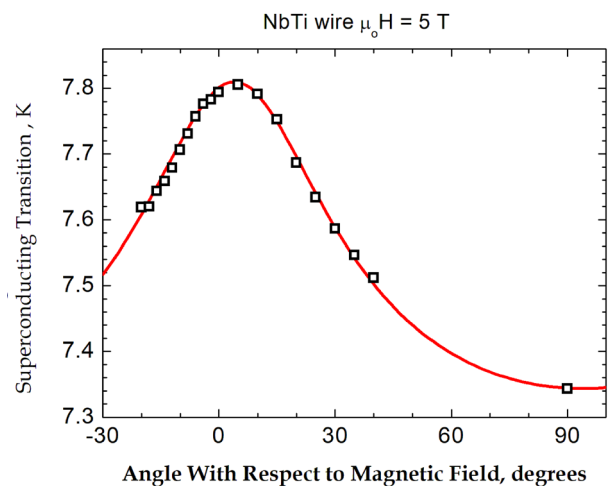
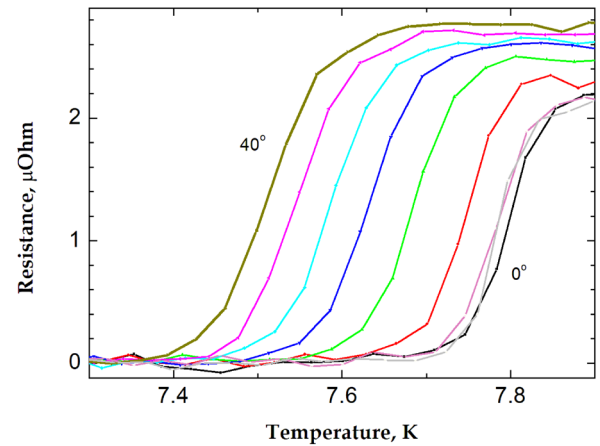


Rotator Probes



CRYOGENIC

www.cryogenic.co.uk

One-Axis Rotator Probes

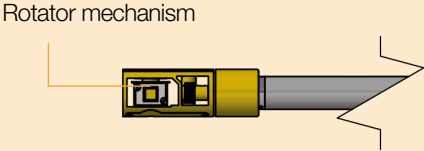
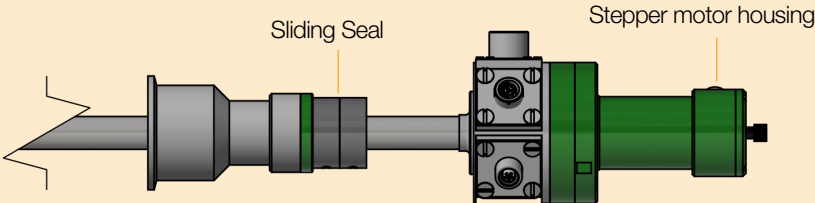
In the single-axis configurations the sample is rotated through 330 degrees around the horizontal axis. The full range of rotation passes the samples through all four principle points of interest (0, 90, 180, 270 degree). Of particular relevance to anisotropic materials, this rotation range allows the preferred magnetization axis to be investigated in both directions with the relative direction of the applied magnetic field varied between perpendicular and parallel.

The sample probe comprises a top flange housing all electronics feed-throughs (for sample wiring and temperature control) fixed to a stainless steel tube which supports a sample mount at the field centre.

