piezosystem jena
incredibly precise

Series *PXY AP*

The unique strategy for high precision positioning

PXY AP *Nano Positioning Stages with* ***VTR select*** *from piezosystem jena*

COMPACT 2-AXIS TRANSLATION STAGES

Highly precise performance

PXY AP *– the new stage series with* ***VTR select***

The world is getting smaller and smaller. Existing structures are more complicated and much more precise than ever. We, ***piezosystem jena***, we are at home in the world of smallest movement, smallest structures and high precision engineering – ***we are a part of the Nano-World*** and based on our unique know how and the special technology, we are a leader in positioning equipments for this world.

Whether individual special system or OEM components - we offer a wide range of high-precision piezoelectric actuators and stages for micro-and nano-positioning as well as nano-automation.

During production and characterization of our products, we rely on modern finite element analysis and special interferometer measurement systems. Thereby we ensure that the products of ***piezosystem jena GmbH*** guarantee a unique precision in the sub-nanometer range, can generate forces of several thousand Newton and realize precise positioning in few micro seconds.

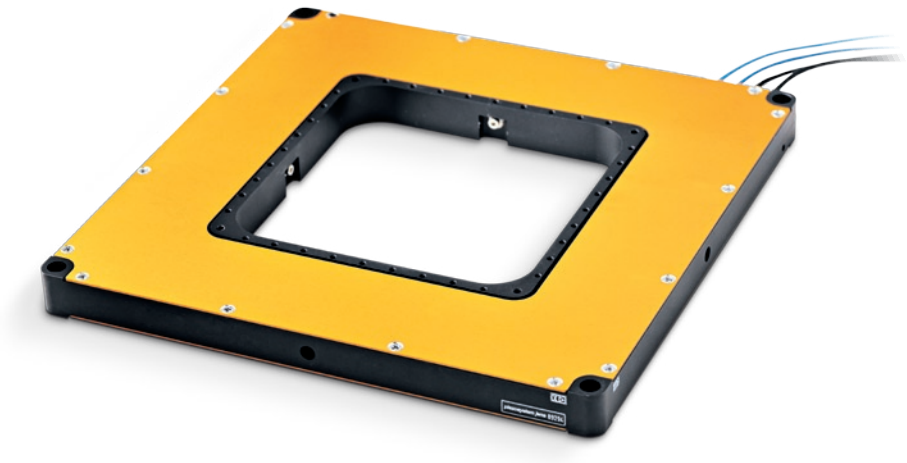
piezosystem jena GmbH was founded in 1991 in Jena – the world wide well known home of high technologies in the areas of research, optics and precision mechanics. A tradition that we are committed: even today, the headquarters for worldwide distribution and marketing of our products on site. And from here we serve our customers from over 40 countries around the world, such as in the U.S., Japan, France, England, Korea, Israel, Italy and Taiwan.

With our highly qualified motivated team and 20 years of experience in the development of special systems and OEM components ***piezosystem jena GmbH*** has been 20 years of the pacemakers in the development and design of piezoelectric positioning technology. See for yourself!

Piezo-Technology up to date

A new technology – a lot of new applications: in optics and laser technology, automation and semiconductor technology to biotechnology. With its special features piezo technology has many applications. And constantly new fields are added. As a forward-looking technology, the piezo technology offers many advantages:

- nearly unlimited resolution of the motion
- high forces generation
- movement completely free of mechanical play
- low response time
- without abrasion and wear
- usable for vacuum and cryogenic applications



You are looking for a system with the best features and best performance? With piezoelectric actuators and nano-positioning of ***piezosytem jena GmbH*** you have found what you're looking: piezoelectric nano-positioning systems and a controller unit with the highest standards of accuracy for demanding applications

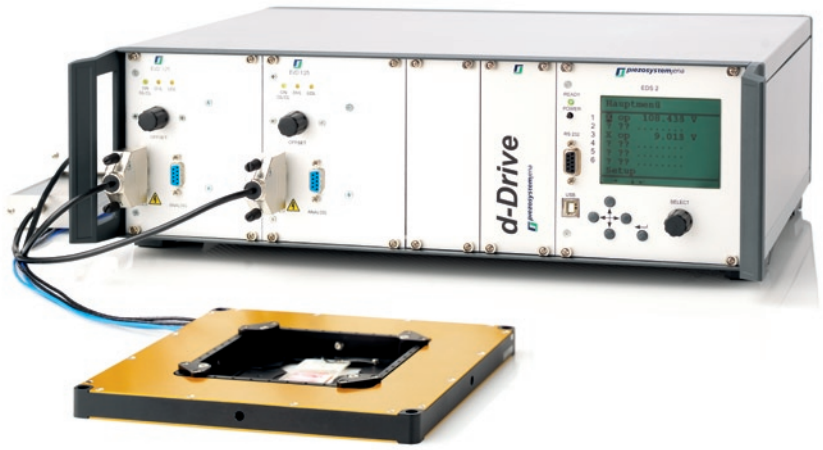
Contact us or our representative in your country and get expert advice! We looking forward for your specific application.

