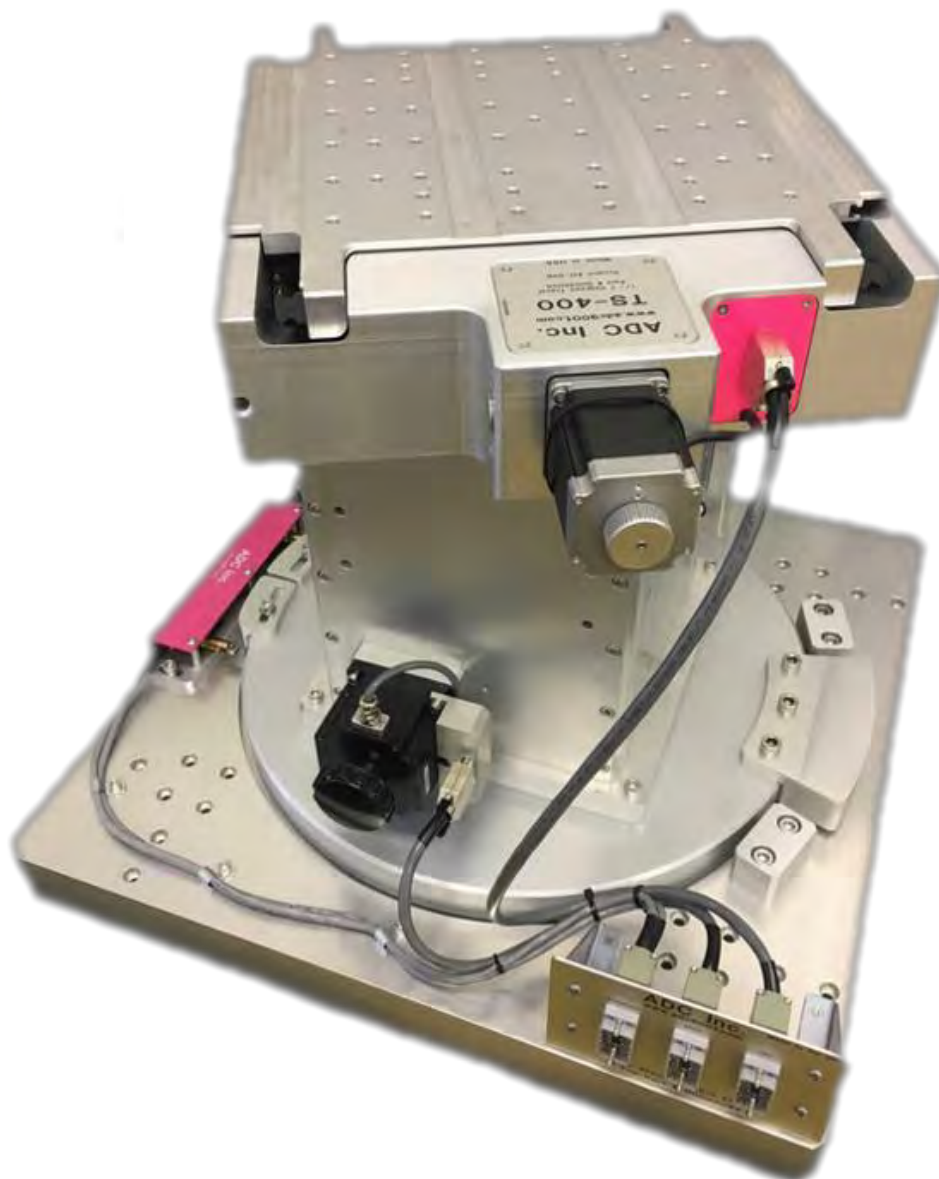




# ADC's Motion Products

High Precision Motion Stages



## Table of Contents

Company Overview .....	3
Company History .....	3
High Precision Motion Stages .....	5
Linear Stages .....	6
DS210 Series .....	7
DS310 Series .....	10
D410 Series .....	13
D510 Series .....	16
Lift Stages .....	19
DJ210 Series .....	20
DJ310 Series .....	23
DJ410 Series .....	26
Big Jacks .....	29
BJ25 Series .....	29
Mounting Plates and Brackets .....	32
Tilt Stages/Goniometers .....	33
Rotation Stages .....	34
Custom System .....	42
3-Axis Stage Stack .....	42
Company Capabilities .....	45
Engineering Design and Analysis .....	45
Electronics, Instrumentation and Software .....	46
Vacuum Assembly & Testing .....	46
Advanced Manufacturing .....	47
Equipment .....	47
Welding Capabilities .....	48
ADC's Service and Support .....	49
ADC's ISO Certification .....	50

## Company Overview

### ADC USA, Inc.

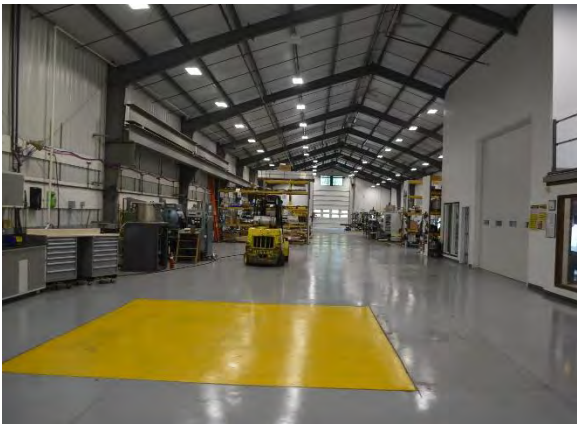
ADC USA, Inc. (ADC) is a leading developer and supplier of complex scientific components and instruments for large government laboratories and corporations around the world.



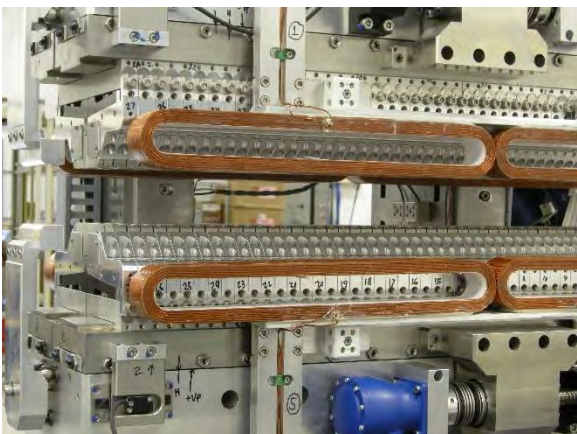
ADC, like many successful companies (and rock bands), got its start in a garage in 1995. Our garage was in Ithaca, NY on the banks of Cayuga Lake and home of Cornell University. ADC has since grown into a worldwide leader in the field of design and manufacturing of complex research instrumentation.

ADC provides machining systems and products to our diverse customers from structural metal fabrication to turn key design products with complex control systems.

We specialize in engineered experimental tables and beamline components.



ADC occupies over 22,000 square feet of space. This includes our in-house machine shop. We use precision equipment to verify each order and are committed to delivering precision machined parts. We are very proud of our shop and the capabilities we can offer because of our state-of-the-art precision CNC milling and CNC turning machines.



Our engineering department works closely with our customers to realize designs that meet their technical requirements. Through an iterative process, we have developed standard designs that can be optimally customized for each new project. Our engineers provide incisive trouble shooting and technical recommendations to our customers resulting in high performing cutting-edge instruments.

## Company History

ADC was incorporated in 1995, starting in a small office at Cornell Business and Technology Park. ADC established itself as a custom design manufacturing prime contractor. In 1995, ADC won its first contract for \$10,700 working with Crouse-Hinds-Cooper Industries. By 1998, ADC had expanded enough to occupy its first building with 3,000 square feet of office and workshop space. The company grew steadily throughout the next decade, always reinvesting in the people and new engineering design, manufacturing and assembly equipment to provide the most cost-effective solutions to our customers.

We have come a long way from our modest beginnings by developing our expertise and capabilities while continuing to provide excellence in products and service. ADC now consists of different departments to make up the framework of our operations: Engineering Design and Analysis, Manufacturing and Planning, Temperature Control/Clean Room Assembly/Testing Facility, Ultra-High Vacuum (UHV) Facility, Metrology Laboratory, Magnetic Measurement Facility (Undulator Testing Facility), and Electronics and Instrumentation. Our comprehensive facilities give our engineers the capacity and freedom to innovate.

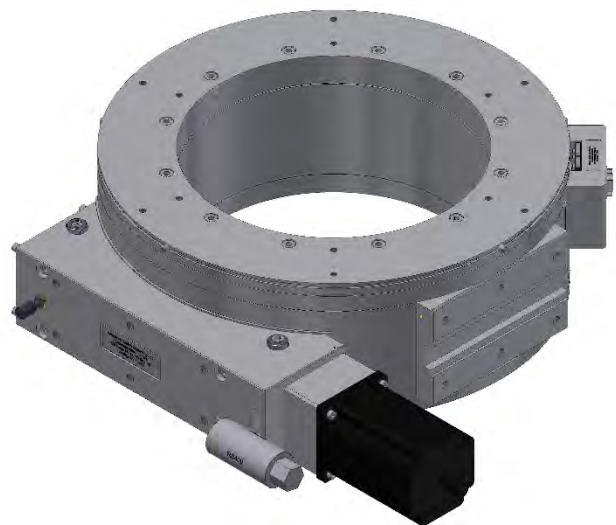
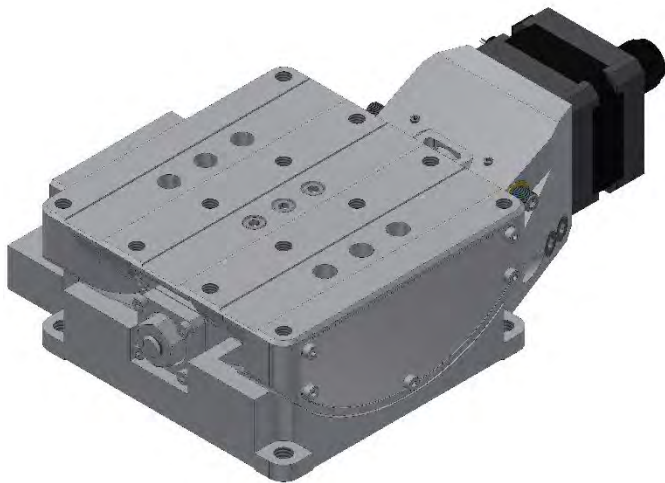
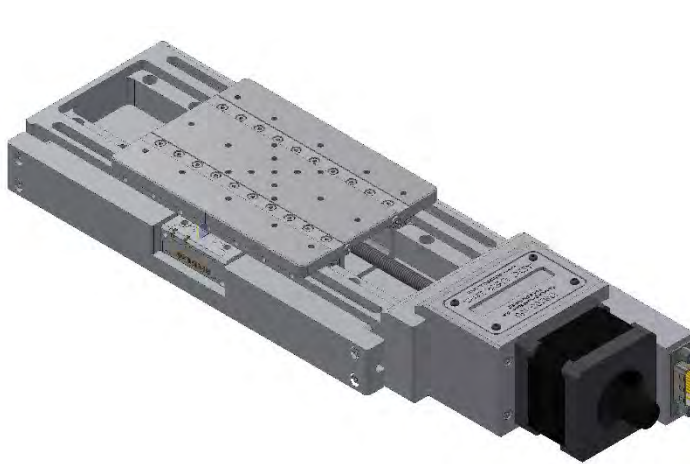
Today, ADC has a worldwide reach. ADC's vision is to be a global leader in the development and manufacturing of innovative products for scientific and research markets.





