

CPSHR₁ – CRYO POSITIONING STAGE HIGH RESONANCE 1



Features

- xyz motion for very stable cavity measurements
- Parallel kinematics for optimized stiffness
- High resonance frequencies
- Coarse motion using Cryo Linear Actuators
- Scanning motion integrated
- 20mK to 375K, vacuum compatible
- Compatible with CVIP₁ vibration isolator

Description / Applications

The Cryo Positioning Stage High Resonance (CPSHR) is a XYZ positioning stage developed for operation in a cryo-vacuum environment, especially suited for very stable cavity measurements. Parallel kinematics result in a light and stiff stage with very high internal resonance frequencies, making it less sensitive to floor vibrations. The CPSHR 1 is the most compact design with small stroke and highest resonances.

Specifications

General info	
Type of motion	xyz with parasitic angular motion
Parasitic angle from xy stroke	20 mrad/mm, about the x and y axis
No load resonance frequency	xy: 1,5 kHz / z: 4,0 kHz
Dimensions	See drawings below
Operational environmental conditions	20 mK to 375 K, ambient to UHV
Weight	300 g
Stepping motion	
Travel range	x $\pm 1,3$ mm / y $\pm 1,5$ mm / z $\pm 0,5$ mm (not simultaneously)
Actuator	CLA2201, see drawings for calculating actuator outputs to system motion
Minimal step size @ 300 K	5 nm
Minimal step size @ 4 K	1 nm
Scanning motion	
Actuator	Piezo actuators, see drawings for calculating piezo outputs to system motion
Scanning range @ 300 K, typical	x $6,5 \mu\text{m}$ / y $7,5 \mu\text{m}$ / z $2,5 \mu\text{m}$ (not simultaneously)
Scanning range @ 4 K, typical	x $\pm 1,3 \mu\text{m}$ / y $\pm 1,5 \mu\text{m}$ / z $\pm 0,5 \mu\text{m}$ (not simultaneously)
Minimal step size	Sub-nm
Drive voltage @ 300 K	-30 V to 120 V
Drive voltage @ 4 K	-150 V to 150 V
Forces and load capacity	
Load capacity	200 g
Materials	
Main body	Titanium
CLA2201	Stainless steel, ceramic, piezo actuator*
Scanner	Piezo actuator*
*Piezo actuator	Low voltage multilayer, ceramic insulated
Model specific information	
-S	xyz scanner added, see above for range
Electronics CPSC	
Controller Base Cabinet	CAB
Driver for stepping and scanning	CADM or PSM (scanning only)

Ordering Information

Available models

CPSHR1-S Cryo Positioning Stage High Resonance 1-Scanner

Available Options

-HV Upgrade to High Vacuum compatibility
 -UHV Upgrade to Ultra High Vacuum compatibility