A well balanced team

PXY AP with VTR select – highly precise positioning within milliseconds

piezosystem jena GmbH is expanding the range of its XY scanning stages with the introduction of the new stage series ***PXY AP*** ushering in the revolutionary ***VTR select*** concept. The combination of an innovative design, a long travel range and a high load capability in combination with an ultra flat stage design represent a milestone in the field of nano-positioning.

Your advantage: No other system is available on the market featuring an ultra low profile along with a large aperture of 100 mm by 100 mm. These are unique characteristics which make the ***PXY AP*** a flexible solution to meet the diverse demands of sample positioning.



Key-Features Series PXY AP:

- VTR select allows to combine different travel ranges for different axes
- fast scanning – 2 axes piezo stage with an ultra low profile: height of 15 mm (0.59 inch) only
- large clearance aperture with a size of 100 mm by 100 mm to mount universal stage inserts
- integrated high resolution capacitive feedback sensors
- nanoX® - design with active resetting forces
- parallel kinematics principle with a travel range up to 700 µm (open loop motion)

Key-Applications Series PXY AP:

- nano-positioning and scanning
- materials research
- microscopy / lithography
- semiconductor testing equipments
- wafer handling and mask alignment
- biotechnology

Concept

PXY AP was designed for the fast and highly precise positioning of optical and mechanical components. All systems are optimized to guarantee extremely high z-axis stiffness. Due to optimized parallel kinematics of the actuator the high guidance precision without any mechanical play is always assured. All drive elements in the monolithic flexure system create a completely play free motion. Overshooting (oscillation) is actively minimized by controllable setting and resetting forces (generated by two different actuating systems). Even under full load pre-selected positions can be reached in milliseconds with nanometer accuracy. This is an essential characteristic especially for high-speed scanning.

Upon request the series ***PXY AP*** can be offered in a vacuum compatible version and as well as a cryogenic version. The stage body also can be made of titanium, aluminum or thermally stable material Invar and Superinvar.

The optional sensor preamplifier (version external/ digital) allows an implementation independent from the cable length.

Specifics

In combination with the integrated high resolution capacitive direct metrology by ***piezosystem jena GmbH*** the series ***PZY AP*** is set up for very accurate position stability, linearity and reproducibility in controlled motion.

The digital amplifiers of ***piezosystem jena GmbH*** enable a dynamic setting of PID control parameter, a slew rate limit and the bandwidth of the notch filter. Mechanical resonance can be measured by the integrated sweep generator and faded out during operation with the bandwidth of the notch filter. This avoids that the system gets affected by its own resonance frequency.

*The combination of **PXY AP** with the digital controller represents the perfect system setup – adaptation to the current loading scenario included.*

Superior positioned

***PXY AP** with **VTR select** – modularity brought to the point*

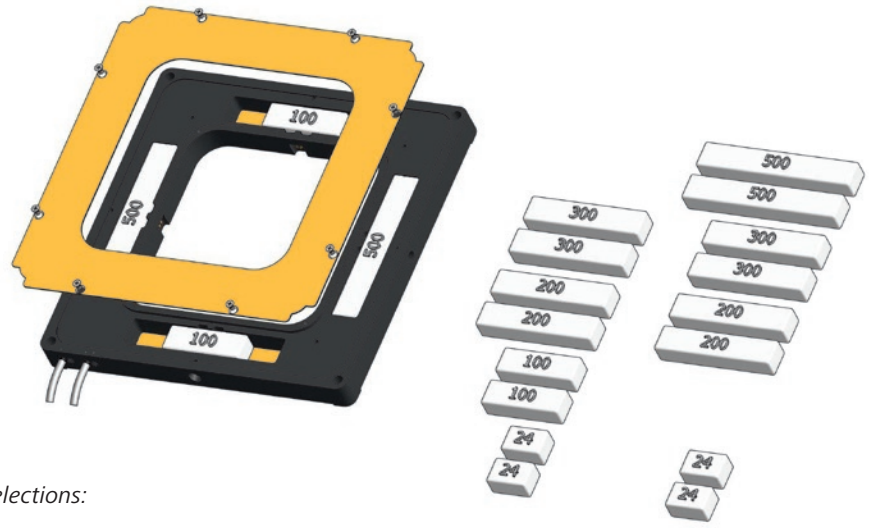
Variable travel range selections for each axis make it possible to adjust the nano-positioning system for a wide range of special applications. Just combine the dynamic performances according to your requirements.

