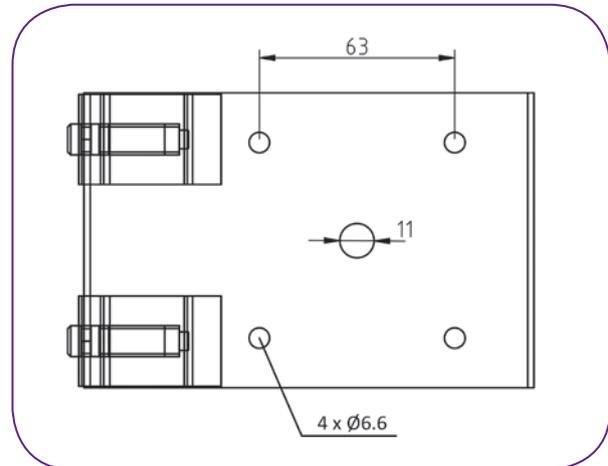


## Clamping Carrier X 95

The Clamping Carrier X 95 allows the construction of T-shaped structures with X 95 profiles. In contrast to the Carriers X 95 (see page 06), these clamping versions are not equipped with a Teflon film on the bottom side to provide a non-slippery connection to the profiles.



- Building T-structures with X 95 profiles
- Equipped with two anvil clamps
- Ø 11 mm center bore for mounting Levelling Feet
- 63 mm hole grid with Ø 6.6 mm holes



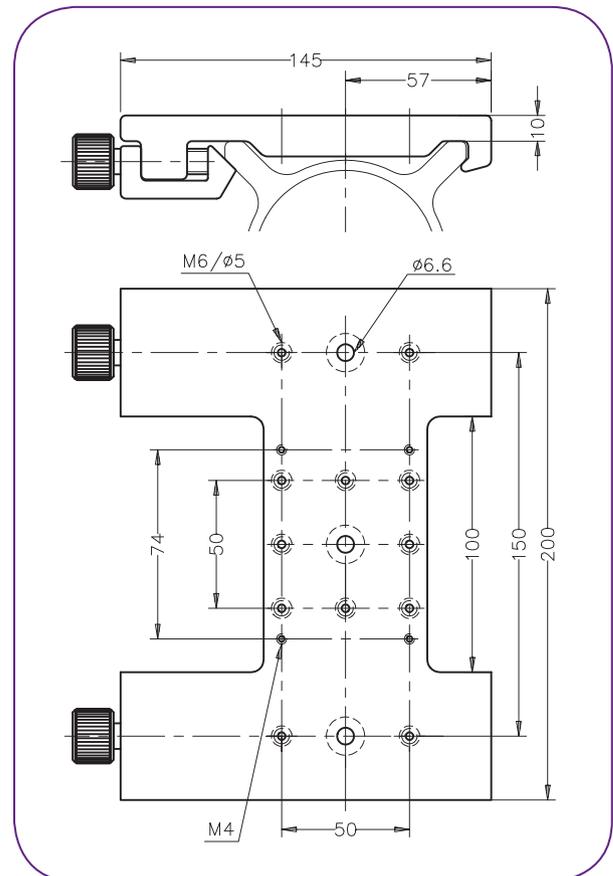
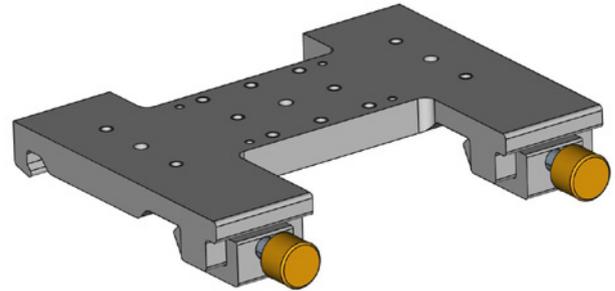
08

Item Title	Width (B) / mm	Width (B) / inch	Anodized	Part No.
Clamping Carrier colorless	95	3.74	Colorless	G026408000
Clamping Carrier black	95	3.74	Black	G026508000

## Cross Carrier X 95

For mounting components such as beam steering mirrors or beam splitters at the intersection of two optical axes.

- Teflon-coated guide surfaces
- Two anvil clamps for rigid mounting
- Equipped with spring-loaded clamps for smooth gliding actions



09

### A Closer Look

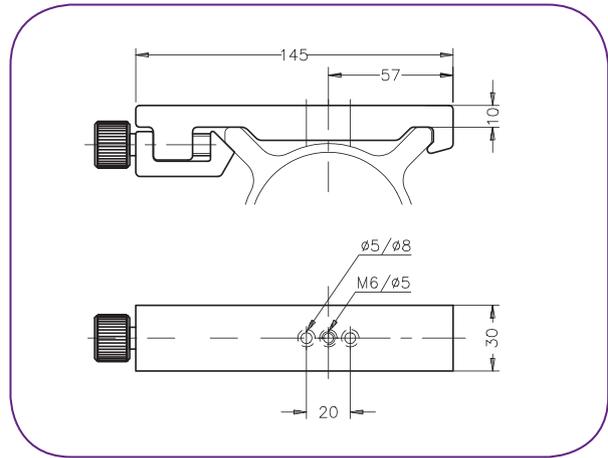
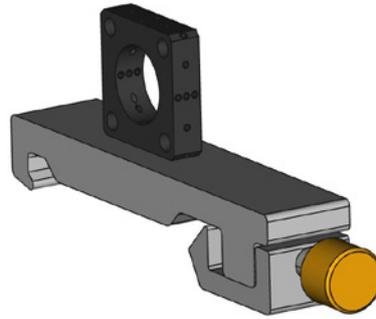
CAD files of all mechanical components can be found at [www.qioptiq-shop.com](http://www.qioptiq-shop.com) under "Docs and Drawings" on the respective product sheets.

