

# Magnetic Rotary Drives

The production-proven MagiDrive range of rotary feedthroughs enables rotation to be transferred into a vacuum system using a stiff high flux magnetic coupling. With no bellows, fluids or dynamic seals, the MagiDrive range offers reliable and leak-tight UHV operation.

### MagiDrive concept

Using the latest magnetic materials technology, a large number of high flux magnetic fields interlock inner and outer rotating assemblies through a solid stainless steel enclosure. The enclosure or vacuum envelope is manufactured from one piece ensuring vacuum integrity. The high density of interlocking fields ensures exceptionally high torsional rigidity.

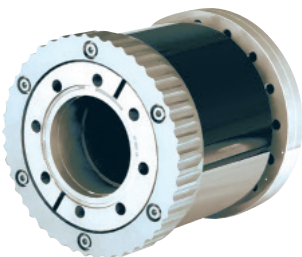
MagiDrives used in excess of their torque rating simply release their magnetic grip and lock back onto the next magnetic pole. This protects the drive and whatever it is driving from incurring any damage, thereby avoiding expensive maintenance. MagiDrives offer high precision rotation with zero angular backlash under low load and acceleration. All drives are fitted with magnetic shielding.

MagiDrives are available in a range of CF flange sizes and include hollow variants to enable stacking of drives to provide three independent axes of rotation or to enable services, such as heating, to be fed through. MagiDrives can be actuated manually, pneumatically or motorised using stepper or DC motors. MagiDrives are available in both Solid and Hollow configurations.



## Solid MagiDrive Series

The solid shaft series provides a range of standard shaft options as detailed in the product configuration options. Customised shafts are available upon request. For longer shafts, where concentricity and stability of the rotating shaft is critical, UHV Design offer a range of extended bearing housings to support the shaft along its axis of rotation. Details are available upon request.



## Hollow MagiDrive Series

The four largest MagiDrives are available in a hollow configuration, terminating with a non-rotating CF flange at the rear. This allows services to be passed through the drive or alternatively, an additional MagiDrive to be mounted to the rear, providing a secondary axis of rotation. Up to four independent axes of rotation can be provided by combining the MD16, MD40H, MD64H and MD100H MagiDrives. This stacking capability is typically used to provide simple solutions to sophisticated manipulation requirements.

### KEY ADVANTAGES

- » Magnetically-coupled, fail safe design
- » Single piece vacuum enclosure ensures leak-free performance
- » Magnetic shielding permits use in magnetically-sensitive environments
- » No bellows, organics or sliding seals
- » Bakeable to 250°C (including magnets)
- » High torque to size ratio
- » Zero backlash under low load and acceleration
- » Hollow variants allow stacking of concentric drives

### MagiDrive Selection Table

MagiDrive	Mounting Flange	Standard Torque	Medium Torque	High Torque	Ultra-High Torque
		0.04-2.0 Nm	2.1-4.5 Nm	4.6-10.0 Nm	11-40 Nm
MD10	CF10, (1" OD CF)	✓ (page 8)			
MD16N/MD16A	CF16, (1.33" OD CF)	✓ (page 10)			
MD40N/MD40A	CF40, (2.75" OD CF)	✓ (page 12)			
MD40/MD40H				✓ (page 14/20)	
MD35LB				✓ (page 22)	
MD64/MD64H	CF64, (4.5" OD CF)			✓ (page 16/24)	
MD64LB				✓ (page 26)	
MD64LBM					✓ (page 26)
MD100H	CF100, (6" OD CF)				✓ (page 28)
MD150H	CF150, (8" OD CF)				✓ (page 30)

# MAGIDRIVE Actuation options

The MagiDrive range is available with a variety of manual, pneumatic and motorised actuation methods.

## Manual actuation

Code	Item	Description
T	Standard drive	The standard manual drive.
F	Friction control	An adjustable external friction system enables the drive to hold its position when the desired position is reached. Resistance to turn is adjusted by tightening/ loosening a single screw located at the rear of the drive. Ideal for shutter applications.
B	Brake	A thumbscrew brake facility enables the drive to be locked in any position.
CB	Calibrated thimble with brake	Calibrated thimble with 1° increments and thumbscrew brake facility.
D	Dual shaft	MagiDrives can be supplied with both input and output shafts. This allows the customer to retrofit their own motorisation option or to fit a position encoder.
P	Timing pulley	A pulley is mounted on the end of the drive allowing users to install their own motor assembly.



Calibrated thimble



Brake



Dual shaft



Timing pulley

## Pneumatic actuation

Code	Item	Description
RA	Rotary actuator	Pneumatically actuated MagiDrives are fitted with an adjustable rotary actuator providing from 30-170° sweep. Flow controllers enable input and exhaust to be throttled to control speed.
RAI	Rotary actuator with visual position indicators and reed switches for position feedback	As above but fitted with two reed switches to provide position feedback for system interlock facilities. This option also includes LEDs allowing the user to see the position of the shutter in open or closed states.



