

## **GRIPHI TYPE B PIEZOELECTRIC MICROGRIPPER**

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### **ABSTRACT**

The DS describes the main features of the GriPhi Type B piezoelectric microgripper. It includes technical data and drawings.

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### **REVISION HISTORY**

List of changes from original release to current revision.

*NOTE: Page numbers for previous revisions may differ from page numbers in the current version.*

#### **CHANGES FROM REV. A**

Page 3: size and dimensional drawing updated to the new Type B microgripper standard.

Page 4: mounting updated to the new Type B microgripper standard.

Page 5: force-opening plot updated to the new Type B microgripper standard.

#### **CHANGES FROM REV. B**

Page 5: grippers stroke corrected for Types B and C

Page 4: Symmetric and Asymmetric microgripper

Page 5: Main dimensions of the tips

#### **CHANGES FROM REV. C**

Force-opening performance (Theoretical Analysis)

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## 1. Features

- Gripper stroke – Up to 1.00 mm
- Clamping force – Up to 2 N
- Dimensions – 55 x 22 x 8 mm
- Sample size – from 0.2 mm up to 1 mm
- Initial opening – Adjustable by grub screw
- Shape – Available on request
- High vacuum version – Available on request
- Position sensor – Available on request
- Closed-loop control – Available on request

## 2. Applications

- Micro optics manipulation
- Fiber optics connection
- Fiber bundle positioning
- Precision mounting and adjusting
- Biological sample manipulation
- High-dynamic applications

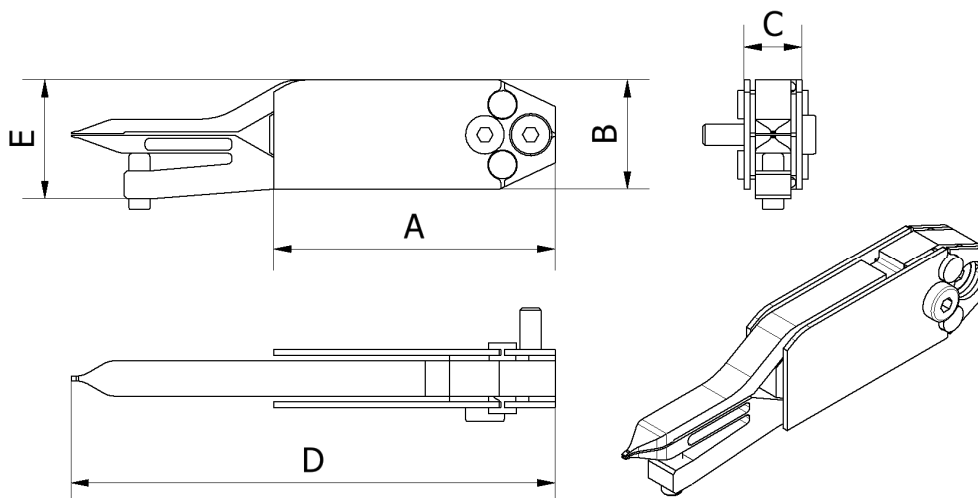
## 3. Description

The GriPhi Type B piezoelectric microgripper can handle small samples whose size stands between 0.2 mm and 1.0 mm. Thanks to its low inertia, it is suitable for high-dynamic applications. The mechanism which transforms the piezo stroke into the gripper stroke is designed by means of FEM (Finite Elements Method) analysis. This makes it possible to tune the opening and strength levels as desired by the customer.

The GriPhi Type B system is fully compatible with the GriPhi Driver devices provided by Phi Drive. Even if the GriPhi Type B system is highly customizable, this DS refers to the standard version of the microgripper.