Item Title	Width (B) / mm	Width (B) / inch	Anodized	Part No.
Cross Carrier colorless	200	7.87	Colorless	G026424000
Cross Carrier black	200	7.87	Black	G026524000

### Carrier – Microbench (MB)

This carrier can be used to mount Microbench components directly onto an X 95 profile. Furthermore, posts, etc. can be mounted via the central M6 thread.

- Teflon-coated guide surfaces
- Anvil/clamping screw locking mechanism
- Equipped with spring-loaded clamps for smooth gliding
- Bottom mounting of Microbench mounts
- Central M6 thread
- With counterbored holes for M4 screws



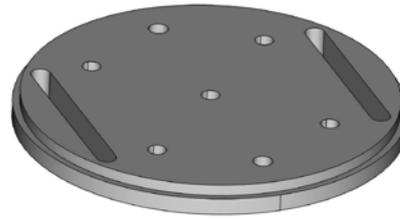
#### High Quality

This Carrier gives you the connection to our high performance LINOS Microbench system. This multi-functional cage system is well known for the highest axial precision in the market.

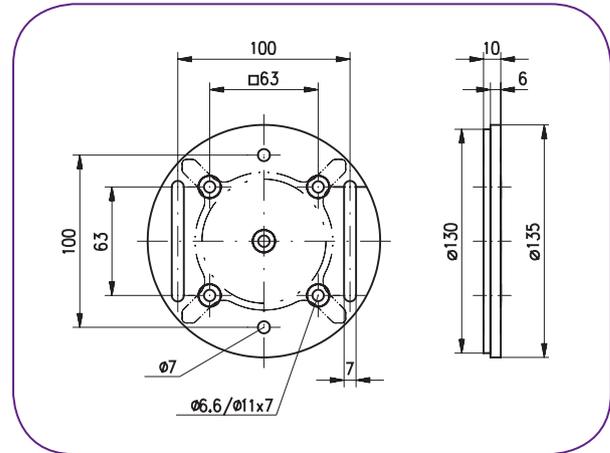
Item Title	Width (B) / mm	Width (B) / inch	Anodized	Part No.
Carrier - Microbench colorless	30	1.18	Colorless	G026427000
Carrier - Microbench black	30	1.18	Black	G026527000

## Base Plate

- For perpendicular mounting of profiles onto e.g. optical tables
- Easy positioning with slotted holes



Item Title	Outer Diameter (mm)	Outer Diameter (inch)	Part No.
Base Plate	30	1.18	G026206000



11

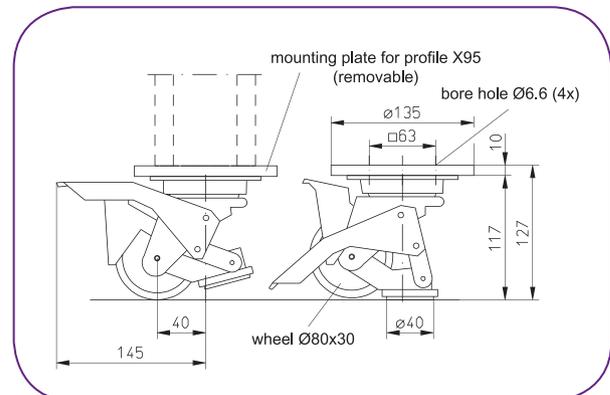
## Locking Caster

The Locking Caster can be used for mobile X 95 structures. It can be mounted directly to one end of a profile or to a Corner Connector.

- Easy to use locking lever
- Load capacity of up to 2 kN
- Mounts on X 95 Corner Connectors or ends of X 95 profiles
- Supplied complete with mounting screws



Item Title	Part No.
Locking Caster	G026256000



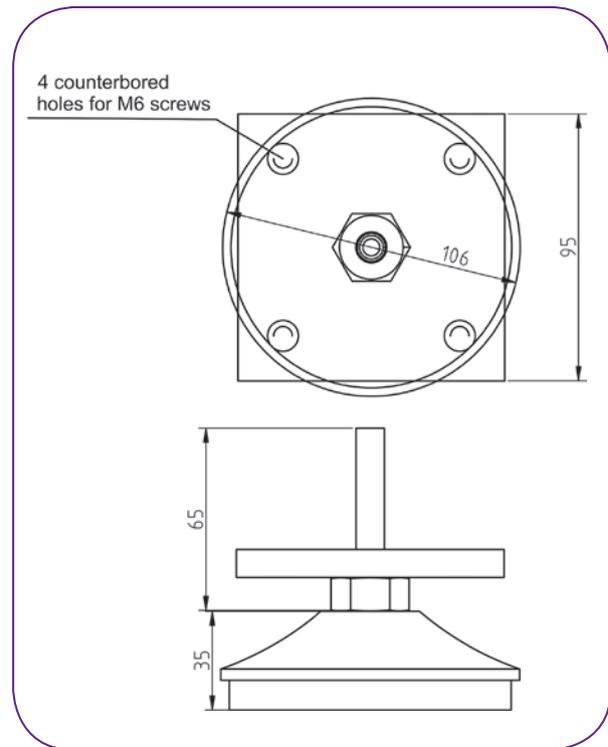
## Levelling Foot

The Levelling Foot provides a way to isolate a X 95 structure against vibrations. Combined with its high load capacity it is well suited as a foot for framework structures.