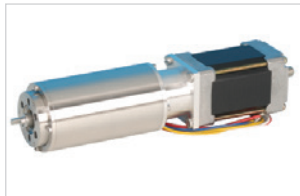
Pneumatic actuation

## Motorised actuation

Motorised MagiDrives can be driven with DC or stepper motors, and are available with a selection of motor and gearbox combinations to cover a wide range of load, speed and positioning requirements (see page 33).

Motors can be mounted either to the side or in-line with the drive (as shown below), to suit the space available. Motors are easily removed for bakeout and have pre-set mounting brackets to ensure the correct re-alignment and belt tension is maintained when the motor is replaced.

Code	Item	Description
Stepper Motors		
IS	In-line stepper motor	A co-axially mounted stepper motor providing minimum lateral footprint.
SS	Side-mounted stepper motor	A stepper motor mounted to the side of the drive.
DC Motors		
ID	In-line DC motors	A co-axially mounted DC motor providing minimum lateral footprint.
SD	Side-mounted DC motor	A DC motor mounted to the side of the drive.



In-line motor



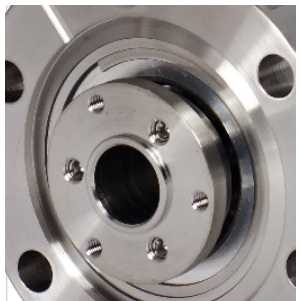
Side-mounted motor

## Additional options for motorised MagiDrives

Code	Item	Description
S	Home Sensor	Single optical sensor for home positioning whilst allowing continuous rotation
L	Limit Switches	End of travel switch limiters
E	Rotary Encoder	Rotary positional data

## Shaft Options

Code	Item	Description
X000	Stub shaft or spigot	Stub shaft - short stub shaft for end users to connect to.  Spigot flange - spigot flanges to provide a rigid coupling to the driven load, whilst ensuring drive and shaft concentricity.
X030	30mm shaft	30 mm long stub shaft with a machined flat to aid connection (MD16). 30 mm long hollow tube shaft (MD35LB).
D	Dual shaft	Drive is provided with both input and output shafts.



Spigot Flange

# CF10, 1" OD Flange

Solid MagiDrive Series

## MD10 Series

This miniature drive is made possible through the use of the CF10 micro flange, which has an outside diameter of just 25.4mm. The body diameter is no bigger than the flange 1" OD, which makes the MD10 ideal for rotating small instrumentation loads, in applications where space is at a premium.

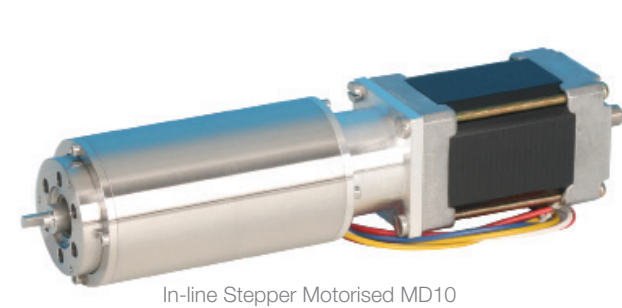
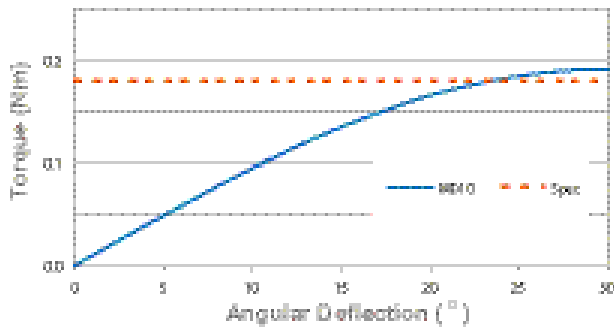


- MD10 KEY ADVANTAGES**
- » Magnetically-coupled fail-safe design
  - » Smallest UHV drive on market
  - » High torque / size ratio
  - » No bellows or dynamic seals
  - » Bakeable to 250°C
  - » Zero backlash under low load
  - » True UHV performance

Specification Table

MAGIDRIVE BODY	MD10
System mounting flange	CF10 25.4mm (1") OD CF
Construction	Machined from one piece 316L
Shaft style	Solid
Break-away torque	0.18Nm (0.13 lbf ft)
Max. no load spin speed (standard bearings)	200 rpm
Maximum shaft axial thrust	20N (4.5 lbf ft)
Maximum bakeout temp	250°C