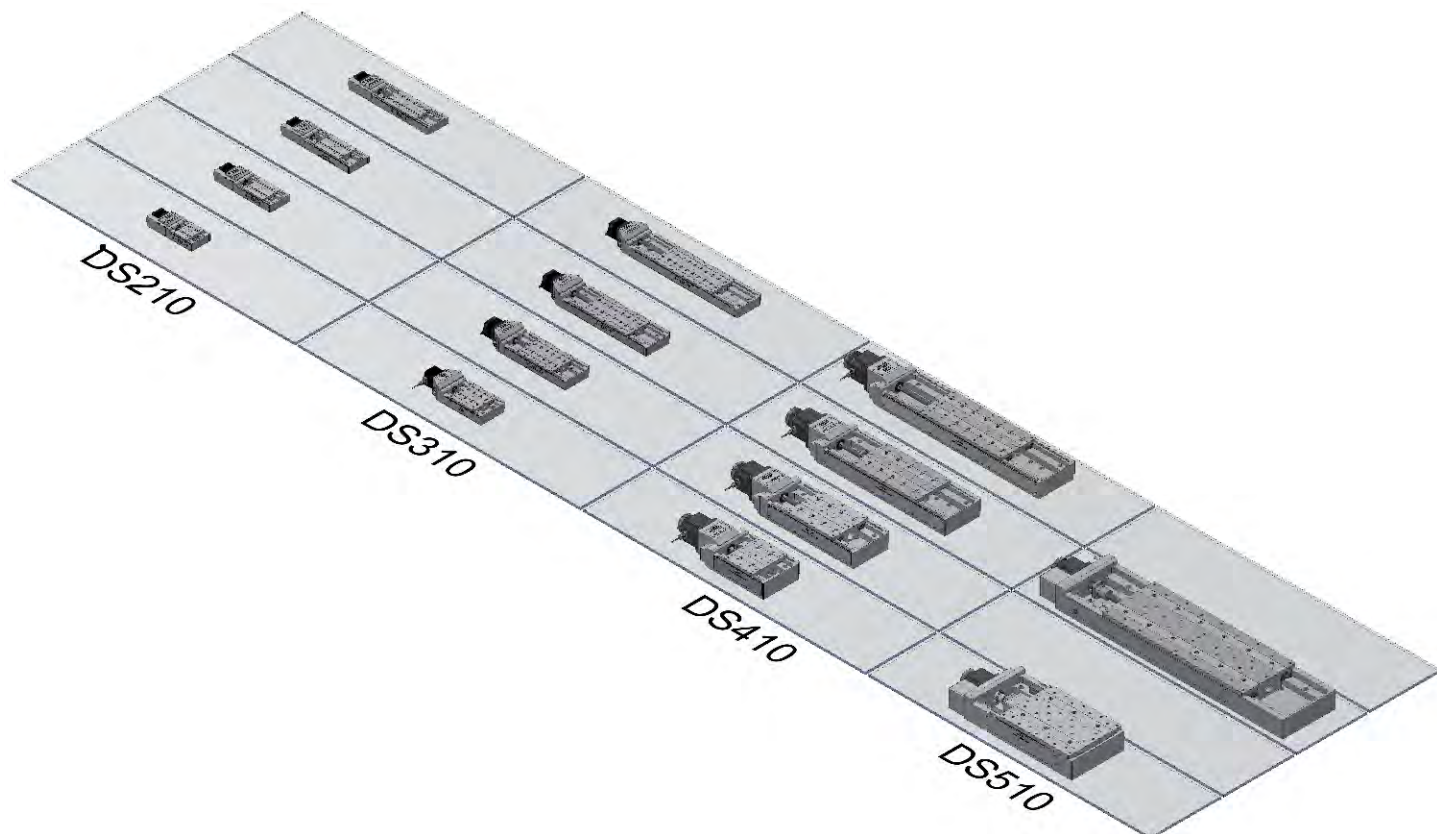
## High Precision Motion Stages

ADC manufactures high quality motion control products and systems that are suitable for Semi-conductor, Automation, and Aerospace industries. Our extensive product line includes linear stages (slides), lift stages (jacks), rotation stages, and tilt stages (goniometers).



## Linear Stages

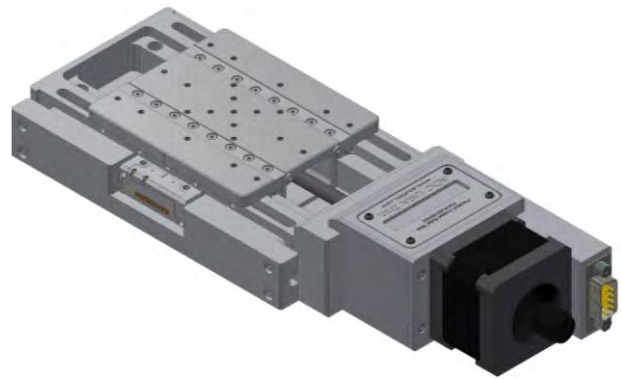
ADC's linear slides are driven by a high class preloaded ballscrew coupled to a high torque 200 step per revolution stepper motor which can be run in full, half, or micro stepping mode to meet customer resolution requirements. Maximum rigidity is assured through the use of preloaded crossed roller linear bearings. Each slide also features two fully adjustable, normally closed limit switches to define the extents of travel.



## DS210 Series

### Key Features:

- Travels 30-100mm
- 1  $\mu\text{m}$  Repeatability
- Various Motor Options
- Load Capacity up to 10.5kg
- Ultra-fine Resolution



### Mechanical:

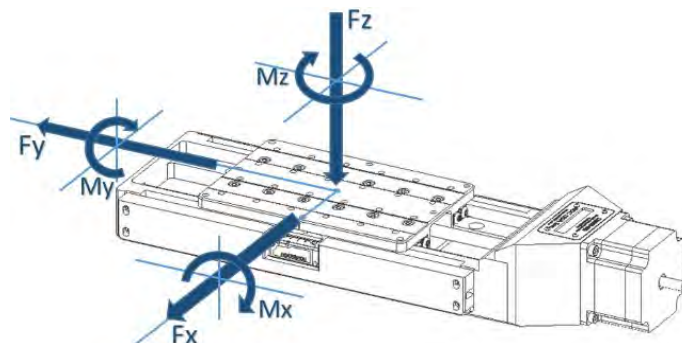
Description	30	50	75	100
Travel (mm)	30	50	75	100
Optional Linear Encoder	Yes	Yes	Yes	Yes
Repeatability ( $\mu\text{m}$ RMS)	1	1	1	1
Lead Accuracy ( $\mu\text{m}/25\text{mm}$ )	2.5	2.5	2.5	2.5
Trajectory Straightness ( $\mu\text{m}/25\text{mm}$ )	2.5	2.5	2.5	2.5
Ball Screw Lead (mm)	1	1	1	1
Maximum Speed (mm/sec)	50	50	50	50
Load Capacity (kg)	10.5	10.5	10.5	10.5
Mass (kg)	1.1	1.4	1.6	1.9

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">http://www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	1.34

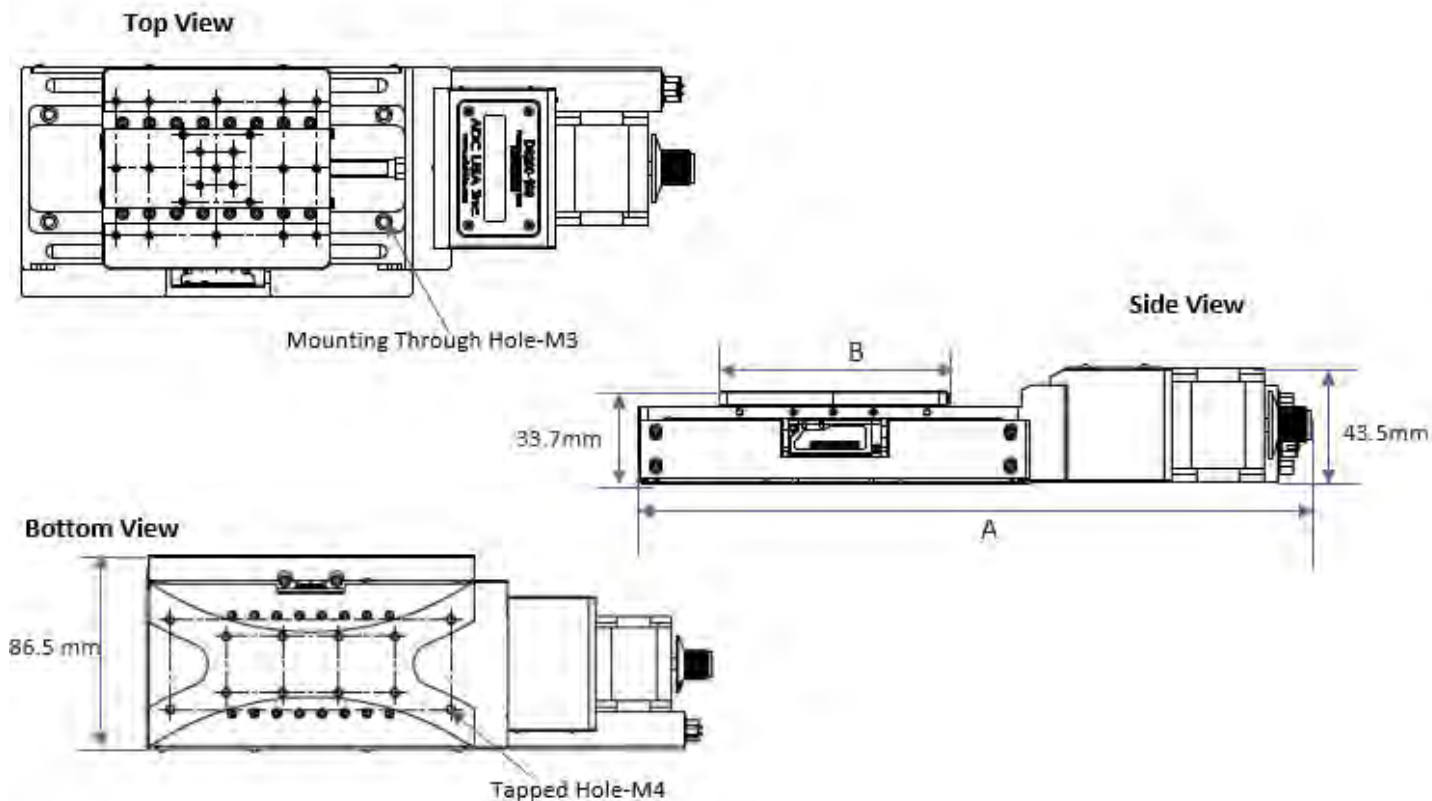
### Load Characteristics:

Fx (N)	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)
90	105	105	9.5	9.7	8.8



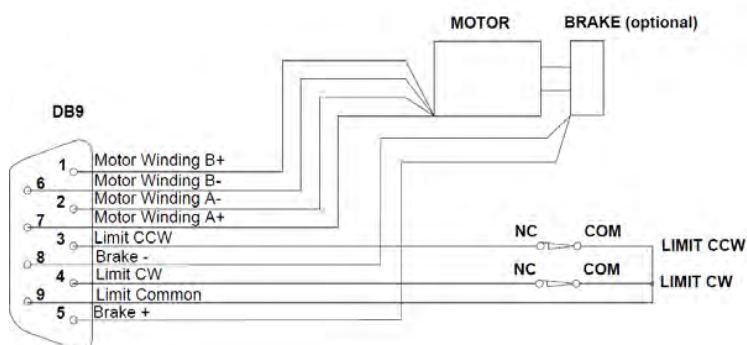
\*Loads are not simultaneous

## Dimensions:



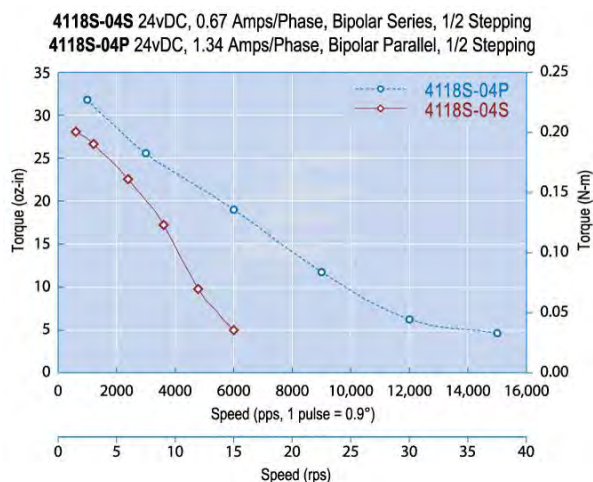
Model	50	100	150	200
A- Total Length (mm)	201.6	251.6	301.6	351.6
B- Stage Length (mm)	55	85	105	135

## Electrical Connector



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

## 2-Phase Motor Torque Graph





### Ordering Information:

Travel	Air Type	Encoder	Brake	Motor	Gearbox
-30	-A	-E	-B	-2PH	3:1
-50	-HV	-N	-N	-5PH	to
-75				-DC	100:1
-100					ratio

### Travel Options

-30	30mm Stage Travel
-50	50mm Stage Travel
-75	75mm Stage Travel
-100	100mm Stage Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Brake Options

-B	With Brake, 24VDC
-N	Without Brake

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

### Example Order

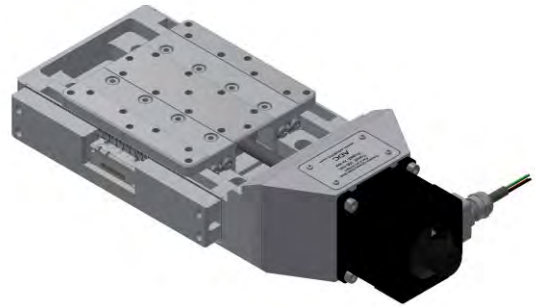
#### **DS210-50-A-N-B-2PH**

This is an order for a DS210 Precision Crossed Roller Slide with 50mm travel, in air, with no encoder, with a brake, and a 2-phase motor.