- Laminated vibration isolator plate diameter 100 mm, 15 mm thick
- The height can be adjusted,  $\pm 3$  mm
- Maximum load capacity of 3.5 kN
- Removable dowel allows mounting of breadboards

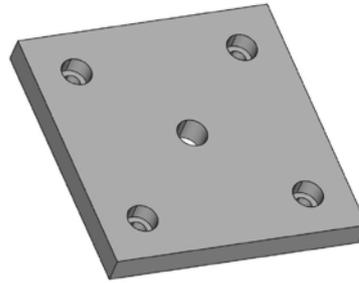


Item Title	Part No.
Levelling Foot	G026202000

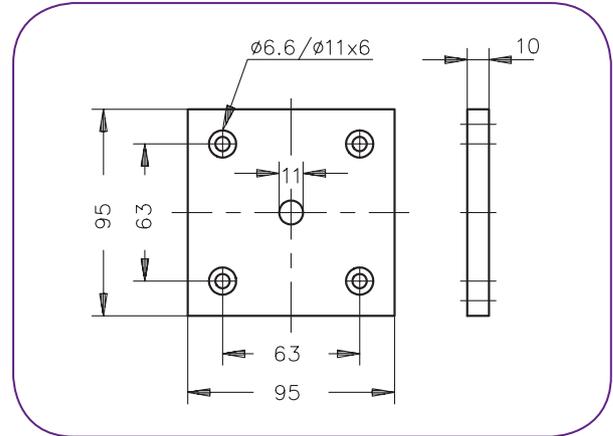


### End Plate

- Caps ends of profiles
- Acts as a stop for carriers
- For mounting X 95 profile structures on Levelling Feet
- Includes 6 ea. M6x16 Allen-head screws



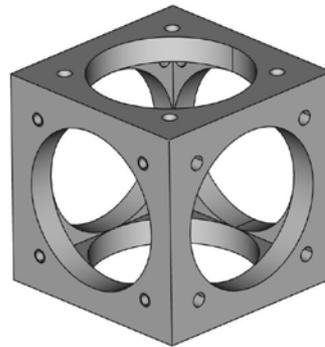
Item Title	Part No.
End Plate	G026201000



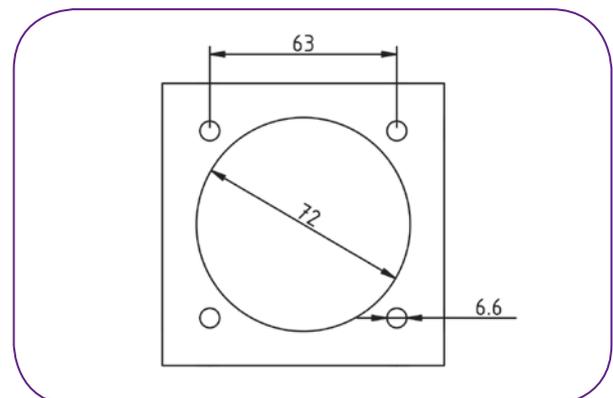
13

### Corner Connector

- Cubic coupler for assembling framework structures
- 5 faces each have diameter 6.6 mm holes for bolting coupler onto end of X 95 profile
- Other face has 4 M6 tapped holes for installing an X 95 clamping carrier

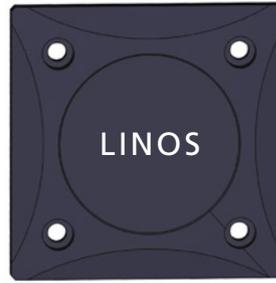


Item Title	Part No.
Corner Connector	G026210000

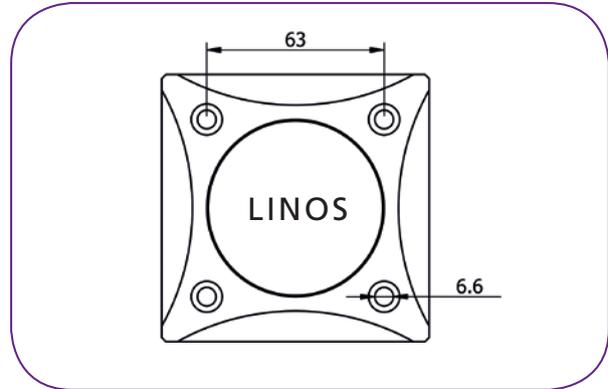


## Cover Plate

- For blanking off unused faces of Corner Connectors or open ends of X 95 profiles
- Supplied with 4 fastening screws
- Black anodized aluminum