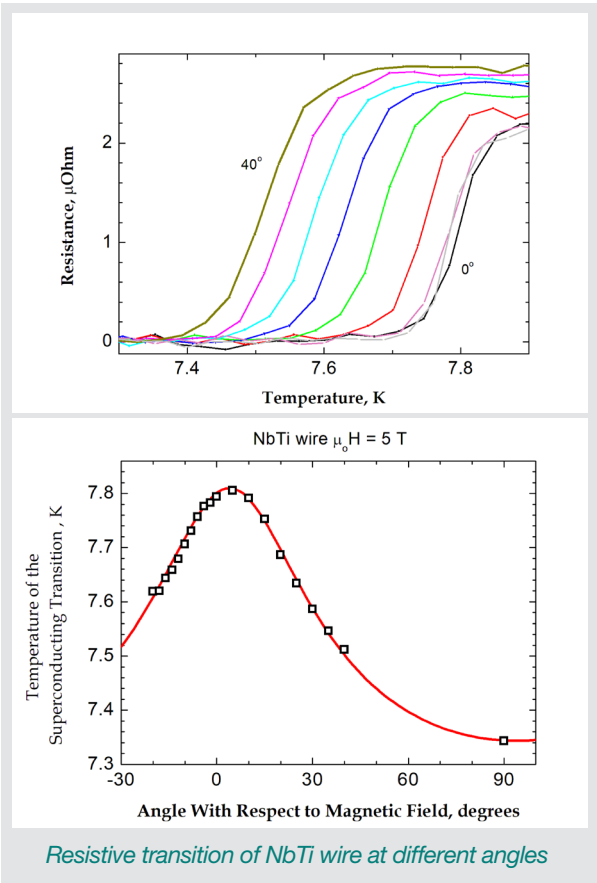
The single axis rotator is compatible with all of the standard electrical sample mounts featuring 6, 8, 20 or 44 sample contacts.

There are two versions of the single axis rotators:

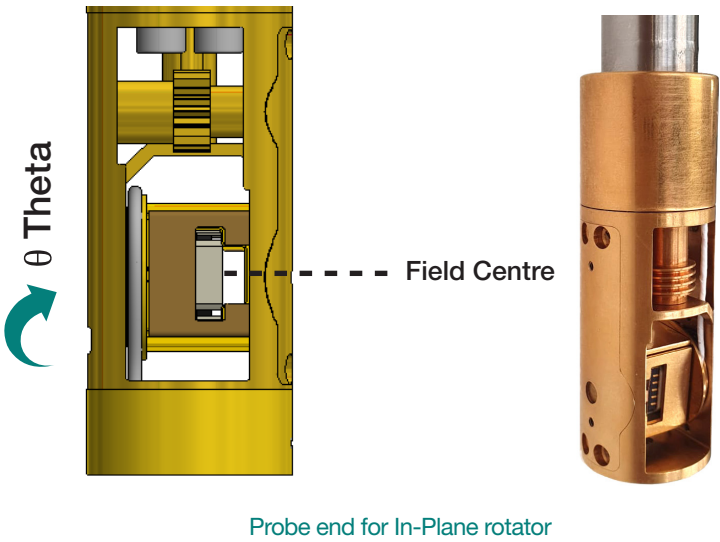
In-Plane rotator:	Out-of-Plane rotator:
Magnetic Field is always parallel to the sample plane.	Magnetic Field can be directed at any angle to the sample plane.
Rotation axis is perpendicular to the sample plane.	Rotation axis lies in the same plane

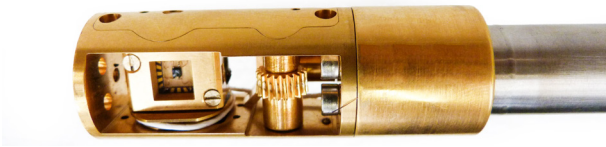
One-Axis Rotator 1.6 K: In-Plane (for 30 mm VTI)



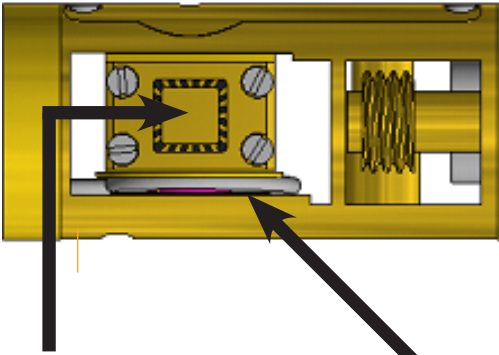
Performance	1.6 K One-Axis Rotator
Sample Platform Type	LCC20 5 x 5 mm ²
Angular Range	330 degrees
Position Control	Angular position sensor
Angular Accuracy	0.1 degrees