Torsional Stiffness



# CF16, 1.33" OD Flange

Solid MagiDrive Series

## MD16N/MD16A Series



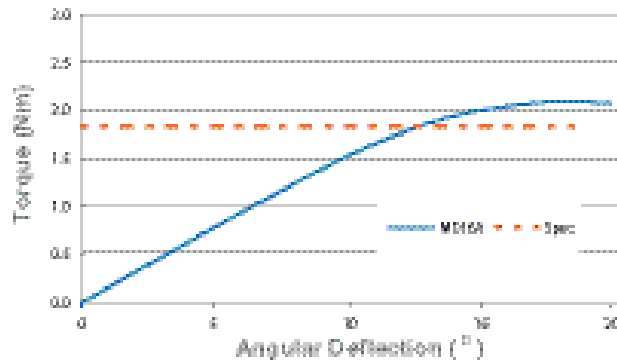
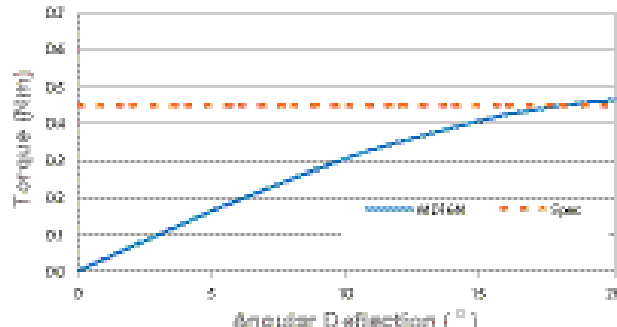
The MD16N is the 'work horse' of the MagiDrive series providing sufficient torque (0.45Nm) for the majority of miniature feedthrough requirements. The MD16A provides the highest torque on the market for a CF16 flange (1.8Nm) and is ideal for shutter applications. Both variants benefit from our simple actuation upgrade options via a simple 'do it yourself' upgrade kit.

- MD16N/MD16A KEY ADVANTAGES**
- » Magnetically-coupled fail-safe design
  - » High torque / size ratio
  - » No bellows or dynamic seals
  - » Bakeable to 250°C
  - » Zero backlash under low load
  - » True UHV performance

Specification Table

MAGIDRIVE BODY	MD16N	MD16A
System mounting flange	CF16 34mm (1.33") OD CF	
Construction	Machined from one piece 316L	
Shaft style	Solid	
Break-away torque	0.45 Nm (0.33 lbf ft)	1.8 Nm (1.33 lbf ft)
Maximum no load spin speed (standard bearings)	1000 rpm	
Maximum shaft axial thrust	20 N (4.5 lbf)	
Maximum bakeout temp	250°C	

Torsional Stiffness



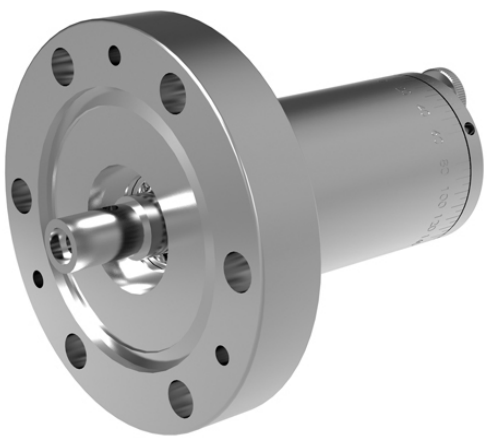
MD16 with optical sensor





# CF40, 2.75" OD Flange

Solid MagiDrive Series



## MD40N/MD40A Series

The MD40N and MD40A provide 0.45Nm and 1.8Nm break-away torque for low- to medium-torque applications.

Both versions can be upgraded from manual actuation to motorisation at a later date using a simple-to-install motorisation kit.

### MD40N/MD40A KEY ADVANTAGES

- » Magnetically-coupled fail-safe design
- » High torque / size ratio
- » No bellows or dynamic seals
- » Bakeable to 250°C
- » Zero backlash under low load
- » True UHV performance

# CF40, 2.75" OD Flange

Solid MagiDrive Series



## MD40 Series

The MD40 MagiDrive provides 9Nm torque on a 70mm OD (2¾" OD CF) flange. The drive is ideally suited to applications such as the rotation of samples and small platens, where stability is key. The MD40 is also available in a hollow configuration (see MD40H, page 20). For larger bore requirements on this flange size see MD35LB Series (6Nm) on page 22.