Item Title	Part No.
Cover Plate	G026212000



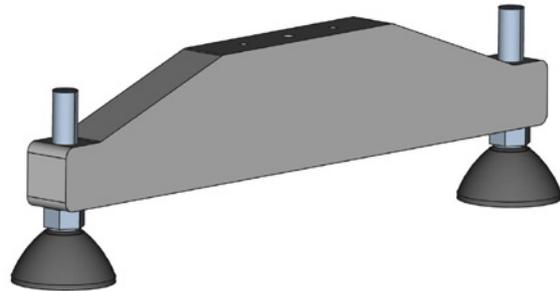
14

### Standard Plus

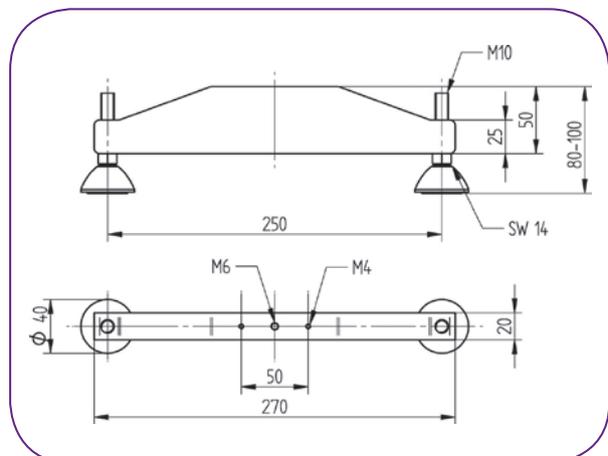
For volume orders have the cover plate engraved with your logo!

## Double Leg

- Height adjustable (approx.  $\pm 10$  mm)
- Swivel levelling pads
- Supplied with screws
- Requires Carrier X 95 for mounting (not included)

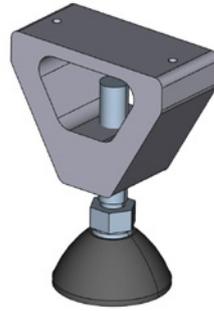


Item Title	Part No.
Double Leg	G026310000

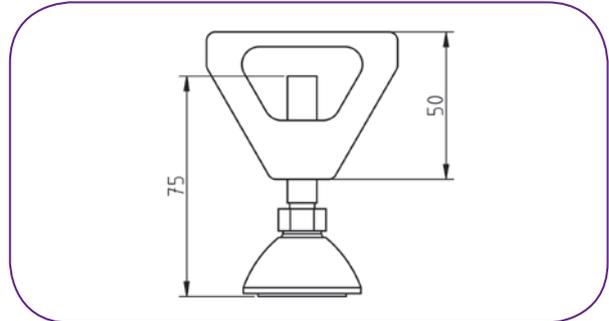


### Single Leg

- Height adjustable (approx.  $\pm 10$  mm)
- Swivel levelling pads supplied with screws
- Requires Carrier X 95 for mounting (not included)



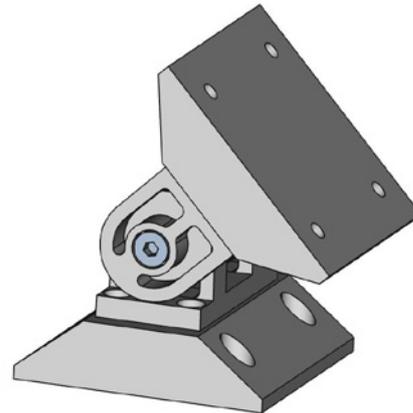
Item Title	Part No.
Single Leg	G026304000



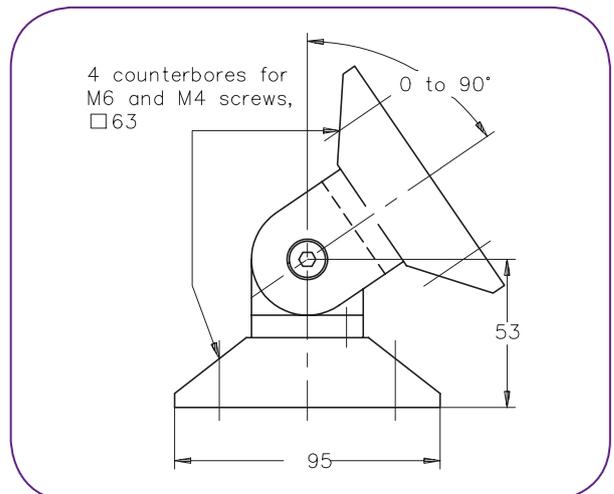
15

### Hinged Connector

- Allows for angle variation between two X 95 profiles
- Used as a cross brace for X 95 structures
- Supplied complete with mounting screws
- $\pm 90^\circ$  pivot