One-Axis Rotator 1.6 K: Out-of-Plane (for 30 mm VTI)



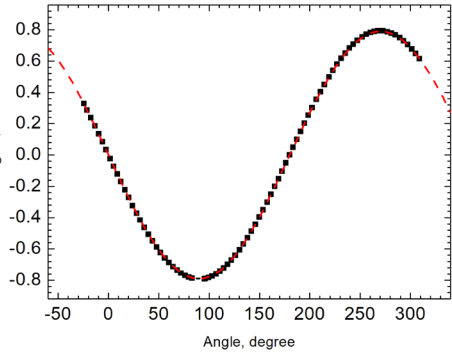
 θ Theta



Rotation platform
and Cernox

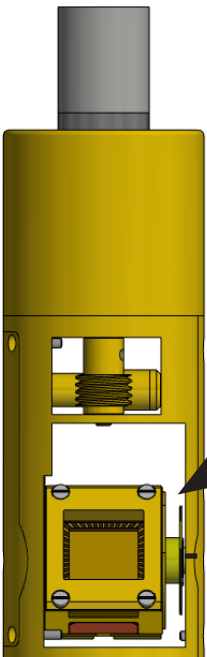
Wiring loom

Performance	1.6 K One-Axis Rotator
Sample platform Type	LCC20 out-of-plane (6, 8 pin)
Angular Range	330 degrees
Position Control	Angular position sensor
Angular Accuracy	0.1 degrees



Hall Voltage Measured using One Axis Rotator.

One-Axis Rotator 1.6 K: Out-of-Plane (for 50 mm VTI)



LCC44 Platform

Field Centre

 θ Theta

Performance	1.6 K One-Axis Rotator
Sample platform Type	LCC44 out-of-plane
Angular Range	330 degrees
Position Control	Angular position sensor
Angular Accuracy	0.1 degrees