For accurate scanning applications two different axis configurations are normally used: a fast axis with a long motion range, and a second axis performing small and precise steps on a linefeed. With ***VTR select*** you can adapt each axis to your own needs. If the application set-up changes, each axis can be readjusted to a different travel range selection later on with minimum efforts.

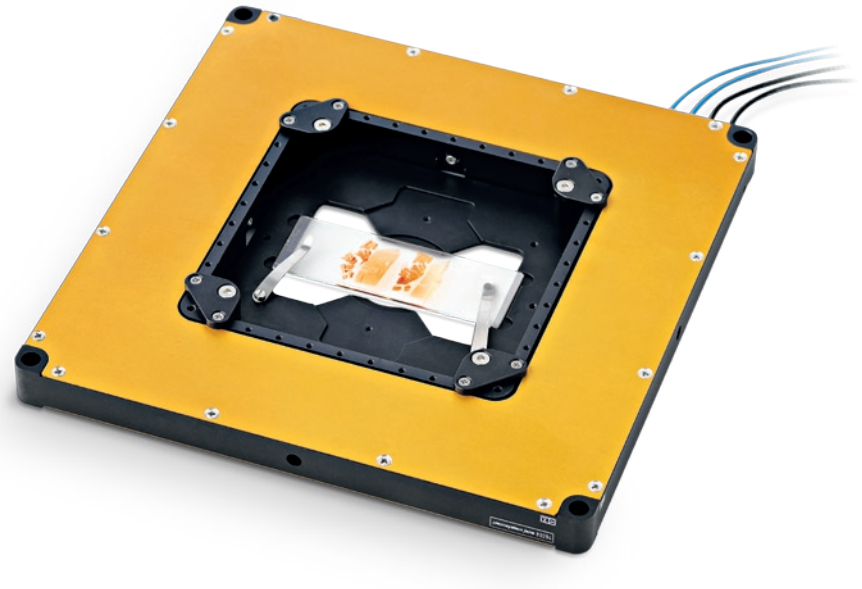
With ***VTR select*** a free choice out of five different travel ranges per axis is available for you: 24 µm, 100 µm, 200 µm, 300 µm, 500 µm (with sensor integration).

In open loop motion (without sensor integration) the travel range is even higher with 30 µm, 120 µm, 250 µm, 350 µm or 700 µm

- an unique solution for scanning stages with nano precision
- flexible combination of variable travel range selections per system
- customized adjustment of axis parameter according to the specific application needs



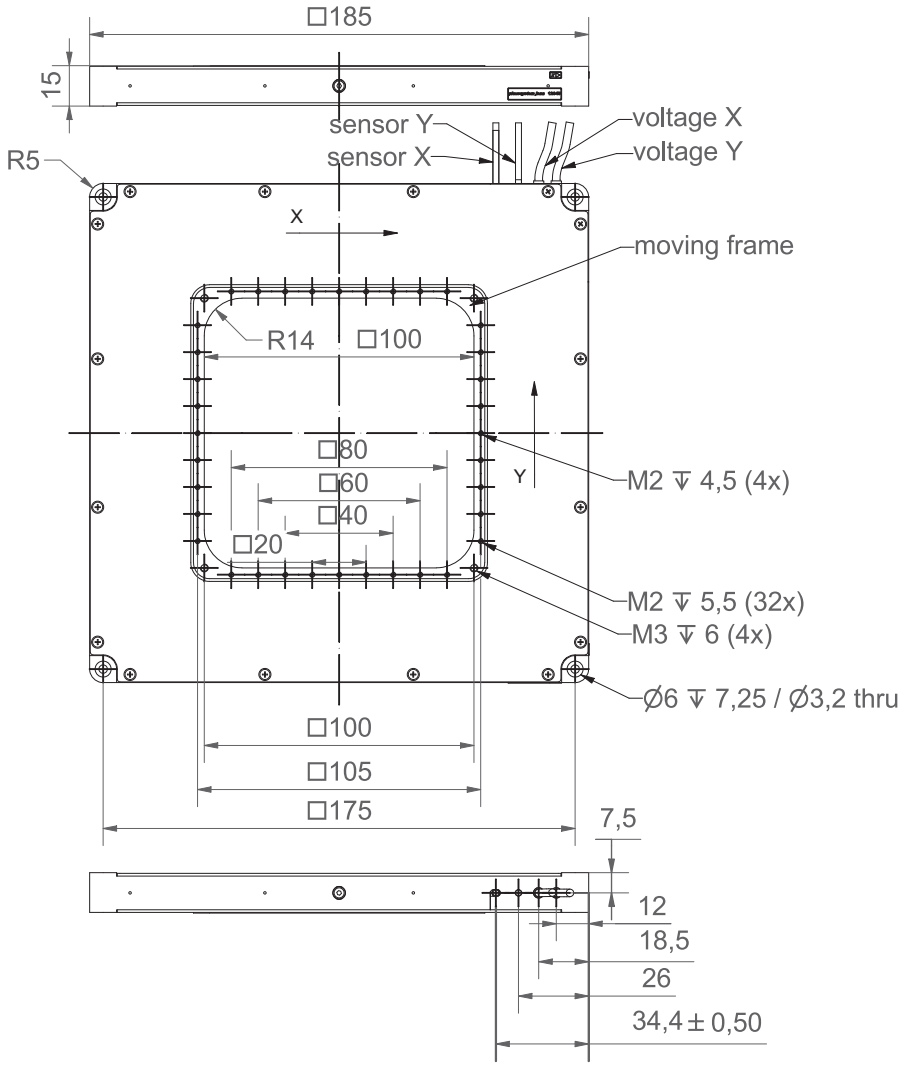
Choices of motion range selections:
(Travel range selection)