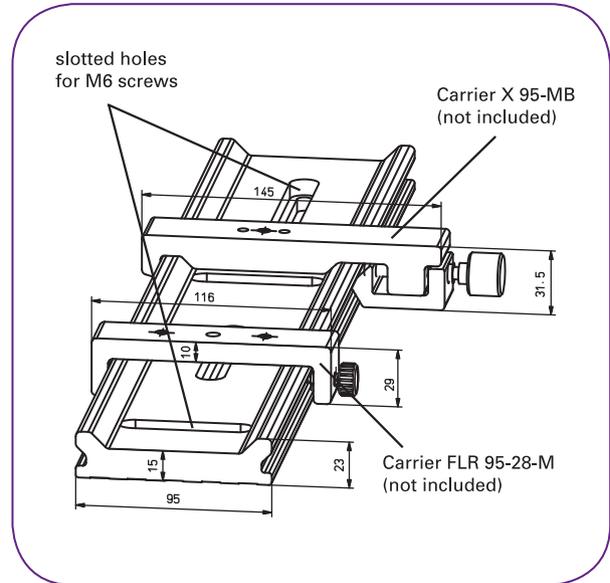
Item Title	Part No.
Hinged Connector	G026218000



## FLS 95 Rail System

The FLS 95 Rail System is ideal as a flat-profile optical bench, particularly for setups on optical tables. Its slotted holes make it independent of existing hole patterns and fit both M6 and 1/4" screws. The profile corresponds to the X 95 system and can use the same carriers. The rail surface is treated with abrasion-resistant black anodizing and the bearing surfaces are milled to ensure the highest guiding accuracy.

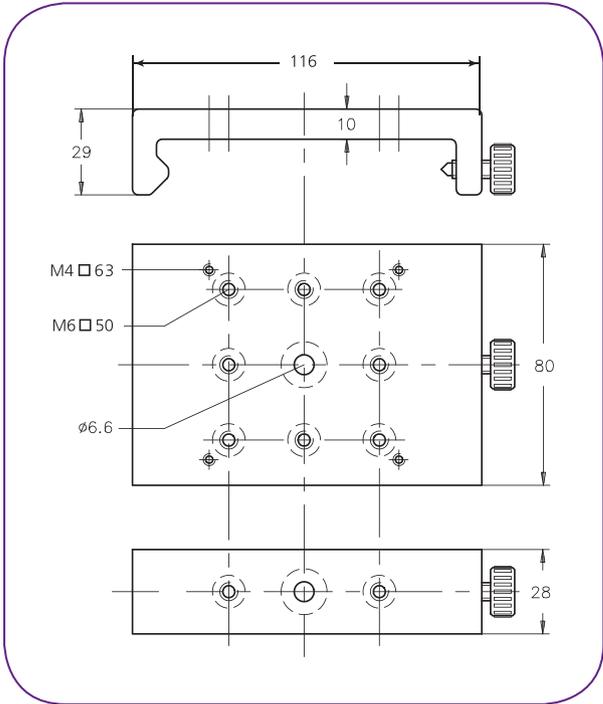
- Flat-profile optical bench
- Ideal for mounting components or instruments
- Slots in rails allow for readily shifting rail positions
- Extremely rigid
- Rails accept X 95 system components
- Black anodized profiled aluminum rails



Item Title	Length / mm	Length / feet	Part No.
FLS 95- 200	200	0.66	G022080000
FLS 95- 500	500	1.64	G022081000
FLS 95- 750	750	2.46	G022082000
FLS 95- 1000	1000	3.28	G022083000
FLS 95- 1500	1500	4.92	G022084000
FLS 95- 2000	2000	6.56	G022087000

**Carriers FLR 95**

- Simple carriers for FLS 95 Rail System and X 95 Profile System.
- Fastening of the carriers on the profile via a clamping screw with plastic cone point
- Without spring loaded clamps (for spring loaded carriers see "Carriers X 95")
- Black anodized aluminum



Item Title	Width / mm	Width / inch	Part No.
Carrier FLR 95-28	28	1.10	G022091000
Carrier FLR 95-80	80	3.15	G022092000

## How to Build a Framework Structure

X 95 components are well suited to design and build rigid and robust frameworks and structures. X 95 profiles can be used as a base frame for breadboards, optical workstations, large scale optical setups, and many other applications. Due to the modularity a multitude of various designs is possible, giving you the highest flexibility in building a reliable system tailored to your needs. Due to the rigidity and torque of inertia a framework made of X 95 components can withstand heavy loads and comprises a high robustness.

With the knowledge of the size of the final system, the required profile lengths can be selected or, if necessary, profiles with customized lengths may be used. The profile ends are connected via Corner Connectors that allow the attachment of profiles on up to 5 sides via M6 screws (Fig. 1). The sixth side has four tapped holes by which Clamping Carriers can directly be attached. With these components the basic frame can be constructed. If required, also cross bracings can be inserted to increase the stability of the system (Fig. 2). To integrate these cross bracings either Clamping Carriers can be used, but also inclined connections are possible by using a Hinged Connector (Fig. 3). Furthermore, the Carriers can be used to build T-shaped structures (Fig. 4) or to mount X 95 profiles onto each other (Fig. 5).

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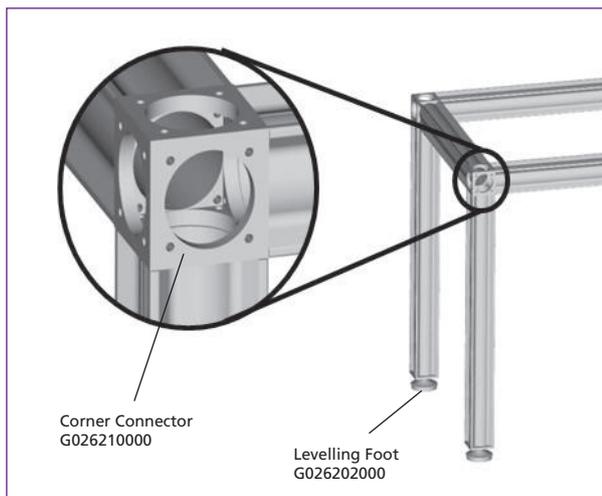


Fig. 1: Connecting profiles via Corner Connectors.