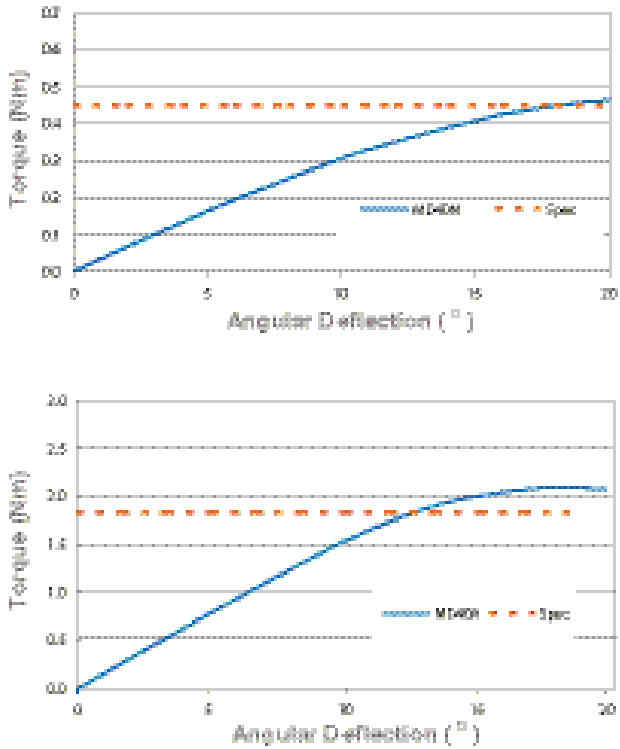
### MD40 KEY ADVANTAGES

- » Magnetically-coupled fail-safe design
- » No bellows or dynamic seals
- » High torque rotation (9Nm)
- » Bakeable to 250°C
- » Zero backlash under low load
- » True UHV performance

Specification Table

MAGIDRIVE BODY	MD40N	MD40A
System mounting flange	CF40 70mm (2.75") OD CF	
Construction	Machined from one piece 316L	
Shaft style	Solid	
Break-away torque	0.45 Nm (0.33 lbf ft)	1.8 Nm (1.33 lbf ft)
Maximum no load spin speed (standard bearings)	1000 rpm	
Maximum shaft axial thrust	20 N (4.5 lbf)	
Maximum bakeout temp	250°C	

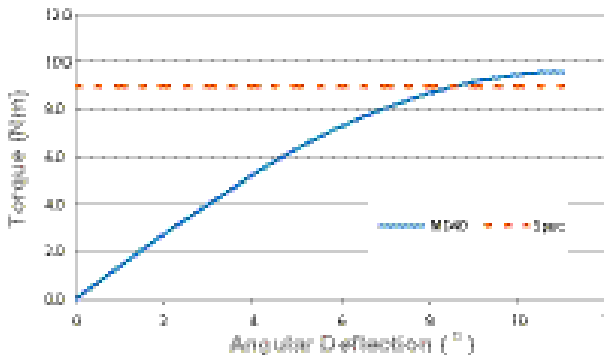
Torsional Stiffness



Specification Table

MAGIDRIVE BODY	MD40
System mounting flange	CF40 70mm (2.75") OD CF
Construction	Machined from one piece 316L
Shaft style	Spigot flange
Break-away torque	9 Nm (6.64 lbf ft)
Maximum no load spin speed (standard bearings)	500 rpm
Maximum shaft axial thrust	142 N (32 lbf)
Maximum bakeout temp	250°C

Torsional Stiffness



MD40 with dual shaft option



# CF64, 4.5" OD Flange

Solid MagiDrive Series

## MD64 Series



The MD64 MagiDrive provides high torque rotation through a high stiffness coupling. This drive would be ideally suited to robot type or platen rotation applications. The MD64 is also available in a hollow configuration (see page 26). For higher torque applications (up to 40Nm) see MD64LBM & MD100H on pages 28 and 30.

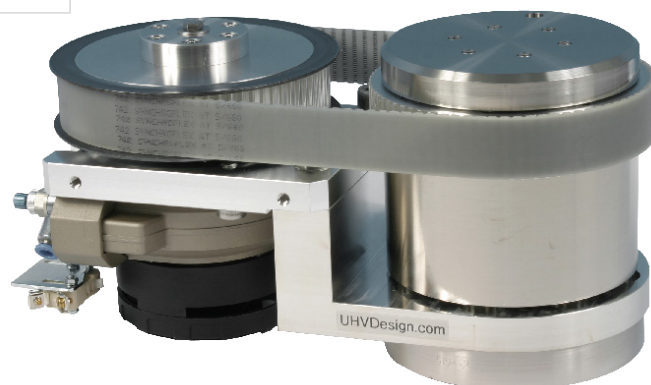
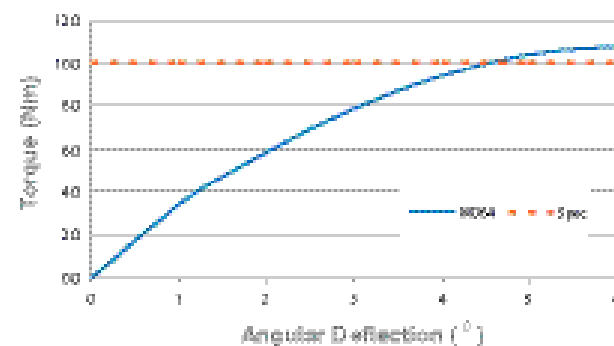
### MD64 KEY ADVANTAGES