## 4. Dimensions

**Fig. 1:** Main dimensions of the microgripper

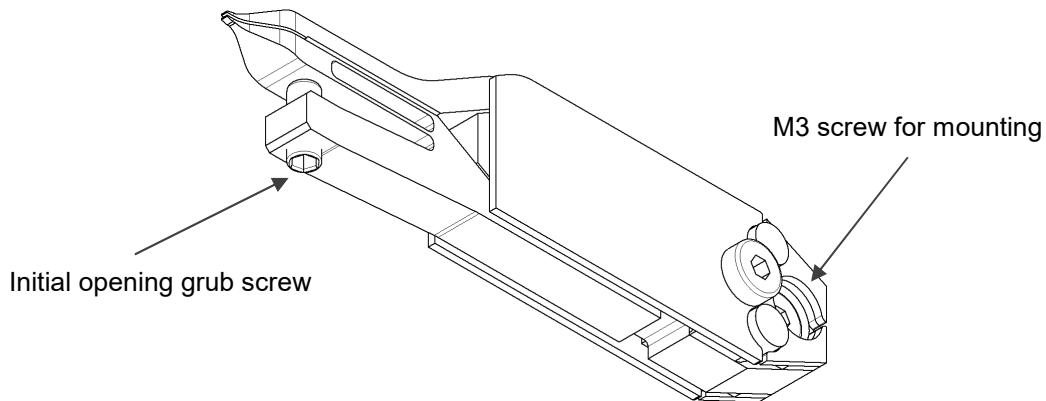


**Tab. 1:** Main dimensions of the microgripper

A		B		C		D		E	
40.0	mm	15.6	mm	8.20	mm	68.8	mm	16.9	mm

## 5. Mounting

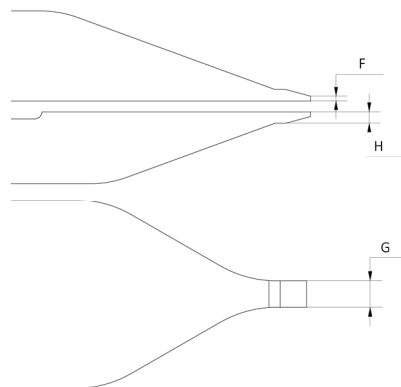
**Fig. 2:** Mechanical interfaces



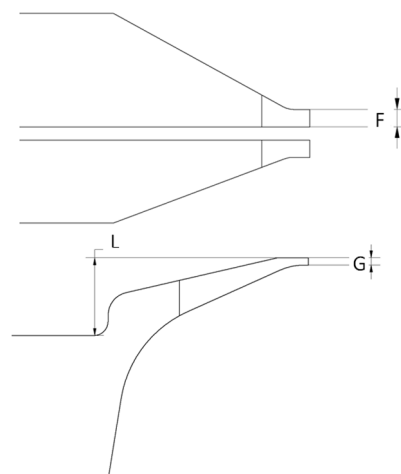
## 6. Jaws

The standard jaws for the GriPhi Type B piezoelectric microgripper are specifically designed to fully exploit the capabilities of the system. However, they can be customized as desired to meet specific needs.

**Fig. 3:** Symmetric microgripper code PH-GP20-0000



**Fig. 4:** Asymmetric microgripper code PH-GP30-0000



Tab. 2, Main dimensions of the tips

CODE	DESCRIPTION	F [mm]	G [mm]	H [mm]	L [mm]
PH-GP20-0000	STD monolithic Symmetric microgripper	0.13	0.7	0.32	-
PH-GP30-0000	STD monolithic Asymmetric microgripper	0.4	0.25	-	2.7

### 6.1. Replaceability

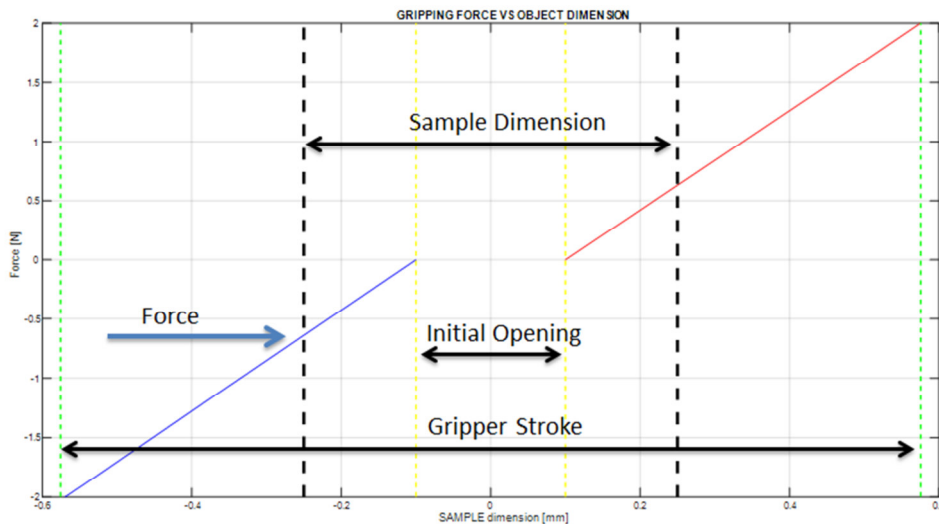
Jaws can be monolithic or interchangeable on request. The interchangeable jaws are only type C.