Fig. 2: Increase the stability of the system via cross bracings.

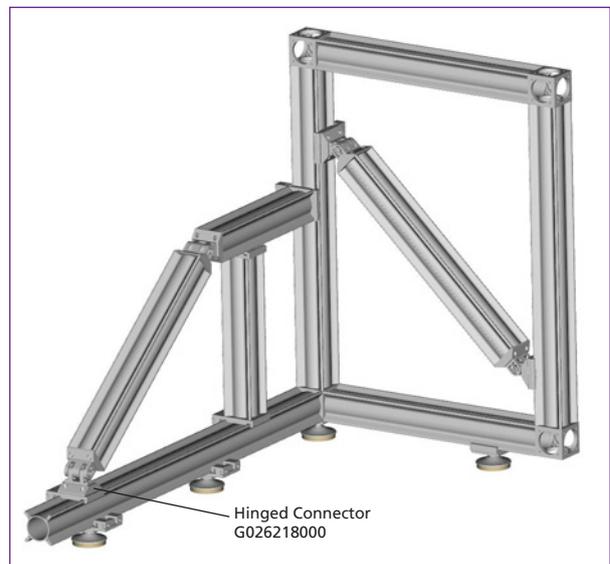


Fig. 3: Inclined connections via the Hinged Connector.

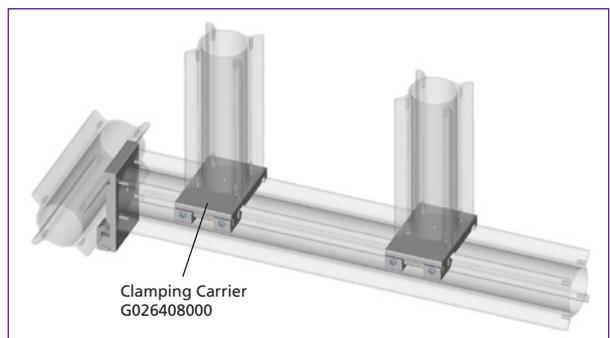


Fig. 4: Building T-shaped structures.

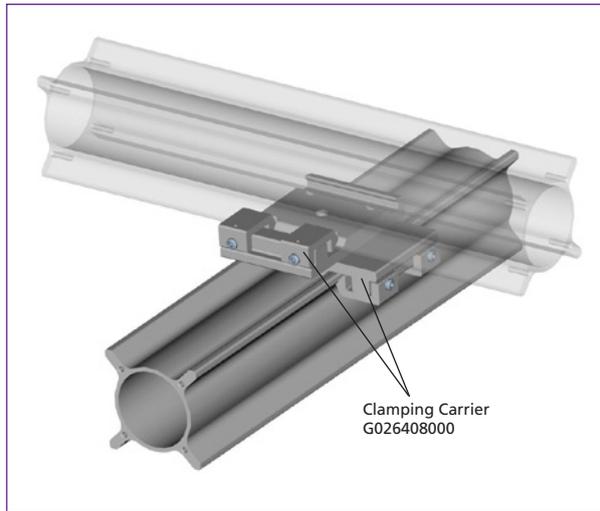


Fig. 5: Mounting two profiles onto each other via carriers. This allows a flexible alignment of the profile's position towards each other.

The last step of the construction is to find suitable feet for the framework. Here you can choose from a variety of different versions depending on your demand (Fig. 6):

- Should the framework be isolated against vibrations?
- Does the framework require a permanent fixation to the ground?
- Does it have to be mobile?
- Is it being used for heavy loads?

For details on the various possibilities, please refer to the respective component description.