- » Magnetically-coupled fail-safe design
- » High torque
- » No bellows or dynamic seals
- » Bakeable to 250°C
- » Zero backlash under low load
- » True UHV performance

### Specification Table

MAGIDRIVE BODY	MD64
System mounting flange	CF64 114mm (4.5") OD CF
Construction	Machined from one piece 316L
Shaft style	Spigot flange
Break-away torque	10 Nm (7.38 lbf ft)
Maximum no load spin speed (standard bearings)	500 rpm
Maximum shaft axial thrust	415 N (93 lbf)
Maximum Bakeout Temp	250°C

### Torsional Stiffness

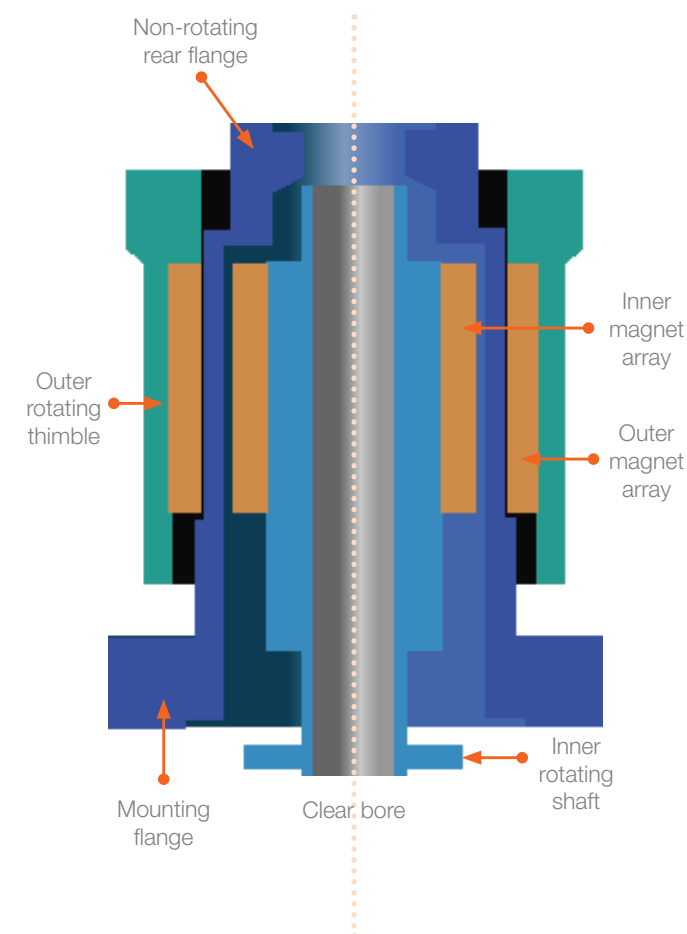


Pneumatically actuated MD64

## Hollow Magnetic Rotary Drives

The four largest MagiDrives are available in a hollow configuration, terminating with a non-rotating CF flange at the rear. This allows services to be passed through the drive or alternatively, an additional MagiDrive to be mounted to the rear, providing a secondary axis of rotation. Up to five independent axes of rotation can be provided by combining the MD16A, MD40H, MD64H, MD100H and MD150H MagiDrives.

This stacking capability is typically used to provide simple solutions to sophisticated manipulation requirements.



### HOLLOW MAGIDRIVE KEY ADVANTAGES

- » Allows services to pass through the centre, i.e. power feedthroughs, thermocouples, cooling tubes etc.
- » Co-axial combinations of drives, providing up to five axes of independent rotation for sophisticated manipulation requirements
- » All MagiDrives are:
  - Failsafe – with excess torque a MagiDrive will simply release and lock back onto the next pole avoiding possible costly damage, maintenance and downtime
  - Bakeable to 250°C
- » MagiDrives benefit from:
  - A single piece vacuum enclosure\* guaranteeing vacuum integrity
  - No bellows, organics or sliding seals
  - True UHV performance
  - High torque
  - Zero backlash under low load and acceleration
  - Magnetic shielding permitting use in magnetically-sensitive environments

\*Excluding MD100H & MD150H

# CF40, 2.75" OD Flange

Hollow MagiDrive Series

## MD40H Series

MD40H is a medium torque, medium stiffness rotary drive. Configured with a hollow body, the MD40H has a fixed rear flange enabling a component to pass through the centre, such as a heater module, a feedthrough, a second MagiDrive rotary feedthrough or a cold lance.