Probe end for Out-of-Plane rotator

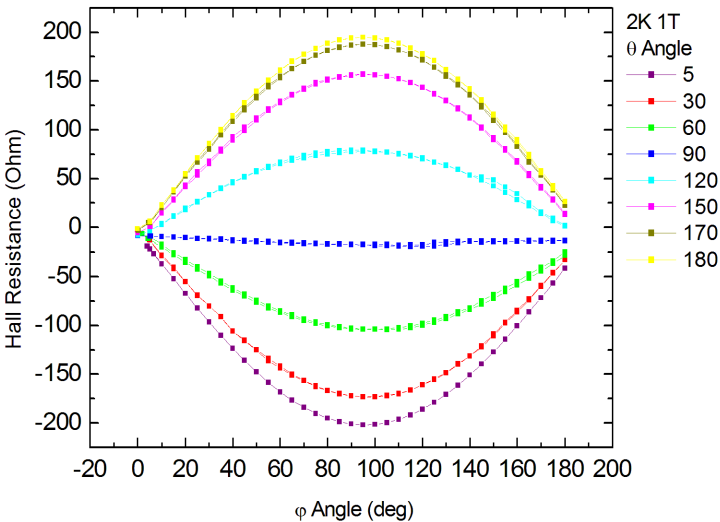
Two-Axis Rotator

Two-Axis Rotator

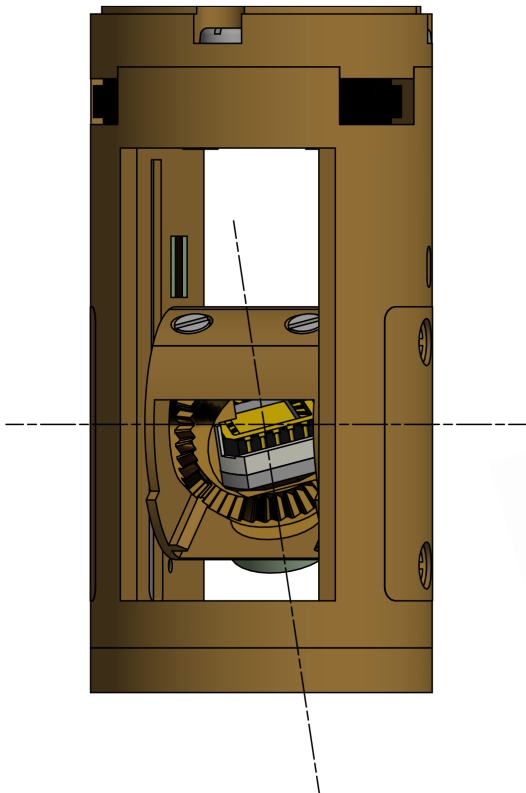
In the two-axis configuration we offer a double-axis rotator where the platform rotates around the horizontal axis and the sample rotates on the platform around the centre of the platform. The angular range is 180 degrees on both axis of rotation. The rotator is motorised using a pair of stepper motors under LabVIEW control.

The double axis rotator is compatible with the LCC20 sample chip only.

Performance	1.6 K Two-Axis Rotator
Sample platform Type	LCC20
Angular Range	180 degrees in each axis
Position Control	Home position detector and hysteresis-free positioning algorithm
Angular Accuracy	0.5 degree in each axis



Hall Voltage Measured using a Two Axis Rotator: Theta Sweeps

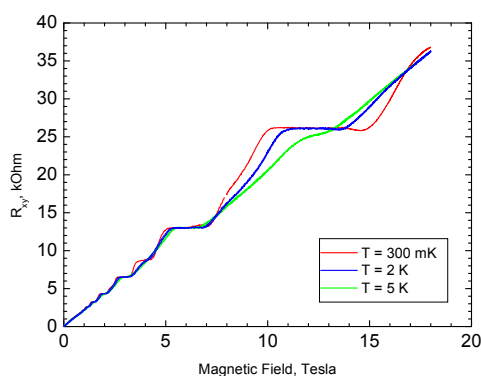


^3He Rotator Probe

^3He One-Axis Out-Of-Plane Rotator

The ^3He rotator insert enables sample temperature control down to 300 mK. the probe is designed to be inserted into our standard Ø30 mm VTI and uses the cooling power of a VTI to condense the charge of ^3He . In the single-axis configurations the sample is rotated through 90 degrees around the horizontal axis. Using only the cooling power of the VTI and two internal temperature-controlled sorption pumps, the sample platform of the Helium-3 Insert can be maintained at any temperature from 300 mK to above 300 K. The insert fits inside the variable temperature space and has a working volume of liquid ^3He of approximately 1.5 cc.

Performance	0.3 K One-Axis Rotator
Sample platform Type	LCC20
Angular Range	90 degrees out-of-plane
Position Control	Angular position sensor
Angular Accuracy	0.5 degree in each axis



Quantum Hall Effect in GaAs-AlGaAs multilayer. Measurement carried out at 300 mK made using a ^3He Insert in an 18-Tesla Cryogen-Free Measurement System.



- Integrated miniature sorption pump allows a small quantity of ^4He exchange gas into the inner vacuum can to condense ^3He into the pot
- Hold time typically greater than 36 hours with automated recondensing procedure
- Sample temperature may be controlled between 290 mK and 2.5 K by controlling the main sorption pump temperature
- Calibrated RuO sensor on sample stage

- Temperature sensors on ^3He pot and sorption pumps
- Fully motorised and computer controlled, software drives a stepper motor with potentiometer position feedback for control
- Completely sealed system with cryopumps installed, eliminating any risk of contamination or loss of ^3He

^3He Rotator Probe Specifications

Mass of ^3He rotator probe insert	<5 kg
Sample mount area	5.5 mm × 5.5 mm (LCC20)
Base temperature	300 mK
Range of angular rotation	0 - 90°
Angular precision	0.3°
Cooldown time with vti at base temperature	~2 hours

Software Control and Sample Platform

Software Control



The rotators are controlled by software incorporated into the Cryogenic Ltd measurement system software.