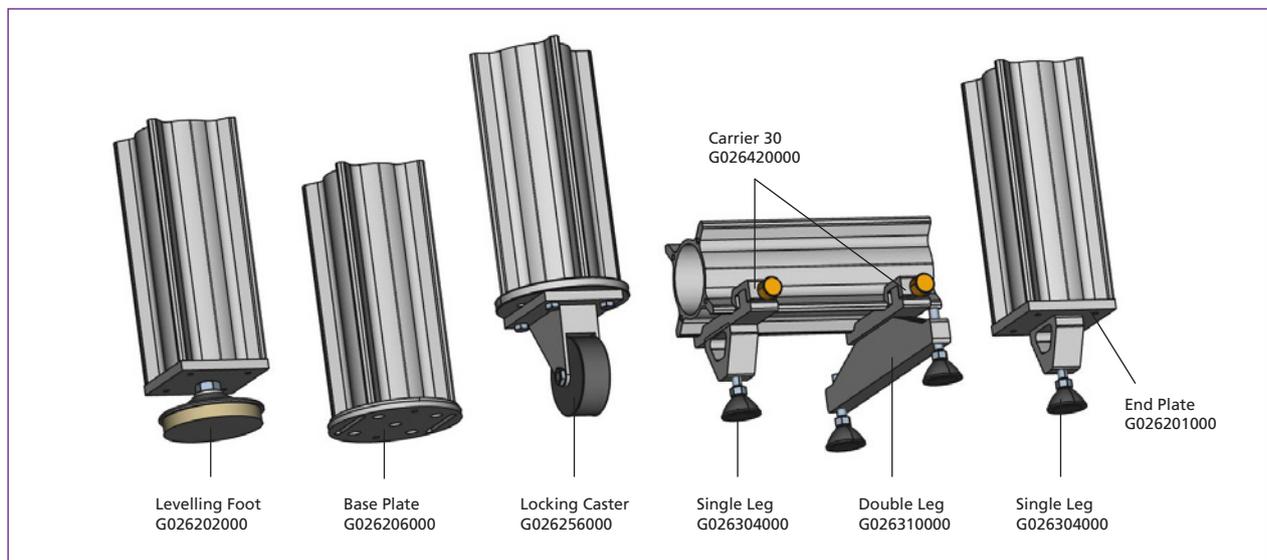


Fig. 6: Selection of different feet for the X 95 system.

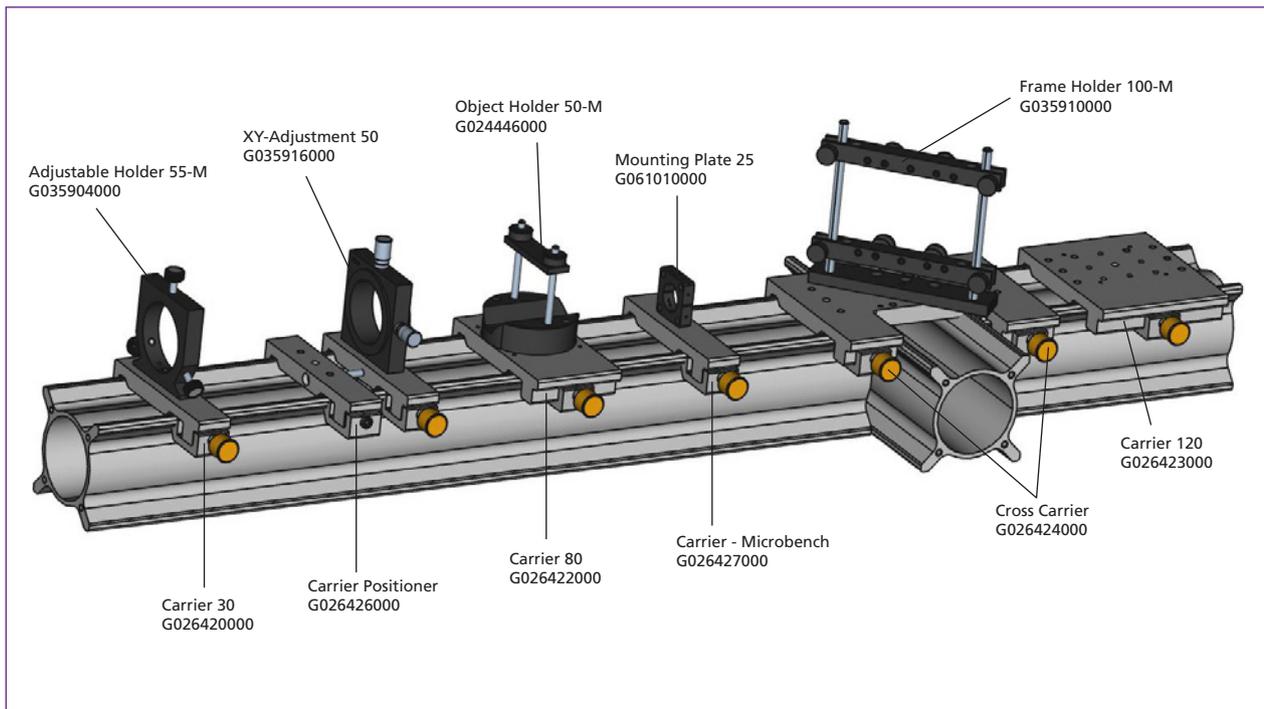
## How to Mount Optical and Microbench Components onto X 95 Profiles

Since the profile system can also be used as a modular large scale optical bench system, the portfolio provides a huge variety of ways to mount optical components onto the profiles. Carriers in widths from 30-300 mm that comprise various hole patterns, allowing you to mount Microbench components, holders, posts and other optomechanical mounts, are available.

In addition we offer carriers that allow the fine-alignment of components along the profile axis and a Cross Carrier for the positioning of components at the crossing of two profiles.

By integrating Microbench components or by connecting the X 95 to a Microbench system, you can apply the unsurpassed precision of our Microbench components to the X 95 system. Your benefit is the synergy of the X 95 system's robustness and stability combined with the Microbench's axial accuracy.

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## Application Examples

The versatility of the X 95 system is reflected in a multitude of application areas. This section shows a few examples where the system is being used in standard situations but also in more specialized applications.