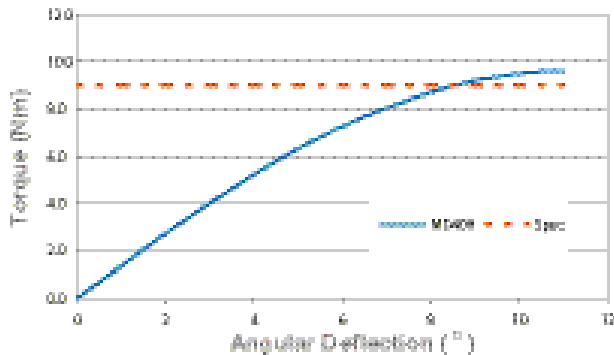


- MD40H KEY ADVANTAGES**
- » 14.5mm clear bore
  - » Magnetically-coupled fail-safe design
  - » Medium torque
  - » No bellows or dynamic seals
  - » Bakeable to 250°C
  - » Zero backlash under low load
  - » True UHV performance

Specification Table

MAGIDRIVE BODY	MD40H
System mounting flange	CF40 70mm (2.75") OD CF
Fixed rear flange	CF16 34mm (1.33") OD CF
Construction	Machined from one piece 316L
Clear bore diameter	14.5mm
Shaft style	Spigot flange
Break-away torque	9 Nm (6.62 lbf ft)
Maximum no load spin speed (standard bearings)	500 rpm
Maximum shaft axial thrust	142 N (32 lbf)
Maximum bakeout temp	250°C

Torsional Stiffness



# CF40, 2.75" OD Flange

Hollow MagiDrive Series

## MD35LB Series

MD35LB is a medium/high torque, medium stiffness rotary drive. The MD35LB is provided with calibrated thimble, brake and timing pulley as standard. An adjustable rear flange enables rotation of position prior to fixing. The large 27mm clear bore allows a component to pass through the centre, such as a heater module, a feedthrough or a cold lance.

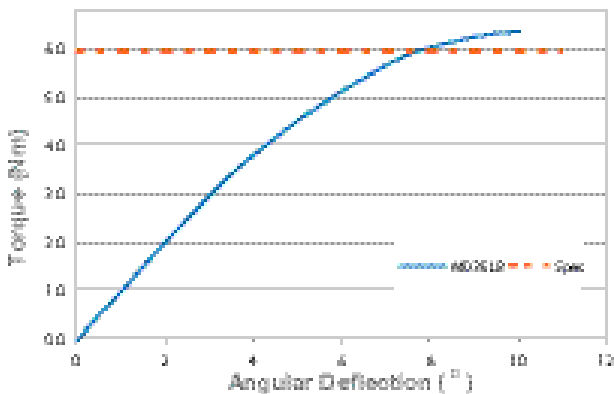


- MD35LB KEY ADVANTAGES**
- » 27mm clear bore
  - » Magnetically-coupled fail-safe design
  - » Medium/high torque
  - » No bellows or dynamic seals
  - » Bakeable to 250°C
  - » Zero backlash under low load
  - » True UHV performance

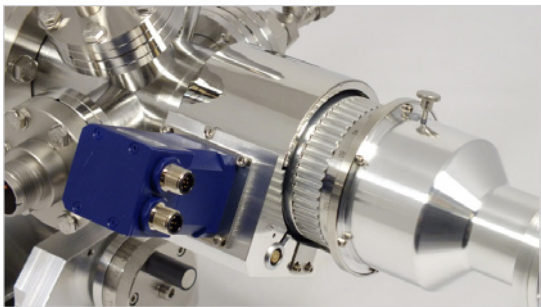
Specification Table

MAGIDRIVE BODY	MD35LB
System mounting flange	CF40 70mm (2.75") OD CF
Fixed rear flange	CF40 70mm (2.75") OD CF
Construction	Machined from one piece 316L
Clear bore diameter	27mm
Shaft style	Tube
Break-away torque	6 Nm (4.43 lbf ft)
Maximum no load spin speed (standard bearings)	500 rpm
Maximum shaft axial thrust	145 N (32.5 lbf)
Maximum bakeout temp	250°C

Torsional Stiffness



MD35LBCBP 27mm clear bore



MD35LBCBP as part of a manipulator

# CF64, 4.5" OD Flange

Hollow MagiDrive Series

## MD64H Series

The MD64H MagiDrive provides high torque rotation through a high stiffness coupling. This drive is ideally suited to platen rotation or robot type applications. The MD64H has an adjustable rear flange enabling rotation of position prior to fixing. The hollow bore allows a component to pass through the centre such as a heater module, or a second MagiDrive rotary feedthrough shaft.