This allows ease of use, unattended operation and can be easily extended.



Sample Platforms

Sample platform Type	Number of Contacts	Size of Sample	Types of Rotator these can be used for.	To suit what diameter of VTI
6 pin	6	10mm x 5mm	One axis – out of plane	>25mm
8 pin	8	10mm x10mm	One axis – out of plane	>25mm
LCC20	20	5.5mm x 5.5mm	One axis – out of plane One axis – in plane One axis ³ He out of plane Two axis	>30mm
LCC44	44	12mm x 12mm	One axis – out of plane	>50mm



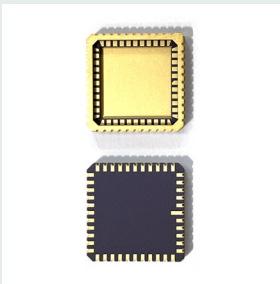
6 pin sample chip
and probe end



8 pin sample chip
and probe end



20 pin sample chip Multi
sample probe and probe end



44 pin sample chip Multi
sample probe and probe end

Specifications

One-Axis Rotator 1.6 K: In-Plane

Base temperature	1.6 K
Working temperature range	1.6 K – 325 K
Outer diameter	23 mm (to suit 30 mm VTI)
Sample Platform Type	LCC20 in-plane
Angular Range	330 degrees
Position Control	Angular position sensor
Angular Accuracy	0.1 degrees

Two-Axis Rotator 1.6 K: In and Out-of-Plane

Base temperature	1.6 K
Working temperature range	1.6 K – 325 K
Outer diameter	28 mm (to suit 30 mm VTI)
Sample Platform Type	LCC20
Angular Range	180 degree in each axis
Position Control	Home position detector and hysteresis-free positioning algorithm
Angular Accuracy	0.5 degree in each axis

One-Axis Rotator 1.6 K: Out-of-Plane for LCC20

Base temperature	1.6 K
Working temperature range	1.6 K – 325 K
Outer diameter	23 mm (to suit 30 mm VTI)
Sample Platform Type	LCC20 out-of-plane (6, 8 pin)
Angular Range	330 degrees
Position Control	Angular position sensor
Angular Accuracy	0.1 degrees

One-Axis Rotator 1.6 K: Out-of-Plane for LCC44

Base temperature	1.6 K
Working temperature range	1.6 K – 325 K
Outer diameter	48 mm (to suit 50 mm VTI)
Sample Platform Type	LCC44 out-of-plane
Angular Range	330 degrees
Position Control	Angular position sensor
Angular Accuracy	0.1 degrees

³He Insert: Standard and Rotating

Base temperature	<300 mK
Working temperature range	<300 mK – 325 K
³ He capacity	Total ³ He gas volume 2 STP litres. Working volume in normal use approx 1.5 STP litres.
Initial cooldown time	3 hours from room temperature sample change to ³ He condensation temperature under standard cryogen-free VTI operating conditions
Recondensation time	30 minutes to condense 90% of ³ He charge and cool pot to below 2 K
Performance	25 hours at <300 mK with zero load. 8 hours at 350 mK with 30 µW load. 3 hours at 450 mK with 100 µW load.
Outer Diameter	29 mm (to suit 30 mm VTI)
Sample platform Type	LCC20
Angular Range	90 degrees out-of-plane
Position Control	Angular position sensor
Angular Accuracy	0.5 degree in each axis

CRYOGENIC

www.cryogenic.co.uk