## DS310 Series

### Key Features:

- Travels 50-200mm
- 1  $\mu\text{m}$  Repeatability
- Various Motor Options
- Load Capacity up to 46kg
- Ultra-fine Resolution



### Mechanical:

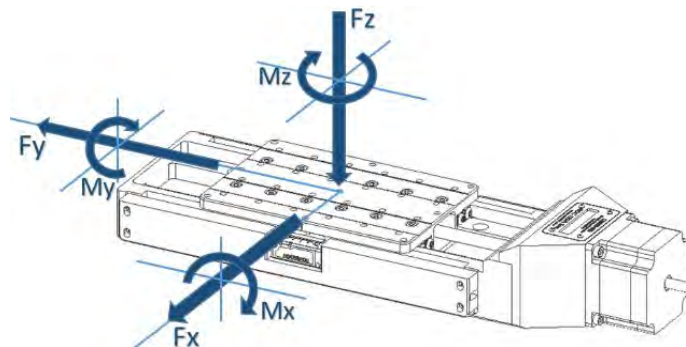
Description	50	100	150	200
Travel (mm)	50	100	150	200
Optional Linear Encoder	Yes	Yes	Yes	Yes
Repeatability ( $\mu\text{m}$ RMS)	1	1	1	1
Lead Accuracy ( $\mu\text{m}/25\text{mm}$ )	5	5	5	5
Trajectory Straightness ( $\mu\text{m}/25\text{mm}$ )	4	4	4	4
Ball Screw Lead (mm)	1	1	1	1
Maximum Speed (mm/sec)	25	25	25	25
Load Capacity (kg)	46	46	46	46
Mass (kg)	2.9	4	4.7	5.6

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">http://www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	2.8

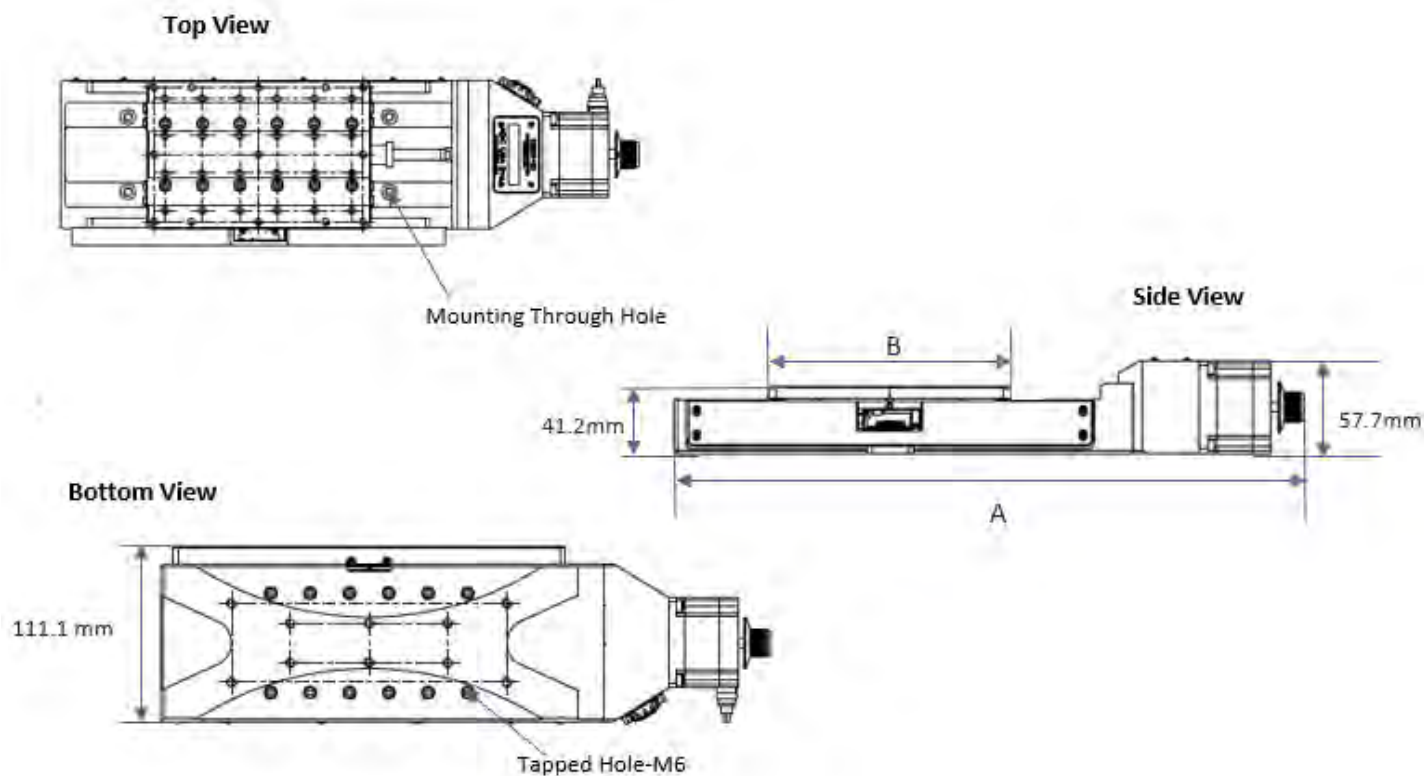
### Load Characteristics:

Fx (N)	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)
730	465	860	103	109	95.7



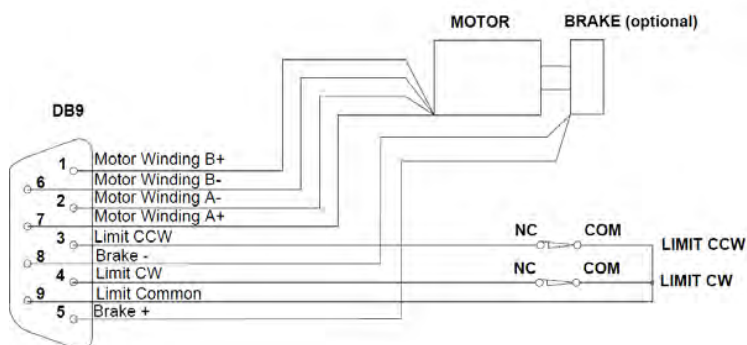
\*Loads are not simultaneous

## Dimensions:



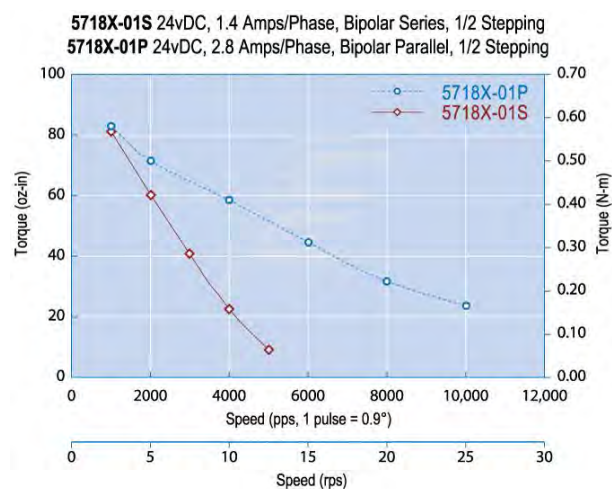
Model	50	100	150	200
A- Total Length (mm)	283	387	483	587
B- Stage Length (mm)	100	150	200	250

## Electrical Connector



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

## 2-Phase Motor Torque Graph



### Ordering Information:

-50	-A	-N	-B	-2PH	-G
Model	Air Type	Encoder	Brake	Motor	Gearbox
-50	-A	-E	-B	-2PH	3:1
-100	-HV	-N	-N	-5PH	to
-150				-DC	100:1
-200					ratio

### Travel Options

-50	50mm Stage Travel
-100	100mm Stage Travel
-150	150mm Stage Travel
-200	200mm Stage Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Brake Options

-B	With Brake, 24VDC
-N	Without Brake

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

### Example Order

#### DS310-50-A-N-B-2PH

This is an order for a DS310 Precision Crossed Roller Slide with 50mm travel, in air, with no encoder, with a brake, and a 2-phase motor.



## D410 Series

### Key Features:

- Travels 75-300mm
- 1  $\mu\text{m}$  Repeatability
- Various Motor Options
- Load Capacity up to 280kg
- Ultra-fine Resolution



### Mechanical:

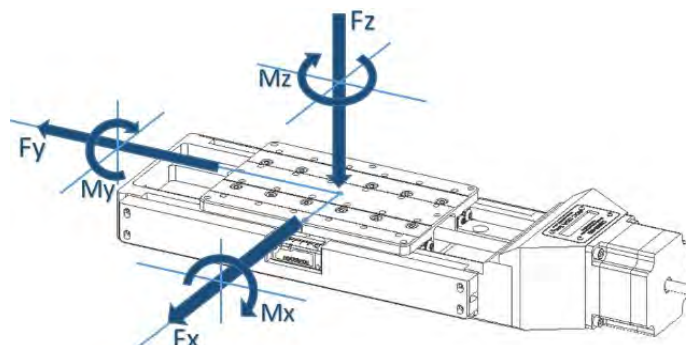
Description	75	150	225	300
Travel (mm)	75	150	225	300
Optional Linear Encoder	Yes	Yes	Yes	Yes
Repeatability ( $\mu\text{m}$ RMS)	1	1	1	1
Lead Accuracy ( $\mu\text{m}/25\text{mm}$ )	6	6	6	6
Trajectory Straightness ( $\mu\text{m}/25\text{mm}$ )	5	5	5	5
Ball Screw Lead (mm)	2	2	2	2
Maximum Speed (mm/sec)	40	40	40	40
Load Capacity (kg)	280	280	280	280
Mass (kg)	10	13.3	16	19.7

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">http://www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	4.2

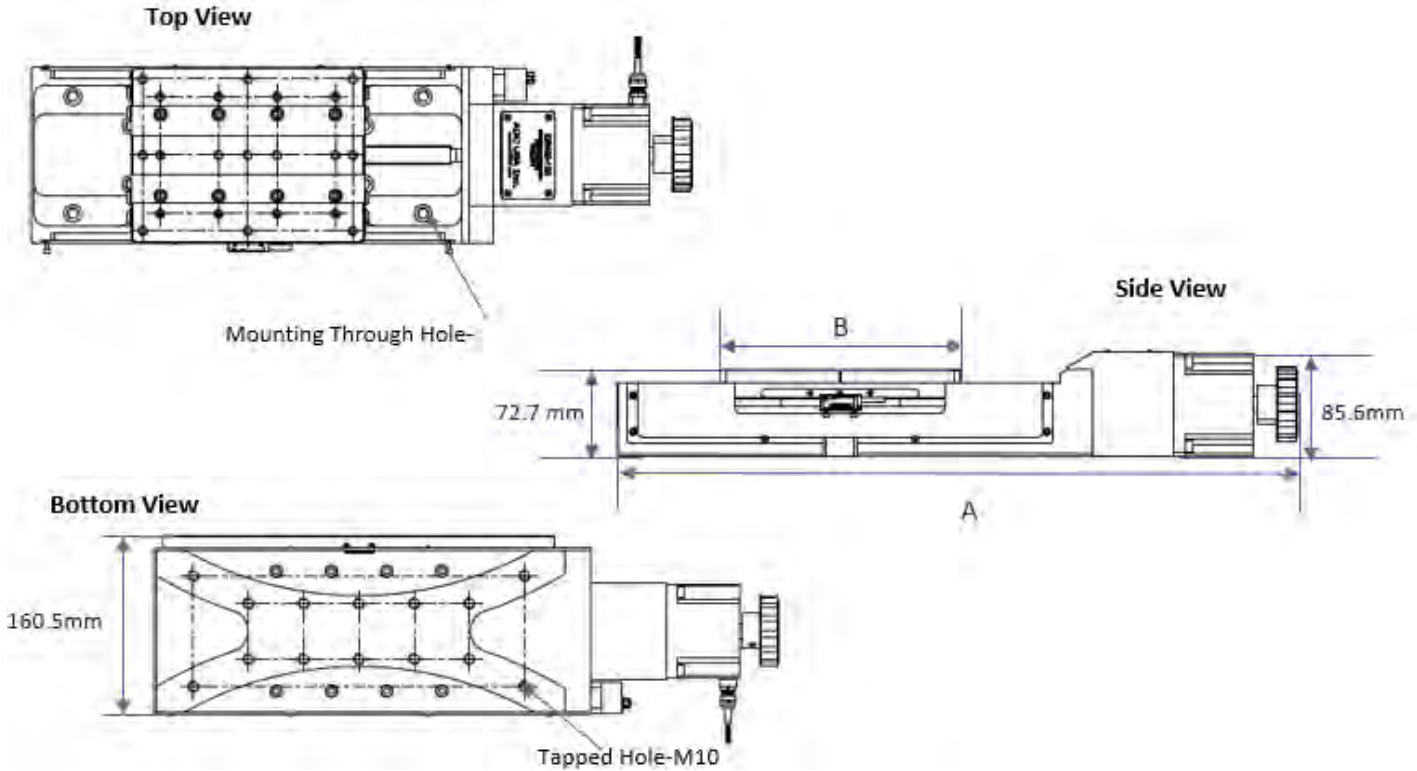
### Load Characteristics:

Fx (N)	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)
1675	2815	1970	260	400	230



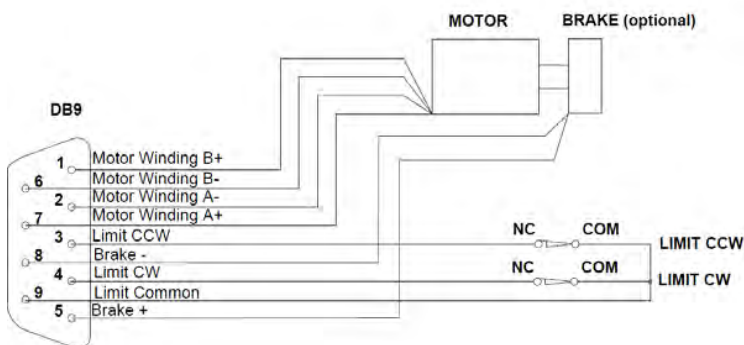
\*Loads are not simultaneous

## Dimensions:



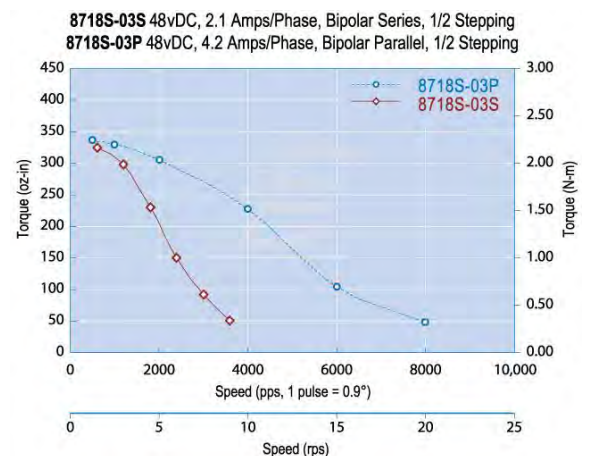
Model	75	150	225	300
A- Total Length (mm)	410.4	566.4	723.9	874.1
B- Stage Length (mm)	125	200	275	350

## Electrical Connector



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

## 2-Phase Motor Torque Graph



### Ordering Information:

-75	-A	-N	-B	-2PH	-G
Model	Air Type	Encoder	Brake	Motor	Gearbox
-75	-A	-E	-B	-2PH	3:1
-150	-HV	-N	-N	-5PH	to
-225				-DC	100:1
-300					ratio

### Travel Options

-75	75mm Stage Travel
-150	150mm Stage Travel
-225	225mm Stage Travel
-300	300mm Stage Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Brake Options

-B	With Brake, 24VDC
-N	Without Brake

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

### Example Order

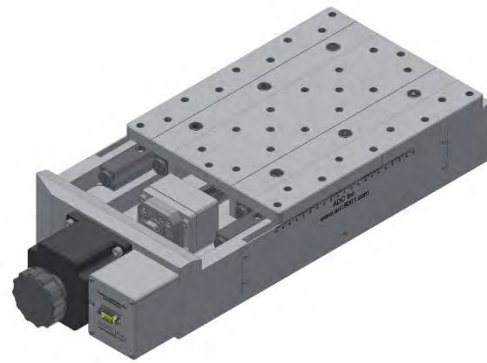
#### **DS410-150-A-N-B-2PH**

This is an order for a D4310 Precision Crossed Roller Slide with 150mm travel, in air, with no encoder, with a brake, and a 2-phase motor.

## D510 Series

### Key Features:

- Travels 100-300mm
- 1  $\mu$ m Repeatability
- Various Motor Options
- Load Capacity up to 575kg
- Ultra-fine Resolution



### Mechanical:

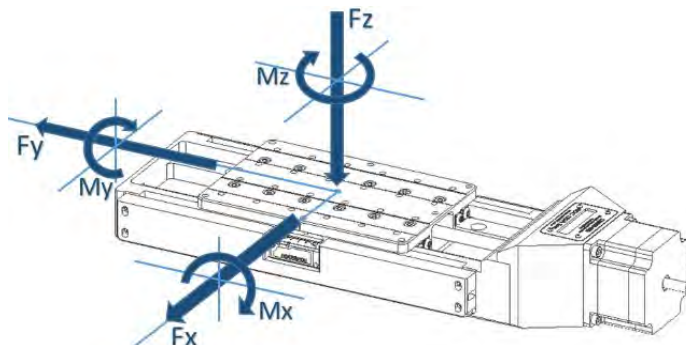
Description	100	300
Travel (mm)	100	300
Optional Linear Encoder	Yes	Yes
Repeatability ( $\mu$ m RMS)	1	1
Lead Accuracy ( $\mu$ m/25mm)	6	6
Trajectory Straightness ( $\mu$ m/25mm)	5	5
Ball Screw Lead (mm)	3	3
Maximum Speed (mm/sec)	100	100
Load Capacity (kg)	575	575
Mass (kg)	20.5	47.4

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">http://www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	4.2

### Load Characteristics:

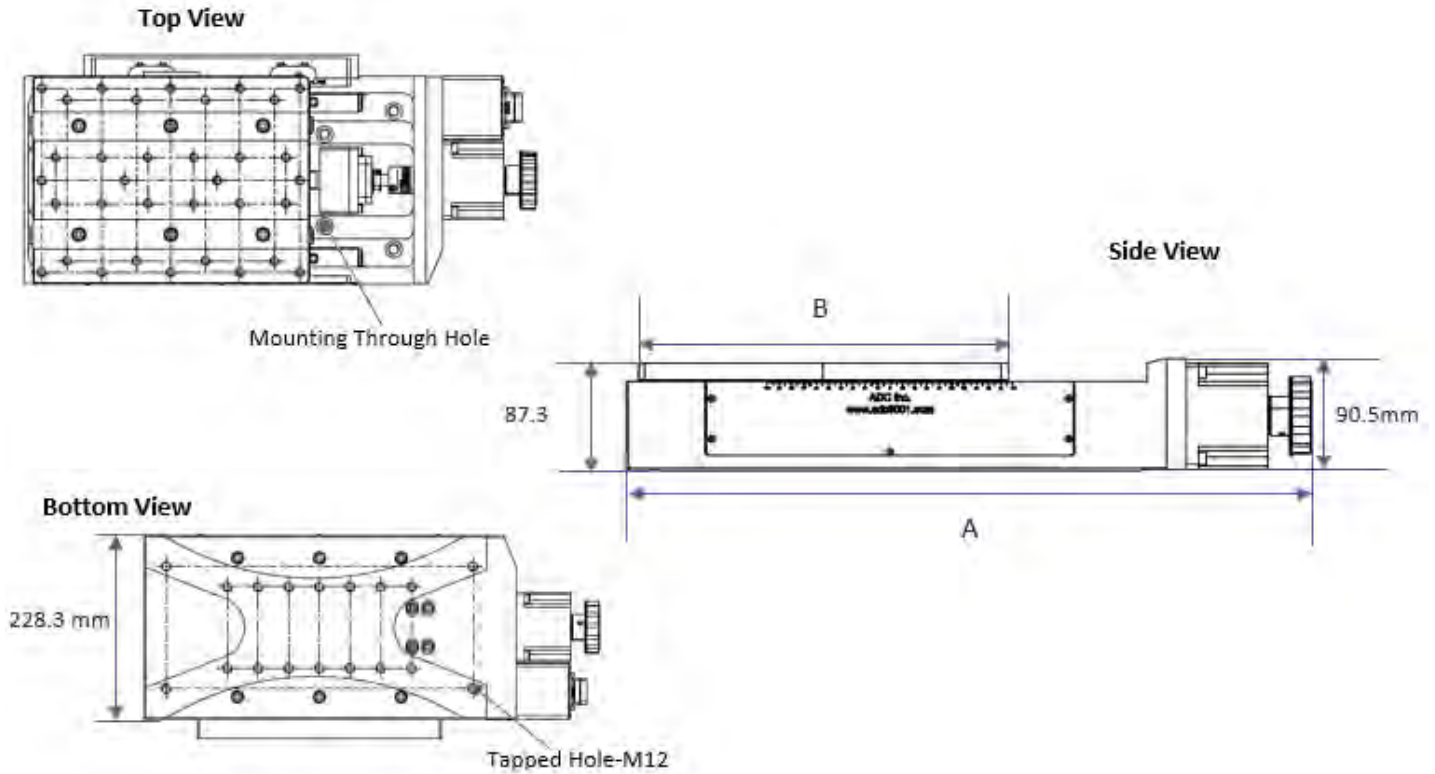
Fx (N)	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)
9320	5760	10960	3150	3560	3360



\*Loads are not simultaneous

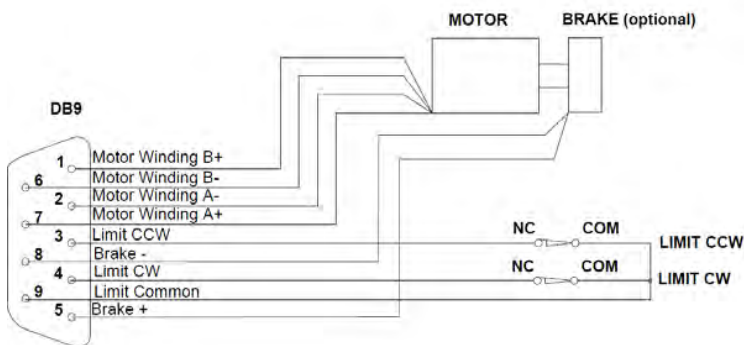


## Dimensions:



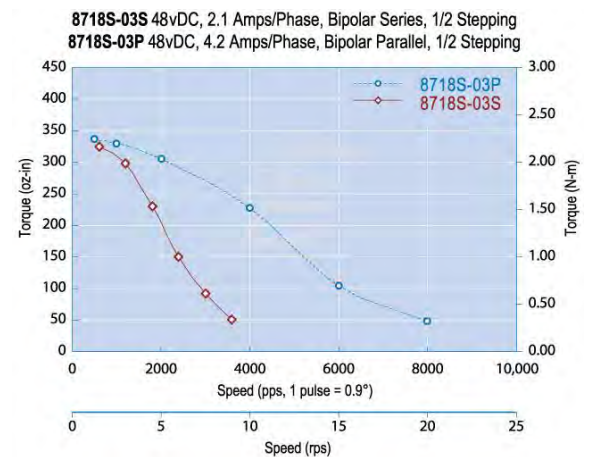
Model	100	300
A- Total Length (mm)	556.6	1065.4
B- Stage Length (mm)	300	600

## Electrical Connector



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

## 2-Phase Motor Torque Graph



### Ordering Information:

-75	-A	-N	-B	-2PH	-G
Model	Air Type	Encoder	Brake	Motor	Gearbox
-100	-A	-E	-B	-2PH	3:1
-300	-HV	-N	-N	-5PH	to
				-DC	100:1
					ratio

### Travel Options

-100	225mm Stage Travel
-300	300mm Stage Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Brake Options