Aperture

Free clearance aperture

The large square aperture of the ***PXY AP*** with a size of 100 mm by 100 mm allows you to mount a stage insert to hold different kinds of microscopy specimen and accessories. The inner frame of the stage is equipped with 36 pieces of thread M2, as well as 4 pieces of thread M3 to install sample holders and other fixtures. The ultra flat frame design enables you to position asymmetrically mounted components exactly without any impact on the precision and guidance accuracy.



series PXY AP	unit	PXY 24 AP	PXY 500 AP
part number	–	T-242-xx	T-250-xx
actuating elements	–	nanoX®-design with applied resetting forces	
motion per axis open loop (±10 %)*	µm	30	700
motion per axis with feedback sensor (±0.2 %)	µm	24	500
capacitance per axis (±20 %)**	µF	3	12
resolution*** open loop	nm	0.06	1.4
resonant frequency @ 100 g	Hz	300/300	120/120
stiffness	N/µm	1.5	0.15
push/pull force open loop	N	45/45	150/150
max. load in z	N	100	
voltage range	V	-20…+130	
cabel length (±10 %)	m	1.2	
material	–	aluminium/stainless steel	
dimension (l x w x h)	mm	185 x 185 x 15	
free aperture	mm	100 x 100	
weight	g	480	850

series PXY AP with integrated measurement system	unit	PXY 24 AP	PXY 500 AP
integrated feedback system	–	capacitive	
resolution*** closed loop	nm	tbd	tbd
typ. repeatability	nm	5	20
push/pull force closed loop	N	4.5/4.5	12.5/12.5
cable length	m	2	

PXY AP – Y-axis drive module	unit	P*Y 24 AP	P*Y 500 AP
part number	–	T-242-MY	T-250-MY
actuating elements	–	nanoX®-design with applied resetting forces	
motion per axis open loop (±10 %)*	µm	30	700
motion per axis with feedback sensor (±0.2 %)*	µm	24	500

* typical value measured with 30V300 nanoX amplifier
** typical value for small electrical field strength
*** the resolution is only limited by the noise of the power amplifier and metrology

Order Information

*The new movement – **PXY AP** with **VTR select** by piezosystem jena GmbH*

1. basic stage module with X-axis drive			
type	description	motion[1)]	part number
standard	PX* 24 AP	24/30 µm	T-242-X0
vacuum	PX* 24 AP V	24/30 µm	T-242-X2
standard	PX* 100 AP	100/120 µm	T-244-X0
vacuum	PX* 100 AP V	100/120 µm	T-244-X2
standard	PX* 200 AP	200/250 µm	T-246-X0
vacuum	PX* 200 AP V	200/250 µm	T-246-X2
standard	PX* 300 AP	300/350 µm	T-248-X0
vacuum	PX* 300 AP V	300/350 µm	T-248-X2
standard	PX* 500 AP	500/700 µm	T-250-X0
vacuum	PX* 500 AP V	500/700 µm	T-250-X2