## 7. Technical data

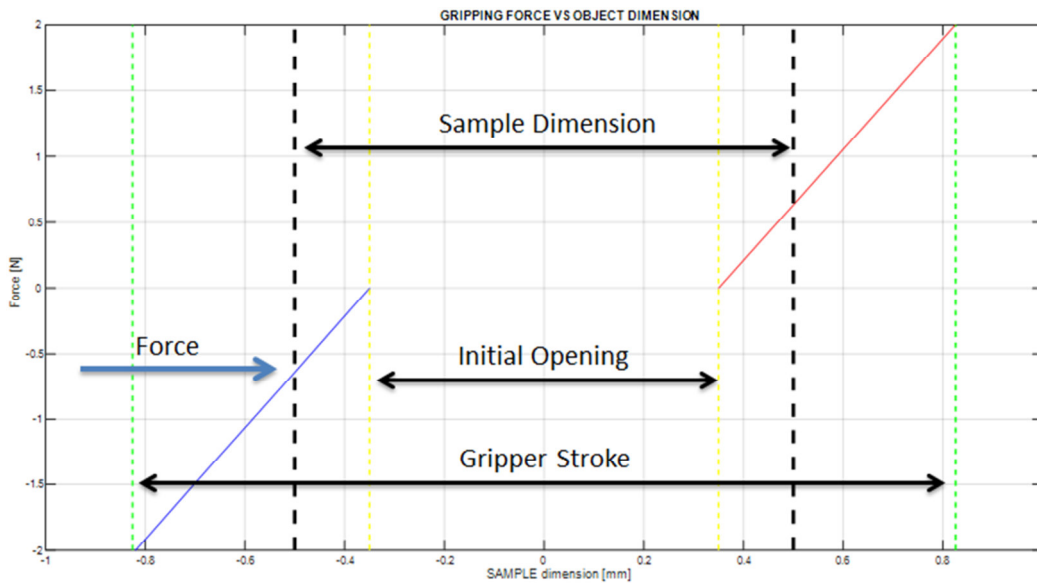
### 7.1. Force-opening performance (Theoretical Analysis)

The initial opening is given by the distance at which the two grippers are located in the rest configuration of the piezo. For example the GriPhi standard with a nominal initial opening of 1 mm can be reduced to 0.2 mm by the adjustment grub. This guarantees that the force acting on the sample remains constant at 0.5 N for sample from 0.5 mm to 1 mm (Fig. 5, Fig. 6).

Fig. 5, Standard monolithic Type B force-opening performance on a sample of 0.5 mm.



**Fig. 6**, Standard monolithic Type B force-opening performance on a sample of 1 mm.



## 7.2. Mechanical specifications

**Tab. 3:** Mechanical specifications of the GriPhi microgrippers

	Type A	Type B	Type C	Unit
Axis of motion	X	X	X	
Gripping stroke	0.8	1.0	1.2	mm
	500	1000	1200	µm
Clamping force at ½ stroke	1	1	1	N
Opening/closing time	<50	<50	<50	ms
Resolution*	<100	<100	<80	nm
Speed	10	14	8	mm/s
Initial gap**	0.0-0.3	Up to 1.5	Up to 4.0	mm
Availability of the HV (High Vacuum) version	YES	YES	YES	
Rated opening-closing cycles	>40 million	>40 million	>40 million	

\*Equipped with GriPhi Driver

\*\*Customizable and adjustable via grub screw

## 7.3. Electrical specifications

The GriPhi Type C system is fully compatible with the GriPhi Driver devices cod. PH-DR10-0000 provided by Phi Drive.

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**NOTES:**

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