-B	With Brake, 24VDC
-N	Without Brake

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

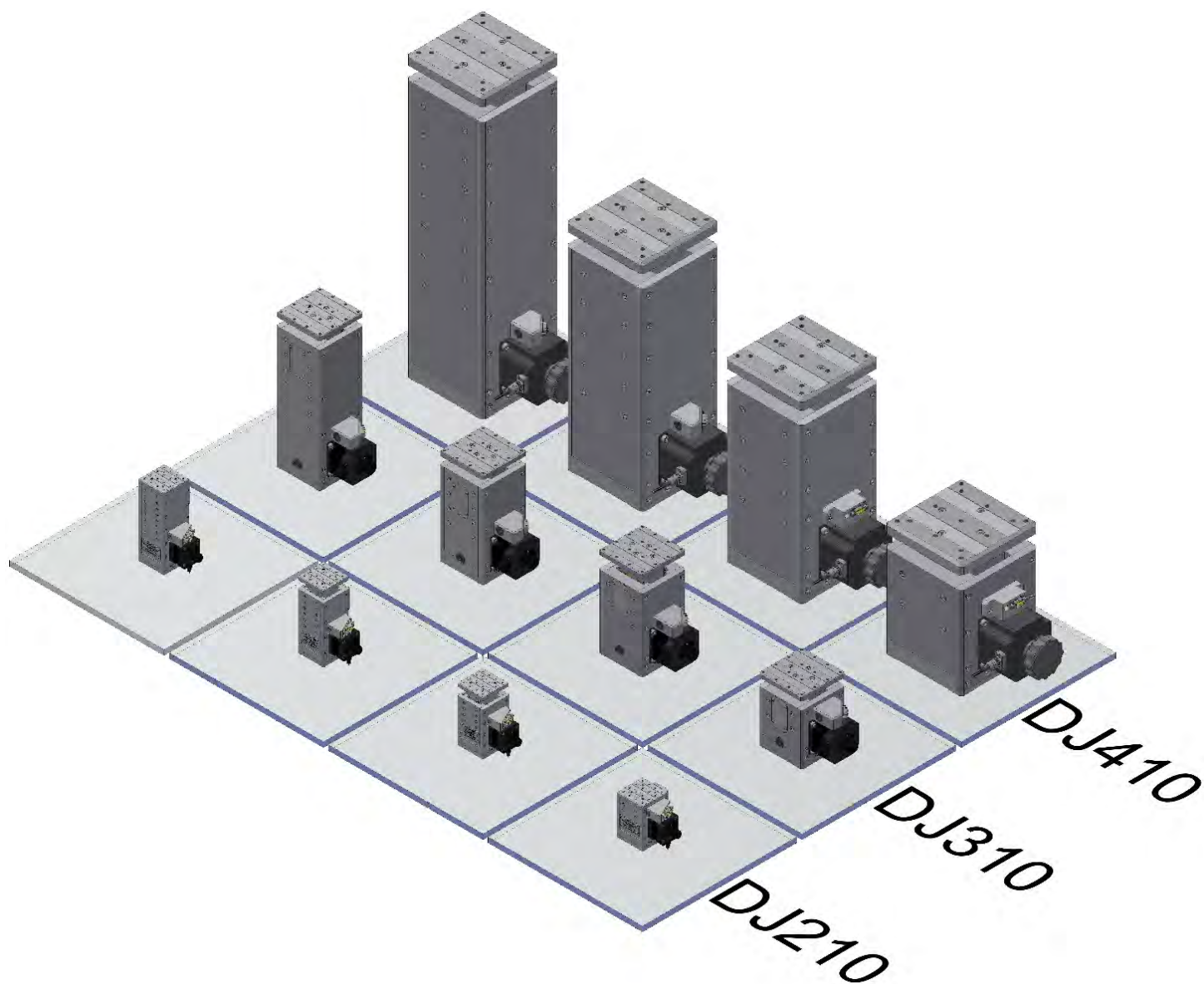
### Example Order

#### **DS510-300-A-N-B-2PH**

This is an order for a D510 Precision Crossed Roller Slide with 300mm travel, in air, with no encoder, with a brake, and a 2-phase motor.

## Lift Stages

ADC's lift stages are driven by a high class preloaded ballscrew coupled to a high torque 200 step per revolution stepper motor which can be run in full, half, or micro stepping mode to meet customer resolution requirements. Maximum rigidity is assured through the use of preloaded crossed roller linear bearings. Each jack also features two fully adjustable, normally closed limit switches to define the extents of travel.



## DJ210 Series

### Key Features:

- Travels 10-50mm
- 2  $\mu\text{m}$  Repeatability
- Various Motor Options
- Load Capacity up to 31kg
- Ultra-fine Resolution



### Mechanical:

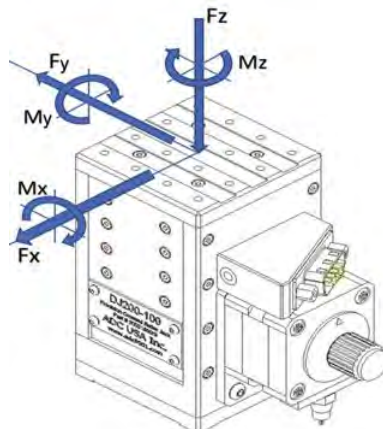
Description	10	25	35	50
Travel (mm)	10	25	35	50
Optional Linear Encoder	No	No	No	No
Repeatability ( $\mu\text{m}$ RMS)	2	2	2	2
Lead Accuracy ( $\mu\text{m}/25\text{mm}$ )	2.5	2.5	2.5	2.5
Trajectory Straightness ( $\mu\text{m}/25\text{mm}$ )	2.5	2.5	2.5	2.5
Travel Resolution (mm/rev)	0.5	0.5	0.5	0.5
Maximum Speed (mm/sec)	25	25	25	25
Load Capacity (kg)	31	31	31	31
Mass (kg)	0.6	.8	1	1.1

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
2-Phase Current (Amps/Phase)	0.45

### Load Characteristics:

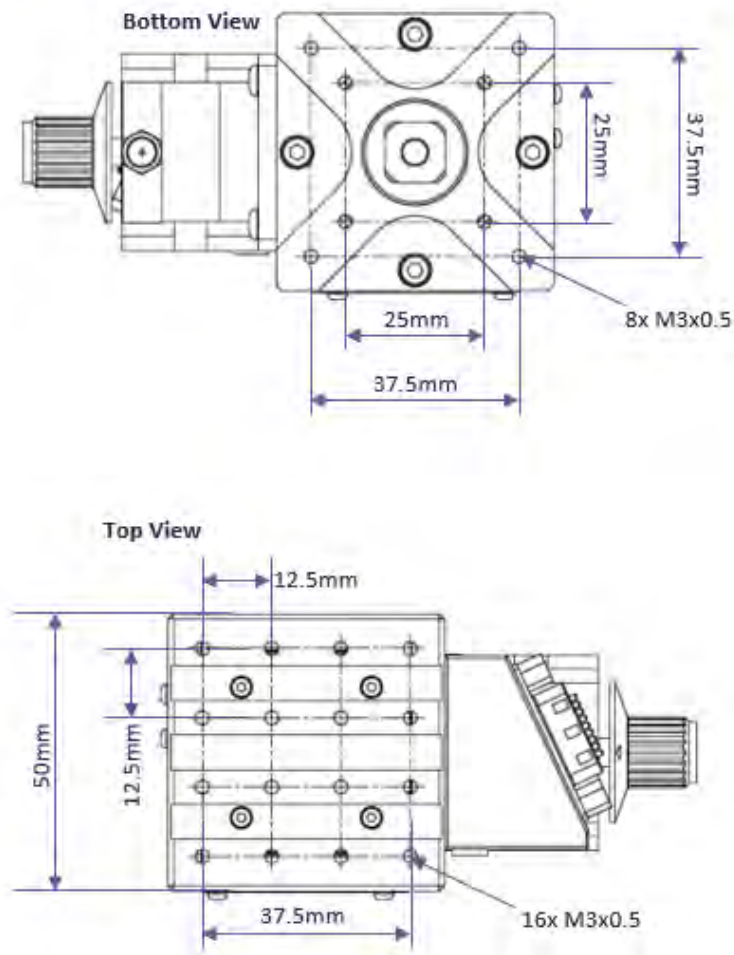
Fx (N)	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)
160	135	310	1.47	1.79	3.22



\*Loads are not simultaneous

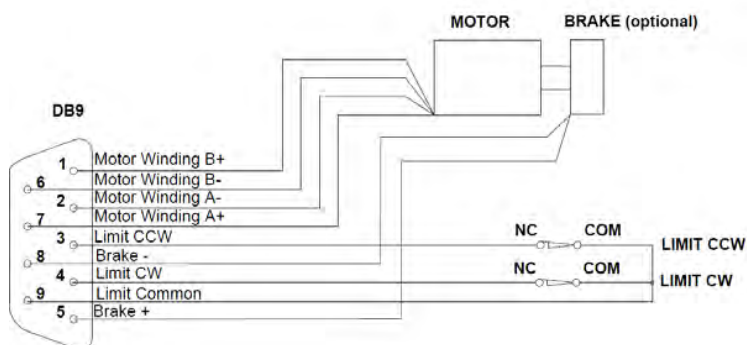


## Dimensions:



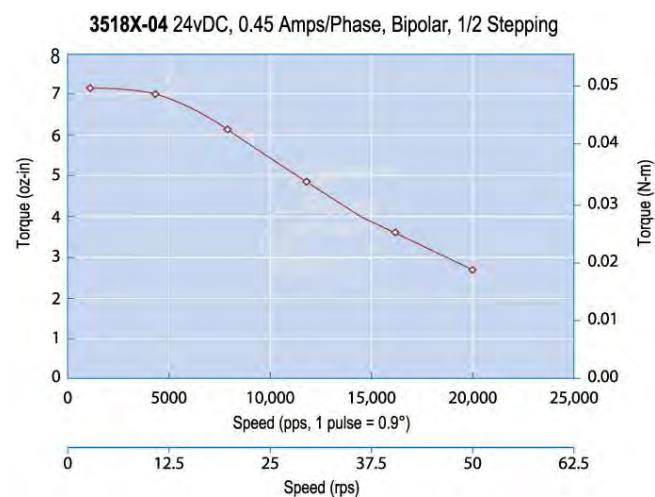
Model	10	25	35	50
A- Closed Height (mm)	75.5	89.4	113.9	137.4

## Electrical Connector



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

## 2-Phase Torque Graph



### Ordering Information:

-50	-A	-N	-B	-2PH	-G
Model	Air Type	Encoder	Brake	Motor	Gearbox
-10	-A	-N	-B	-2PH	3:1
-25	-HV		-N	-5PH	to
-35				-DC	100:1
-50					ratio

### Travel Options

-10	10mm Stage Travel
-25	25mm Stage Travel
-35	35mm Stage Travel
-50	50mm Stage Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-N	Without Optical Encoder
----	-------------------------

### Brake Options

-B	With Brake, 24VDC
-N	Without Brake

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

### Example Order

#### **DJ210-50-A-N-B-2PH**

This is an order for a DJ210 Precision Crossed Roller Jack with 50mm travel, in air, with no encoder, with a brake, and a 2-phase motor.

## DJ310 Series

### Key Features:

- Travels 25-100mm
- 1  $\mu$ m Repeatability
- Various Motor Options
- Load Capacity up to 46kg
- Ultra-fine Resolution



### Mechanical:

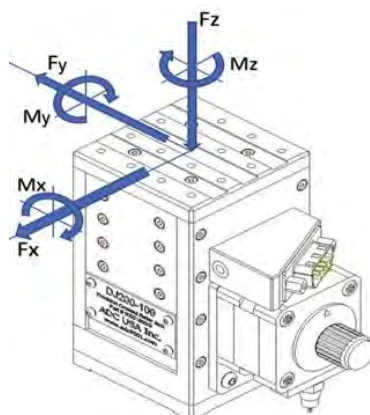
Description	25	50	75	100
Travel (mm)	25	50	75	100
Optional Linear Encoder	Yes	Yes	Yes	Yes
Repeatability ( $\mu$ m RMS)	1	1	1	1
Lead Accuracy ( $\mu$ m/25mm)	5.0	5.0	5.0	5.0
Trajectory Straightness ( $\mu$ m/25mm)	3.0	3.0	3.0	3.0
Travel Resolution (mm/rev)	0.5	0.5	0.5	0.5
Maximum Speed (mm/sec)	12.5	12.5	12.5	12.5
Load Capacity (kg)	46	46	46	46
Mass (kg)	2.6	3.4	3.9	5.1