2. Y-axis drive module		
description	motion[1)]	part number
P*Y 00 AP	without Y-axis	on demand
P*Y 24 AP	24/30 µm	T-242-MY
P*Y 100 AP	100/120 µm	T-244-MY
P*Y 200 AP	200/250 µm	T-246-MY
P*Y 300 AP	300/350 µm	T-248-MY
P*Y 500 AP	500/700 µm	T-250-MY

[1)] motion range depends from the chosen feedback option (with or without feedback control)

3. feedback and connector module			
analogue controller system			
	part number	connector style	
		voltage	sensor
without feedback sensor	T-24M-00	ODU 3 pin	–
with feedback sensor	T-24M-06E	ODU 3 pin	ODU 4 pin
digital controller system			
	part number	connector style	
		voltage	sensor
without feedback sensor	T-24M-00D	Sub-D15	–
with feedback sensor	T-24M-06D	Sub-D15	

First Step: Selection of part number Basic stage module with the required motion range selection for the X-axis and special versions

Second Step: Selection of part number Y-axis module according to the required motion range selection for the Y-axis

Third Step: Selection of part number Sensor and connector module

Important mounting advice!

Piezo actuators generate their power- and expansion behaviour based on a solid state effect. Thus, the motion resolution is solely dependent on the quality of the control signal.

Piezo actuators are not affected by magnetic fields, nor do they create them. In a cryogenic environment they operate almost down to 0 Kelvin along with a decreasing linear relative expansion.

Under vacuum conditions, piezo actuators can be used at pressures below 1Pa, except in the range from 0,01 hPa to 100 hPa. This effect is caused by the reduced dielectric penetration field strength of air.

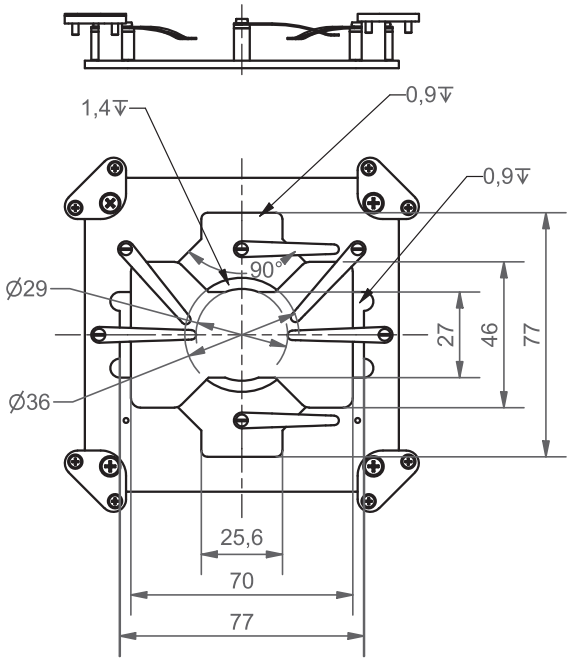
The raster tapped and thru holes allow an easy integration of this stage into any application and mechanical setup.

Recommended Controllers

3. sensor / connector module					
analogue controller interface					
	part number		connector style		analogue
			voltage	sensor	
open loop	T-24M-00		ODU 3 pin	–	30V300 nanoX ENV 40 nanoX ENV 300 nanoX ENV 800 nanoX
closed loop with capacitive sensor	T-24M-06E		ODU 3 pin	ODU 4 pin	30V300 nanoX CLE ENV 300 nanoX CLE ENV 800 nanoX CLE
digital controller interface					
	part number		connector style		analogue
			voltage	sensor	
open loop	T-24M-00D		Sub-D 15	–	EVD 50, EVD 50 CL EVD 125 CL EVD 300 CL 30DV50
closed loop with capacitive sensor	T-24M-06D		Sub-D 15		EVD 50 CL EVD 125 CL EVD 300 CL 30DV50

Accessories

The large square aperture of 100 mm x 100 mm is well suited for a stage insert to hold different kinds of microscopy specimen and accessories. ***Piezosystem jena*** offers a stage insert (part no.: T-240-99) designed to hold 3inch standard slides, Petri dishes, Lab-Tek™-Holder and PH2-Incubators as additional accessories for the series ***PXY AP***. The universal stage insert T-240-99 can be used with upright as well as inverse microscope stands. Other sample holders can be provided upon request.



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ACCESSORIES – ADAPTER AND EXTENSION CABLES, VACUUM FEED THROUGH
OPTIONS
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ELECTRONICS DIGITAL