- MD64H KEY ADVANTAGES**
- » 26mm clear bore
  - » Magnetically-coupled fail-safe design
  - » High torque / stability
  - » No bellows or dynamic seals
  - » Bakeable to 250°C
  - » Zero backlash under low load
  - » True UHV performance

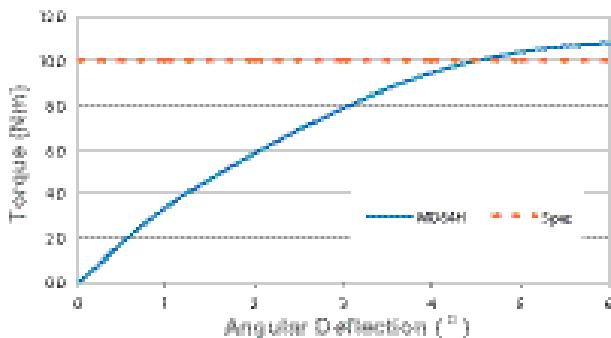
### Specification Table

MAGIDRIVE BODY	MD64H
System mounting flange	CF64 114mm (4.5") OD CF
Fixed rear flange	CF40 70mm (2.75") OD CF
Construction	Machined from one piece 316L
Clear bore diameter	26mm
Shaft style	Spigot flange
Break-away torque	10 Nm (7.38 lbf ft)
Maximum no load spin speed (standard bearings)	500 rpm
Maximum shaft axial thrust	415 N (93 lbf)
Maximum bakeout temp	250°C



MD64H with timing pulley

### Torsional Stiffness



MD64H with side-mounted stepper motor

# CF64, 4.5" OD Flange

Hollow MagiDrive Series

## MD64LB(M) Series

The MD64LB & MD64LBM MagiDrives provides high (8 Nm) or ultra-high (40 Nm) torque rotation through a high stiffness coupling with a large 48.5mm clear bore. This drive is ideally suited to platen rotation or robot type applications. The MD64LBM supplies higher torque with the same dimensions.



- MD64LB(M) KEY ADVANTAGES**
- » 48.5mm clear bore
  - » High torque / stability
  - » No bellows or dynamic seals
  - » Bakeable to 250°C
  - » Zero backlash under low load
  - » True UHV performance

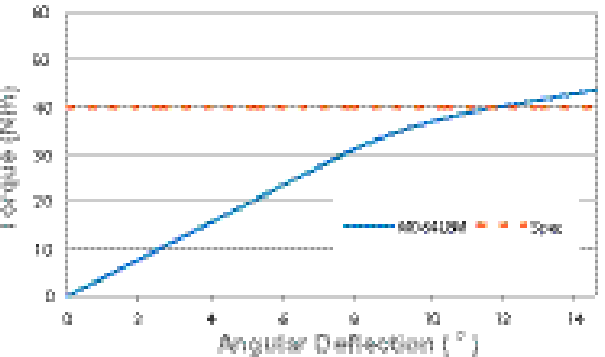
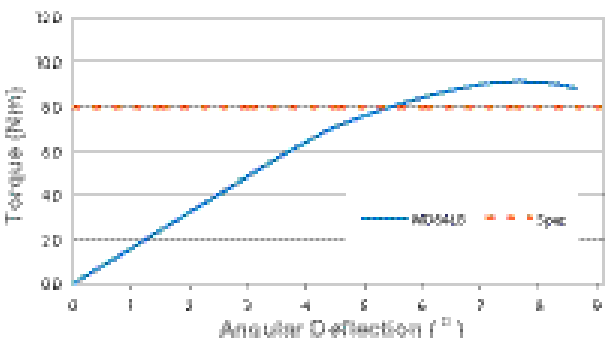
### Specification Table

MAGIDRIVE BODY	MD64LB	MD64LBM
System mounting flange	CF64 114mm (4.5") OD CF	
Fixed rear flange	CF64 114mm (4.5") OD CF	
Construction	Machined from one piece 316L	
Clear bore diameter	48.5mm	
Shaft style	Tube with spigot flange	
Clear bore	48.5mm	
Break-away torque	8 Nm (5.90 lbf ft)	40 Nm (29.50 lbf ft)
Maximum no load spin speed	500 rpm	
Maximum shaft axial thrust	415 N (93 lbf)	
Maximum bakeout temp	250°C	



MD64LB with side-mounted stepper motor

### Torsional Stiffness





# CF100, 6" OD Flange

Hollow MagiDrive Series

## MD100H Series

The MD100H is selected for demanding high torque and stiffness applications where a large bore is required, such as indexing robots or providing substrate rotation. The MD100H has a 65mm clear bore which enables a component to pass through the centre such as a heater module, cooling tubes or a second MagiDrive rotary feedthrough.