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	2.8

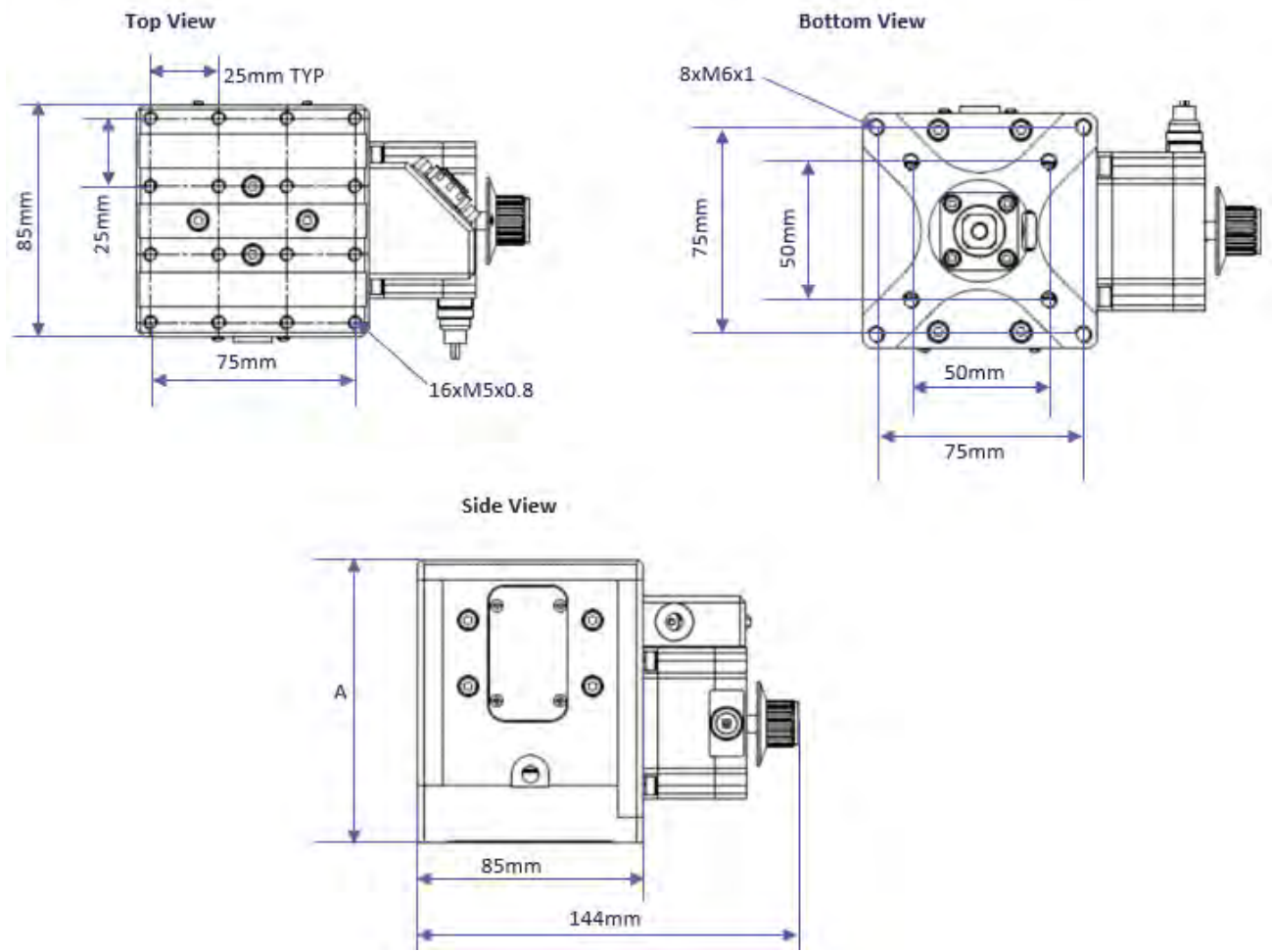
### Load Characteristics:

Fx (N)	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)
430	365	460	22.2	19.4	26.3



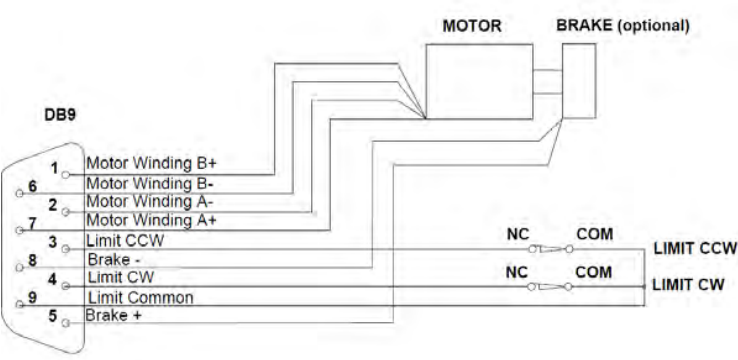
\*Loads are not simultaneous

Dimensions:



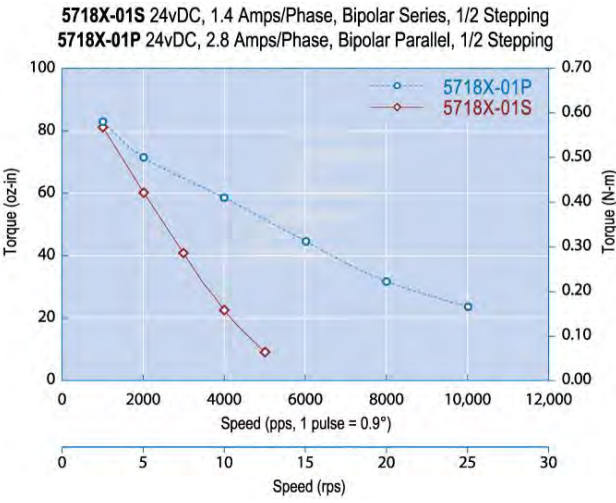
Model	25	50	75	100
A- Closed Height (mm)	107.5	148.5	170	245

Electrical Connector



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

2-Phase Torque Graph





### Ordering Information:

-25	-A	-N	-B	-2PH	-G
Model	Air Type	Encoder	Brake	Motor	Gearbox
-25	-A	-E	-B	-2PH	3:1
-50	-HV	-N	-N	-5PH	to
-75				-DC	100:1
-100					ratio

### Travel Options

-25	25mm Stage Travel
-50	50mm Stage Travel
-75	75mm Stage Travel
-100	100mm Stage Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Brake Options

-B	With Brake, 24VDC
-N	Without Brake

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

### Example Order

#### DJ310-100-A-E-B-2PH

This is an order for a DJ310 Precision Crossed Roller Jack with 100mm travel, in air, with an encoder, with a brake, and a 2-phase motor.

## DJ410 Series

### Key Features:

- Travels 25-100mm
- 1  $\mu$ m Repeatability
- Various Motor Options
- Load Capacity up to 46kg
- Ultra-fine Resolution



### Mechanical:

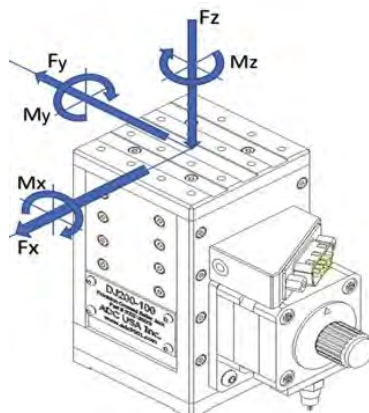
Description	50	100	150	200
Travel (mm)	50	100	150	200
Optional Linear Encoder	Yes	Yes	Yes	Yes
Repeatability ( $\mu$ m RMS)	1	1	1	1
Lead Accuracy ( $\mu$ m/25mm)	5.0	5.0	5.0	5.0
Trajectory Straightness ( $\mu$ m/25mm)	4.0	4.0	4.0	4.0
Travel Resolution (mm/rev)	1.0	1.0	1.0	1.0
Maximum Speed (mm/sec)	20	20	20	20
Load Capacity (kg)	280	280	280	280
Mass (kg)	13.6	21.1	25.6	33

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	4.2

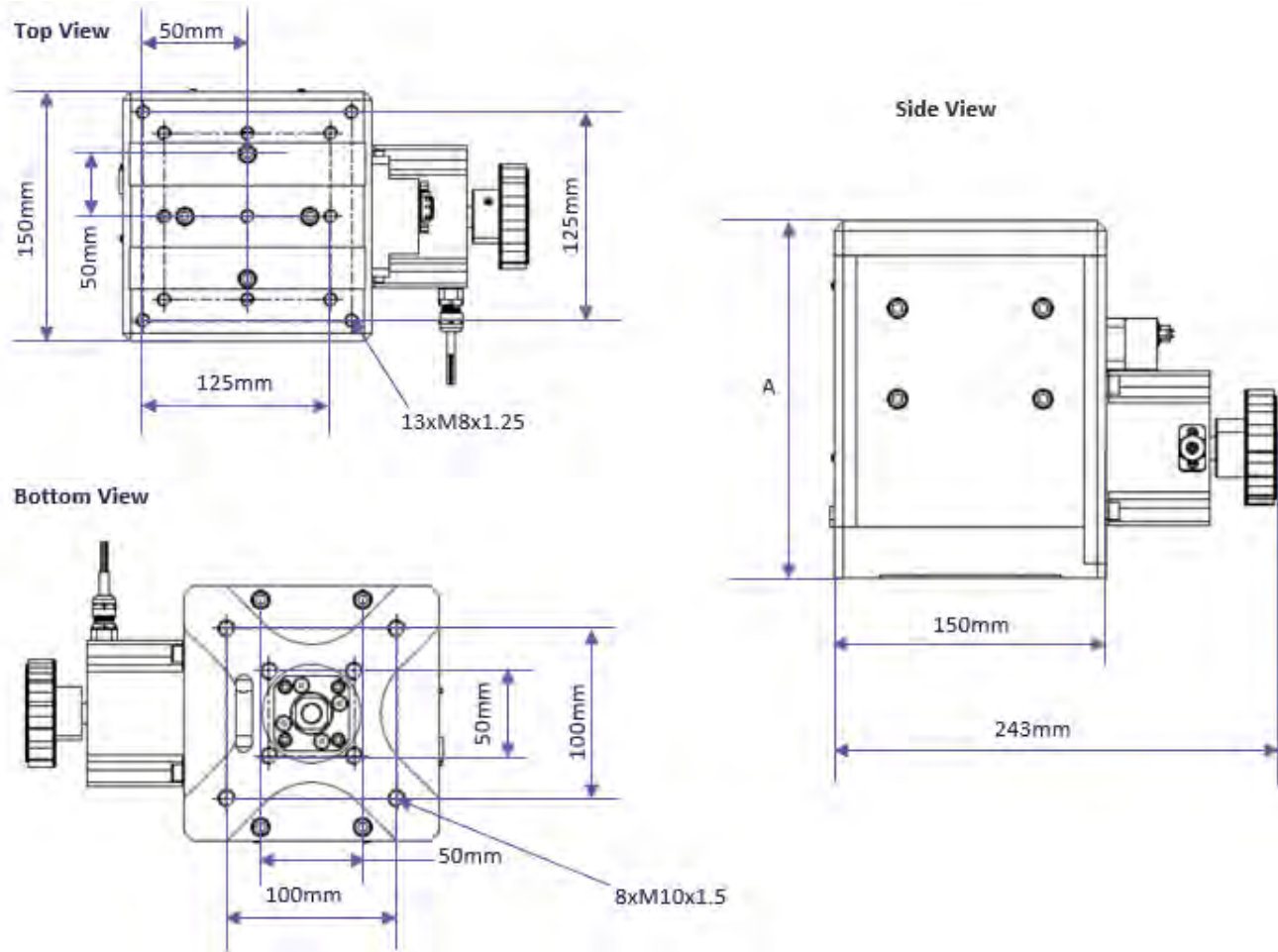
### Load Characteristics:

Fx (N)	Fy (N)	Fz (N)	Mx (Nm)	My (Nm)	Mz (Nm)
1970	1675	2815	230	260	400



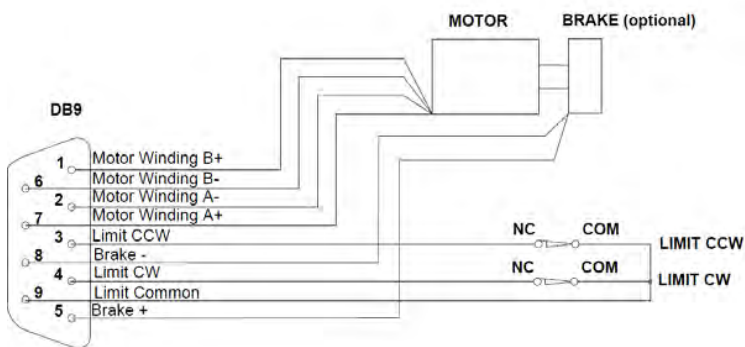
\*Loads are not simultaneous

## Dimensions:



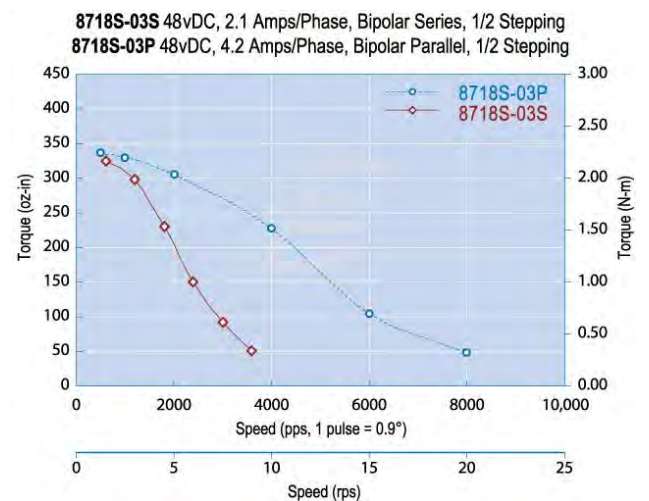
Model	50	100	150	200
<b>A- Closed Height (mm)</b>	196.5	319	394	519

## Electrical Connector



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

## 2-Phase Torque Graph



### Ordering Information:

-25	-A	-N	-B	-2PH	-G
Model	Air Type	Encoder	Brake	Motor	Gearbox
-50	-A	-E	-B	-2PH	3:1
-100	-HV	-N	-N	-5PH	to
-150				-DC	100:1
-200					ratio

### Travel Options

-50	50mm Stage Travel
-100	100mm Stage Travel
-150	150mm Stage Travel
-200	200mm Stage Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Brake Options

-B	With Brake, 24VDC
-N	Without Brake

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

### Example Order

#### **DJ410-200-A-E-N-2PH-G**

This is an order for a DJ410 Precision Crossed Roller Jack with 200mm travel, in air, with an encoder, without a brake, a 2-phase motor, and a gearbox.