Fig. 1 shows the usage of the system as a framework structure in a clean-room environment. The profiles are connected via Clamping Carriers to provide highest flexibility in realigning the system to other sizes. Alternatively for a permanent setup also Corner Connectors could have been used. In this application the Teflon-coating on the surfaces of the carriers is beneficial since it reduces abrasion caused by moving the carriers along the rails. It also shows that the system can easily be adapted to individual space requirements.

Fig. 2 shows an application where a profile provides the backbone of a versatile mounting system for an inspection/microscopy application. Via its Levelling Feet it can compensate for unevenness in the work surface and permit height adjustment of up to 20 mm. A 200 mm FLS 95 flat rail is mounted on the flat milled surface of a mounting base. The sliding X95-200 carrier mounted on the flat rail can be used to hold the test object, or for installing or attaching a specific object mount. The microscope stand can be set up vertically to the measurement plane using the 500 mm long X-95 profile. The X95-30 carrier attached to the profile can be used to secure the mount system, preventing slippage and potential damage to the optical system that would result. Because all its components are standard LINOS products, the system can easily be adapted to virtually any measurement task.



Fig. 1: Frame construction in Qioptiq clean-room environment.

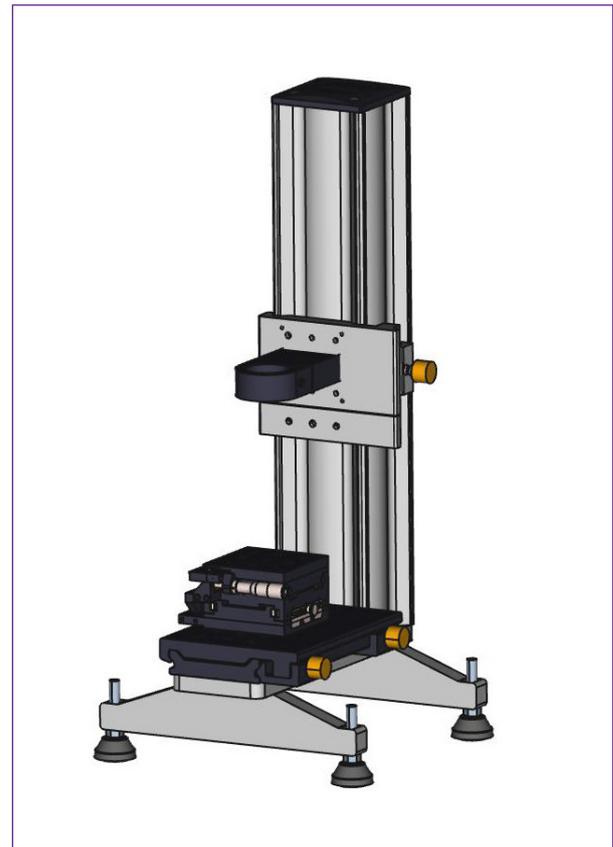


Fig. 2: Vertical construction for a micro-inspection application.

## Application Examples

The DLR Institute of Aerodynamics and Flow Technology (IAS) uses X 95 components for mounting cameras and illumination devices (Fig. 3 and 4) for its research on the aerodynamics of airplane components. The measurement concept is based on recording the motion of individual particles within a fluid allowing to determine the velocity distribution as a function of space around an object.

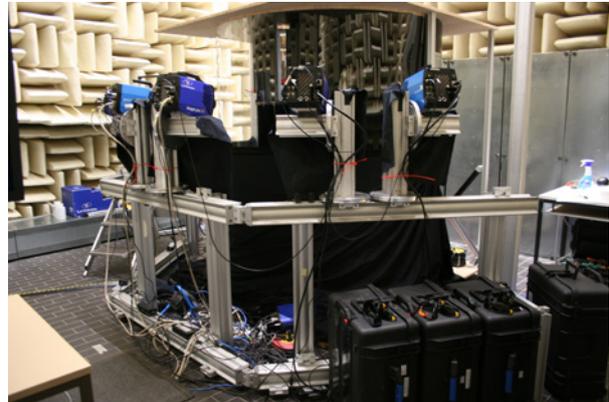


Fig. 3: Solid frame construction for detection equipment at the DLR Institute.

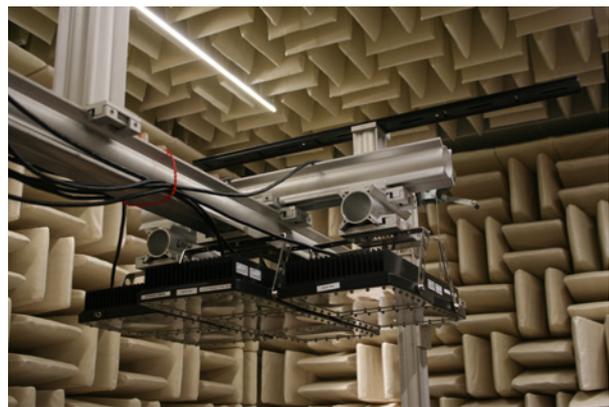


Fig. 4: Horizontal and vertical construction using X 95 and Flat Rail components for research applications.

Our customers also use X 95 equipment in non-lab conditions as Fig. 5 shows. Here X 95 components are used as scaffold for cameras. These are used for inspecting the rails within Zurich Rail Network. Besides the profiles Hinged and Corner Connectors were used for building the framework.



Fig. 5: X 95 components for staging a rail inspection system.





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