Accessories

AKM1 Accessory Kit Mechanical 1
 AKE1 Accessory Kit Electrical 1

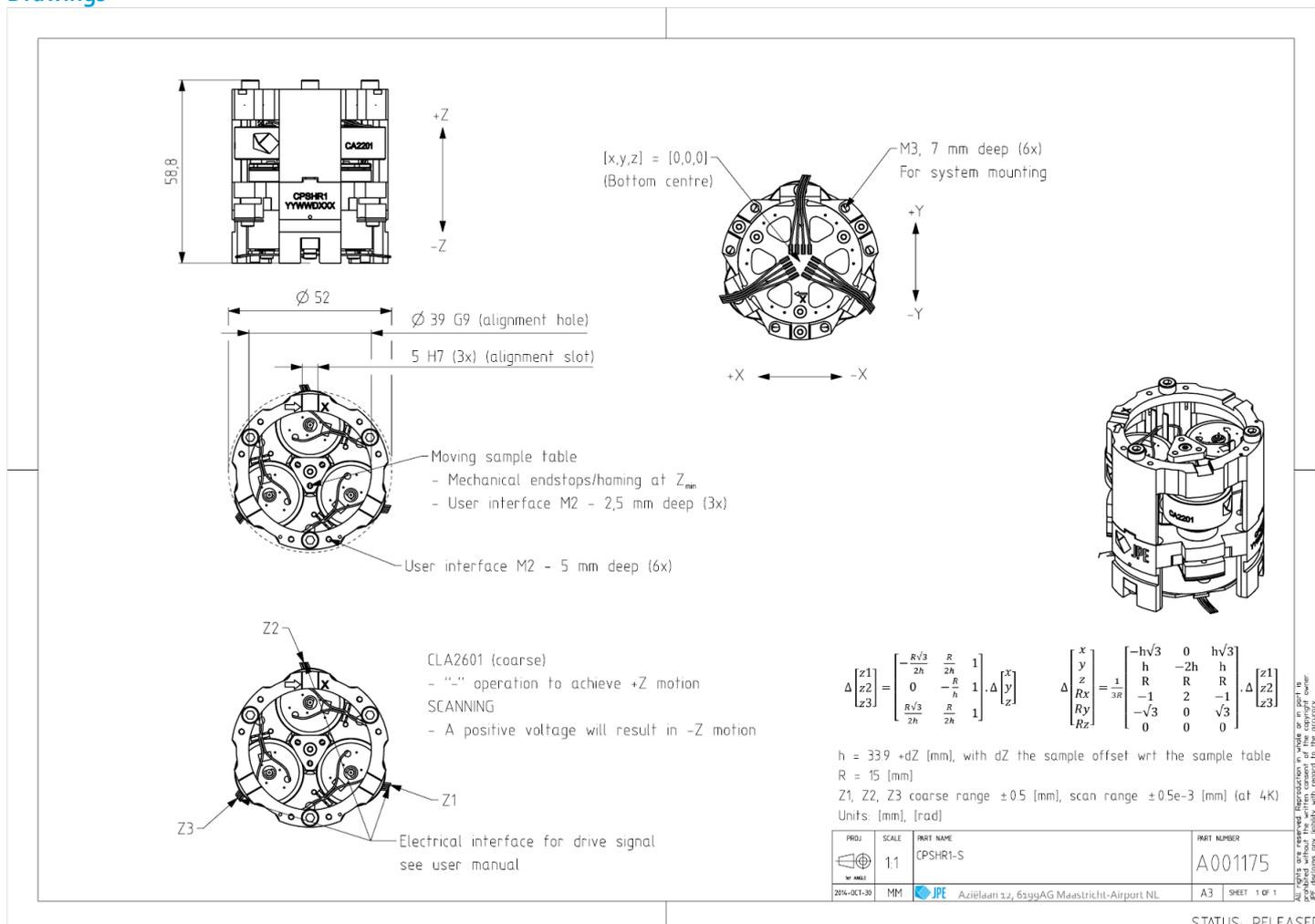
Mechanical and electrical information

Download 3D step files and manuals from:
<https://www.jpe-innovations.com/cryo-nano-products/>

Contact

For quotations, specials, or engineering services, please contact us at:
<https://www.jpe-innovations.com/contact/>

Drawings



58.8

+Z
-Z

CA22H

CPSHR1
YYWWSIOX

$[x,y,z] = [0,0,0]$
(Bottom centre)

M3, 7 mm deep (6x)
For system mounting

+Y
-Y

+X
-X

Ø 52

Ø 39 G9 (alignment hole)

5 H7 (3x) (alignment slot)

Moving sample table
- Mechanical endstops/homing at Z_{min}
- User interface M2 - 2,5 mm deep (3x)

User interface M2 - 5 mm deep (6x)

Z2

CLA2601 (coarse)
- "-" operation to achieve +Z motion
SCANNING
- A positive voltage will result in -Z motion

Z1

Z3

Electrical interface for drive signal
see user manual

$$\Delta \begin{bmatrix} z1 \\ z2 \\ z3 \end{bmatrix} = \begin{bmatrix} -\frac{R\sqrt{3}}{2h} & \frac{R}{2h} & 1 \\ 0 & -\frac{R}{h} & 1 \\ \frac{R\sqrt{3}}{2h} & \frac{R}{2h} & 1 \end{bmatrix} \cdot \Delta \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\Delta \begin{bmatrix} x \\ y \\ z \\ Rx \\ Ry \\ Rz \end{bmatrix} = \frac{1}{3R} \begin{bmatrix} -h\sqrt{3} & 0 & h\sqrt{3} \\ h & -2h & h \\ R & R & R \\ -1 & 2 & -1 \\ -\sqrt{3} & 0 & \sqrt{3} \\ 0 & 0 & 0 \end{bmatrix} \cdot \Delta \begin{bmatrix} z1 \\ z2 \\ z3 \end{bmatrix}$$

$h = 339 + dZ$ [mm], with dZ the sample offset wrt the sample table
 $R = 15$ [mm]
 $Z1, Z2, Z3$ coarse range ± 0.5 [mm], scan range $\pm 0.5e-3$ [mm] (at 4K)
 Units: [mm], [rad]

PROJ.	SCALE	PART NAME	PART NUMBER
204-021-20	1:1	CPSHR1-S	A001175
JPE Aziëlaan 12, 6199AG Maastricht-Airport NL			A3 SHEET 1 OF 1

STATUS: RELEASED