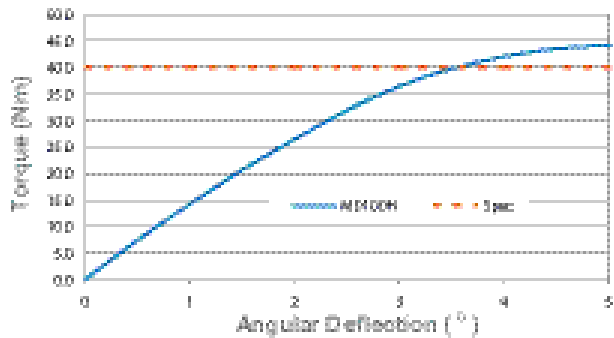
### MD100H KEY ADVANTAGES

- » 65mm clear bore
- » Powerful, stiff coupling
- » No bellows or dynamic seals
- » Bakeable to 250°C
- » Zero backlash under low load
- » True UHV performance

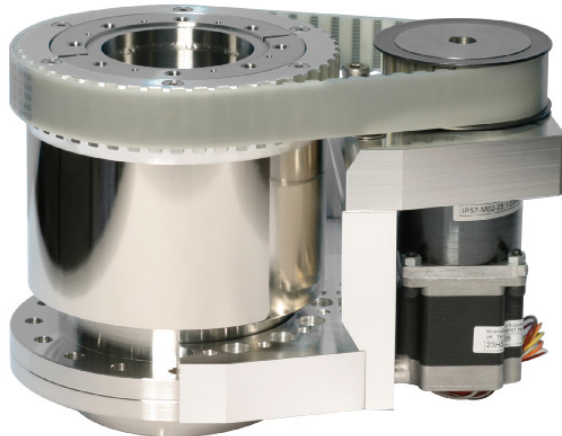
### Specification Table

MAGIDRIVE BODY	MD100H
System mounting flange	CF100 152mm (6") OD CF
Fixed rear flange	CF64 114mm (4.5") OD CF
Construction	Fabrication
Clear bore diameter	65mm
Shaft style	Spigot flange
Break-away torque	40 Nm (29.50 lbf ft)
Maximum no load spin speed	200 rpm
Maximum shaft axial thrust	415 N (93 lbf)
Maximum bakeout temp	250°C

### Torsional Stiffness



MD100H 65mm clear bore



MD100H with side-mounted stepper motor

# MAGIDRIVE Motorisation Details

## Gearbox Options

DRIVE	MOTOR TYPE	MAXIMUM OUTPUT TORQUE Nm FOR GEAR					MAXIMUM OUTPUT SPIN SPEED RPM				
		OPTION:					FOR GEAR OPTION:				
		1	2	3	4	5	1	2	3	4	5
MD10	In-Line DC motor (ID)	0.18	0.18	0.18	0.18	0.18	230	135	70	42	21
	In-Line stepper motor (IS)	0.07	0.18	0.18	0.18	-	200	23	16	8	-
MD16N	In-Line DC motor (ID)	0.21	0.35	0.45	0.45	-	230	135	70	42	-
	In-Line stepper motor (IS)	0.3	0.45	0.45	0.45	-	1000	375	107	63	-
MD16A	In-Line DC motor (ID)	0.21	0.35	0.6	0.6	-	230	135	70	42	-
	In-Line stepper motor (IS)	0.3	1.1	1.8	1.8	-	1000	375	107	63	-
MD40N	In-Line DC motor (ID)	0.21	0.35	0.6	0.6	-	230	135	70	42	-
	In-Line stepper motor (IS)	0.3	0.45	0.45	0.45	-	1000	375	107	63	-
MD40A	In-Line DC motor (ID)	0.21	0.35	0.6	0.6	-	230	135	70	42	-
	In-Line stepper motor (IS)	0.3	1.1	1.8	1.8	-	1000	375	107	63	-
MD40 MD40H	In-Line (ID) & side-mounted (SD) DC motor options	0.5	1.1	2.5	5.0	-	460	230	92	46	-
	Side-mounted stepper motor (SS)	1.0	1.9	5.8	9.0	-	500	188	54	31	-
	In-Line stepper motor (IS)	0.7	3.2	6.4	9.0	-	460	230	92	46	-
MD35LBCBP	Side-mounted DC motor (SD)	0.4	1.7	6.0	6.0	6.0	538	104	28	17	23
	Side-mounted stepper motor (SS)	0.8	3.7	6.0	6.0	6.0	500	150	75	30	23
MD64 MD64H* *side-mounted options only	Side-mounted DC motor (SD)	1.7	4.3	7.9	10	-	245	98	49	25	-
	In-Line DC motor (ID)	0.9	1.8	4.2	8.4	-	440	220	88	44	-
	Side-mounted stepper motor (SS)	3.5	6.9	10	10	-	150	75	30	15	-
	In-Line stepper motor (IS)	4.6	3.7	8.4	10	-	300	150	60	30	-
MD64LBCB (MD64LBMCB)	Side-mounted DC motor (SD)	1.7	4.3	7.9	10	-	245	98	49	25	-
	Side-mounted stepper motor (SS)	3.7	7.3	8.0 (16.8)	8.0 (33.6)	-	150	75	30	15	-
MD100H	Side-mounted DC motor (SD)	1.8	4.6	8.4	16.8	-	230	92	46	23	-
	Side-mounted stepper motor (SS)	3.7	7.3	16.8	33.6	-	150	75	30	15	-
MD150H	Contact us for details.										

For detailed technical information including gearing ratios please contact us