## Big Jacks

### BJ25 Series

#### Key Features:

- Travels 50-200mm
- 3  $\mu$ m Repeatability
- Various Motor Options
- High Resolution
- High Dynamic Performance



#### Mechanical:

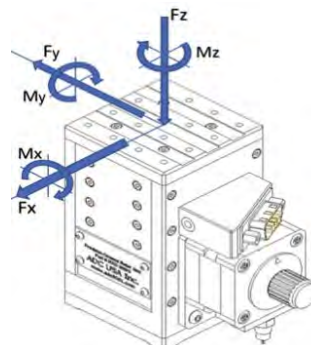
Description	50	100	150	200
Travel (mm)	50	100	150	200
Optional Linear Encoder	Yes	Yes	Yes	Yes
Repeatability ( $\mu$ m RMS)	3	3	3	3
Lead Accuracy ( $\mu$ m/25mm)	8.3	8.3	8.3	8.3
Trajectory Straightness ( $\mu$ m/25mm)	10	15	15	20
Travel Resolution (mm/rev)	0.0013	0.0013	0.0013	0.0013
Maximum Speed (mm/sec)	5	5	5	5
Load Capacity (kg)	2268	2268	2268	2268
Mass (kg)	76.2	85.4	94.6	103.8

#### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	6.3

#### Load Characteristics:

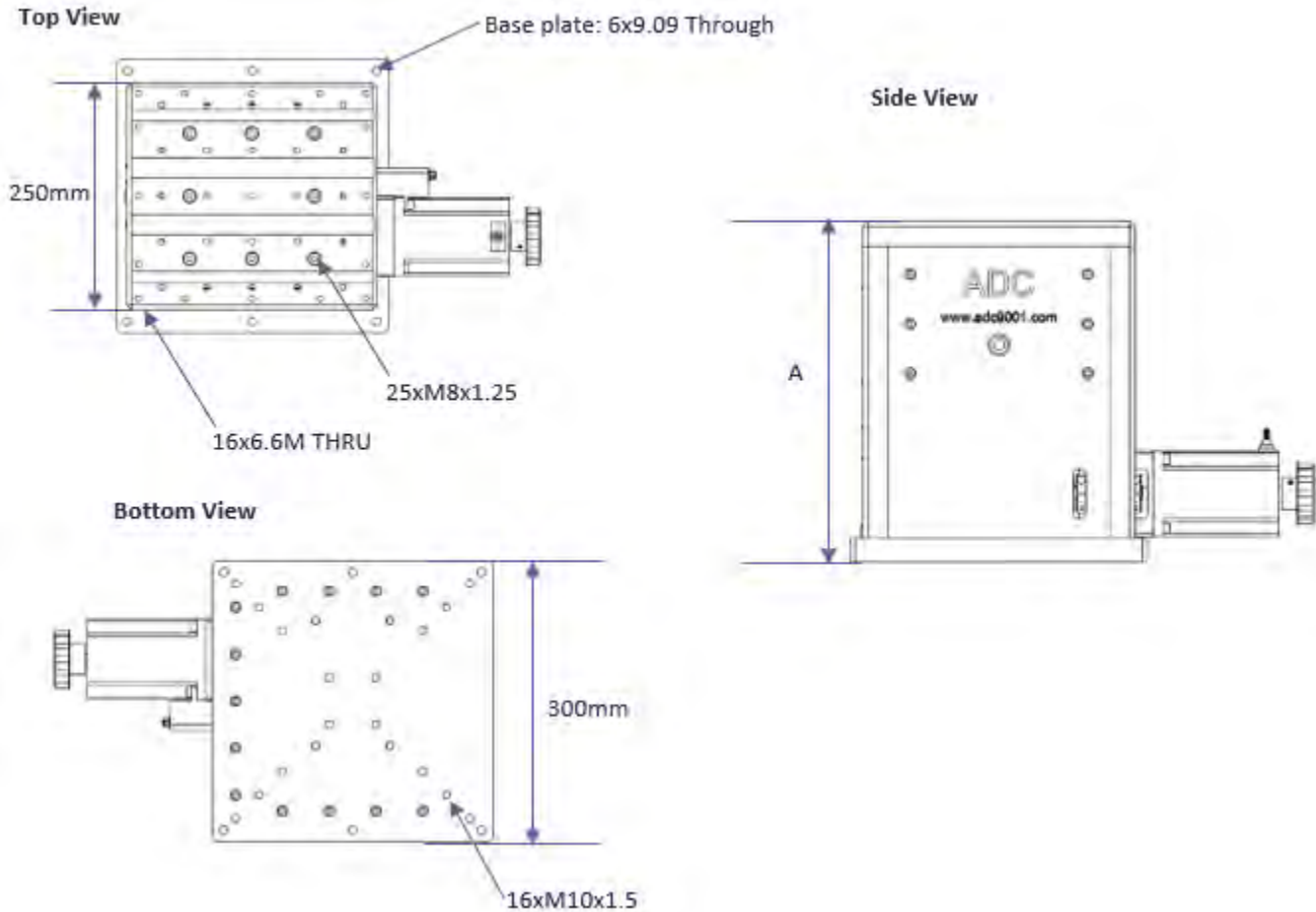
Model	F <sub>x</sub> (N)	F <sub>y</sub> (N)	F <sub>z</sub> (N)	M <sub>x</sub> (Nm)	M <sub>y</sub> (Nm)	M <sub>z</sub> (Nm)
BJ25-50	20	20	24.5	745	745	1000
BJ25-100	26.7	26.7	24.5	745	745	1335
BJ25-150	33.5	33.5	24.5	745	745	1675
BJ25-200	40.1	40.1	24.5	745	745	2005



\*Loads are not simultaneous

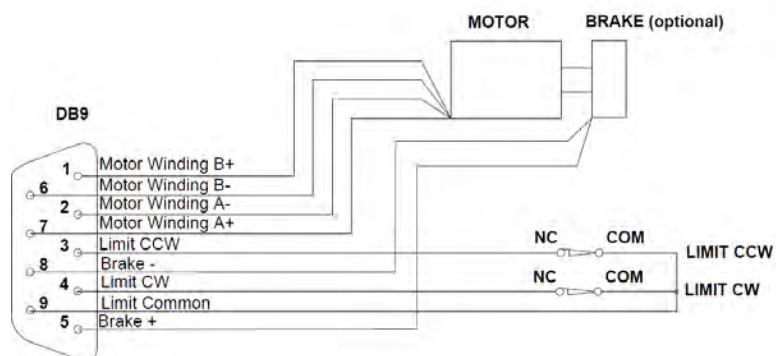


### Dimensions:



Model	50	100	150	200
A- Closed Height (mm)	345	410	475	540

### Electrical Connector:



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

### Ordering Information:

-25	-N	-2PH	-G
Model	Encoder	Motor	Gearbox
-50	-E	-2PH	3:1
-100	-N	-5PH	to
-150		-DC	100:1
-200			ratio

### Travel Options

-50	50mm Stage Travel
-100	100mm Stage Travel
-150	150mm Stage Travel
-200	200mm Stage Travel

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

### Example Order

#### **BJ25-50-N-2PH**

This is an order for a BJ25 Precision Crossed Roller Jack with 50 mm travel, with no encoder, and a 2-phase motor.

## Mounting Plates and Brackets

The chart below shows the corresponding part number per slide and jack combination.

	Mounting Bracket				Mounting Plate
	DS210-30	DS210-50	DS210-75	DS210-100	DJ210-X
<b>DS210-30</b>	MB-200-1	MB-200-2	N/A	N/A	MP-200-6
<b>DS210-50</b>	MB-200-1	MB-200-3	N/A	N/A	MP-200-7
<b>DS210-75</b>	MB-200-1	MB-200-3	MB-200-4	MB-200-5	MP-200-8
<b>DS210-100</b>	MB-200-1	MB-200-3	MB-200-4	MB-200-5	MP-200-7
	DS310-50	DS310-100	DS310-150	DS310-200	DJ310-X
	MB-300-1	MB-300-2	N/A	N/A	MP-300-5
<b>DS310-50</b>	MB-300-1	MB-300-2	N/A	N/A	MP-300-5
<b>DS310-100</b>	MB-300-1	MB-300-2	MB-300-3	MB-300-4	MP-300-5
<b>DS310-150</b>	MB-300-1	MB-300-2	MB-300-3	MB-300-4	MP-300-5
<b>DS310-200</b>	MB-300-1	MB-300-2	MB-300-3	MB-300-4	MP-300-5
	DS410-75	DS410-150	DS410-225	DS410-300	DJ410-X
	MB-400-1	MB-400-2	N/A	N/A	MP-400-5
<b>DS410-75</b>	MB-400-1	MB-400-2	N/A	N/A	MP-400-6
<b>DS410-150</b>	MB-400-1	MB-400-2	MB-400-3	MB-400-4	MP-400-7
<b>DS410-225</b>	MB-400-1	MB-400-2	MB-400-3	MB-400-4	MP-400-7
<b>DS410-300</b>	MB-400-1	MB-400-2	MB-400-3	MB-400-4	MP-400-7

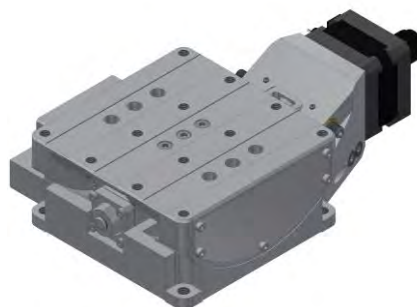
## Tilt Stages

### TS-LD Series

The TS-LD Series tilt stage(s) provide a rigid, accurate motion for general goniometric use. The TS-LD Series is stepper motor driven, guided with curved linear bearings, and has a rugged anodized aluminum body. The top and bottom mounting surfaces are precision ground to provide an optimal interface. The TS-LD Series uses curved crossed roller bearings for the highest possible rigidity and profiled trajectory. The drive mechanism is a precision ground worm wheel segment and stepper motor driven worm.

#### Key Features:

- Travels +/-10°
- Load Capacity up to 250 kg
- Precision Ground Worm Gear
- Incredible Stability



#### Mechanical:

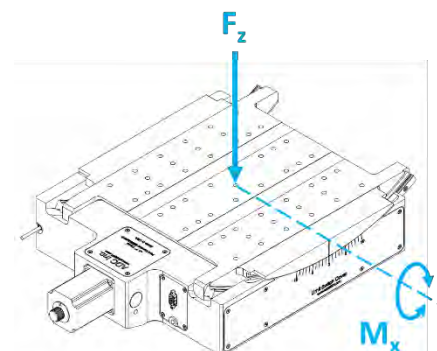
Description	50	90	160
Travel Range (°)	+/-10	+/-10	+/-10
Actuation Mechanism	Worm Gear	Worm Gear	Worm Gear
Repeatability (μrad RMS)	280	280	160
Trajectory Straightness (μm/25mm)	5.0	5.0	5.0
Gear Reduction	360:1	360:1	360:1
Runout (μm)	3.0	3.0	15
Full Step Resolution (μrad)	26	28	27
Load Capacity (kg)	84	188	268
Mass (kg)			
Optional Linear Encoder	Yes	Yes	Yes

#### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	1.4

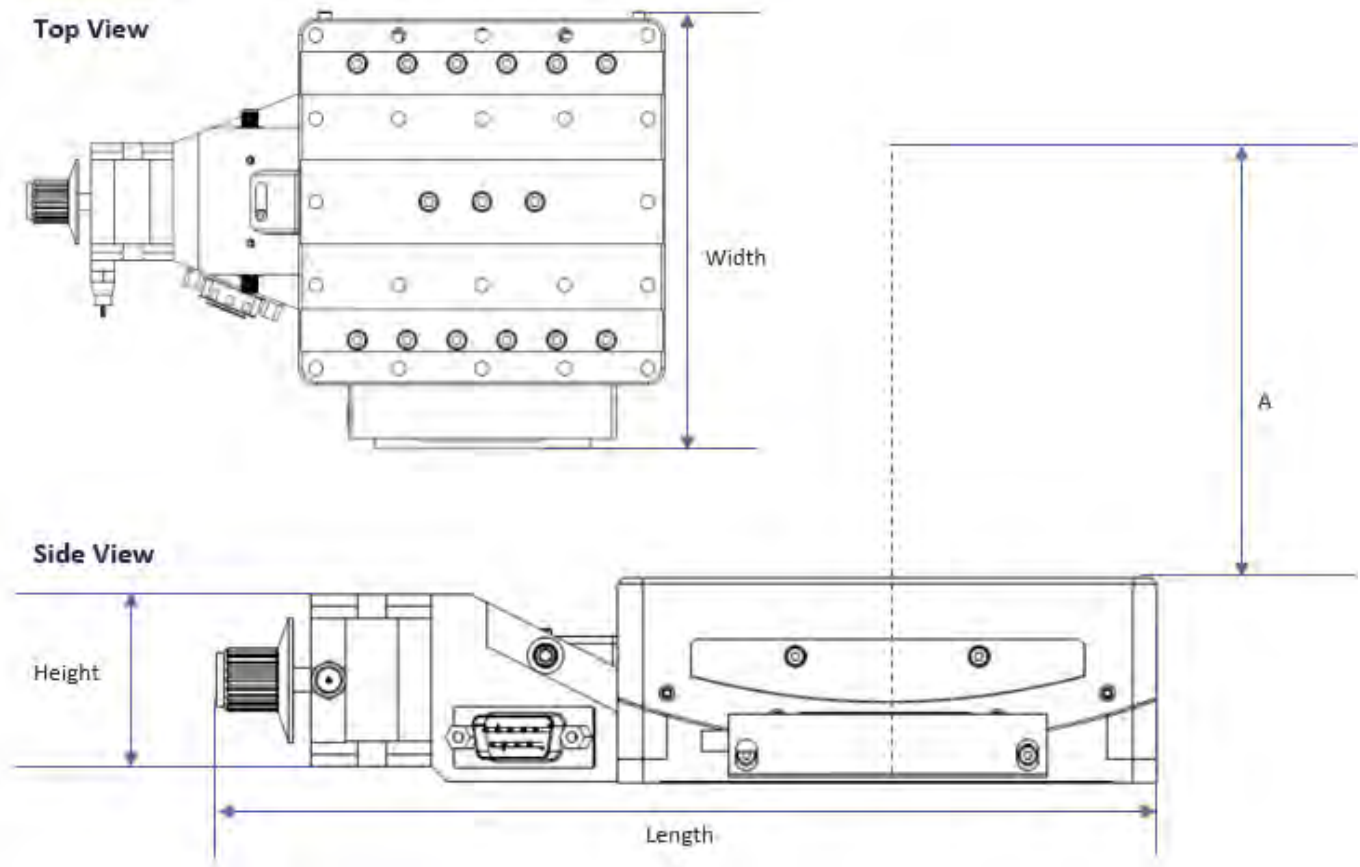
#### Load Characteristics:

Model	Max. Centered Load, F <sub>z</sub> (N)*	Max. Torque, M <sub>x</sub> (Nm)
TS-50	450	5
TS-90	1700	5
TS-160	2500	5



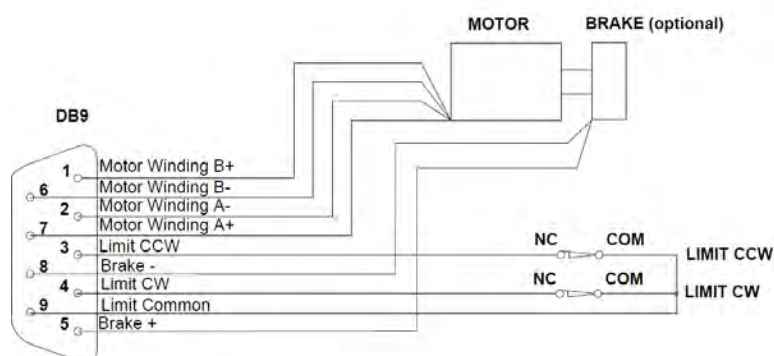
\*For eccentric maximum load, contact ADC engineering

### Dimensions:



Model	50	90	160
Mounting Surface (mm)	85x85	170	87
Length (mm)	85x85	170	106
Width (mm)	110x110	192	112
Height (mm)	85x85	170	87
A (mm)	85x85	170	106
Curvature of Rails (mm)	110x110	192	112

### Electrical Connector:



ADC uses a standard male DB-9 Connector for both the motor and limit switches.



### Ordering Information:

-50	-A	-N	-2PH
Model	Air Type	Encoder	Motor
-50	-A	-E	-2PH
-90	-HV	-N	-5PH
-160			-DC

### Travel Options

-50	+/-10° of Travel
-90	+/-10° of Travel
-160	+/-10° of Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, 10 <sup>-7</sup> torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Example Order

#### **TS-50-A-N-2PH**

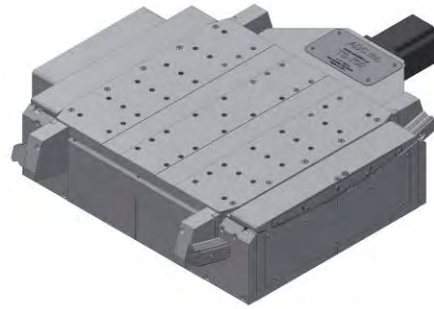
This is an order for a TS-50 Precision Goniometer with 10° of travel, in air, without an encoder, and a 2-phase motor.

## TS-HD Series

The TS-HD Series tilt stage(s) provide a rigid, accurate motion for general goniometric use. Each stage is stepper motor driven and curved linear bearing guided stages with a rugged anodized aluminum body. The top and bottom mounting surfaces are precision ground to provide an optimal interface. The TS-HD Series uses a tangent bar type mechanism to facilitate the rotary motion. A stepper motor driven linear actuator interfaces to the stage through a limited rotation flexure style bearing. This interface results in a highly resolved, very rigid rotary motion. The stage is guided by preloaded ball type profiled linear rails. An optional optical encoder gives closed loop feedback for the device.

### Key Features:

- Travels +/-8°
- Load Capacity up to 1600kg
- Curved Linear Bearings
- Incredible Stability



### Mechanical:

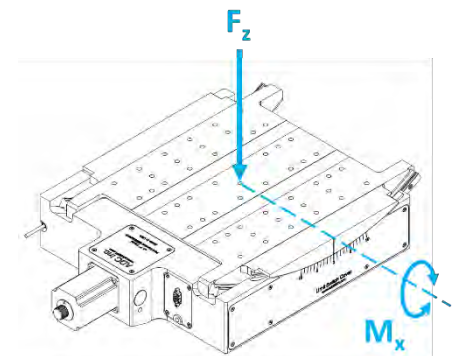
Description	300	400	565	700
Travel Range (°)	+/-8	+/-7	+/-4	+/-4
Actuation Mechanism	Tangent Bar	Tangent Bar	Tangent Bar	Tangent Bar
Repeatability (μrad RMS)	17	17	80	40
Trajectory Straightness (μm/25mm)	20	20	5.0	5.0
Runnout (μm)	15	15	3.0	3.0
Full Step Resolution (μrad)	38	29	38	87
Load Capacity (kg)	680	680	680	1624
Mass (kg)	23.3	27	27.3	33.4
Optional Linear Encoder	Yes	Yes	Yes	Yes

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">www.renishaw.com</a> )
2-Phase Current (Amps/Phase)	3

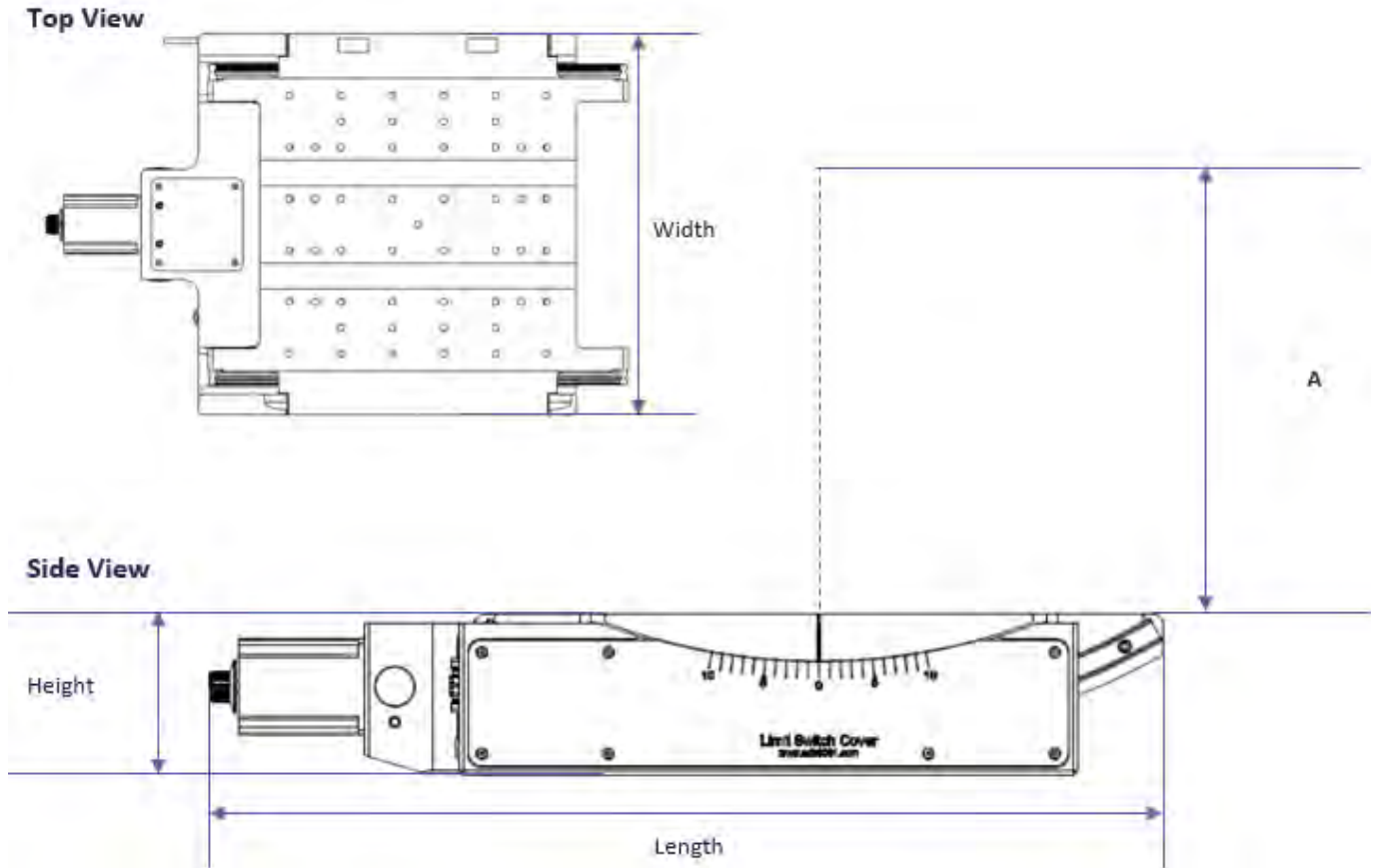
### Load Characteristics:

Model	Max. Centered Load, F <sub>z</sub> (N)*	Max. Torque, M <sub>x</sub> (Nm)
TS-300	10	250
TS-400	10	250
TS-565	10	250
TS-700	10	250



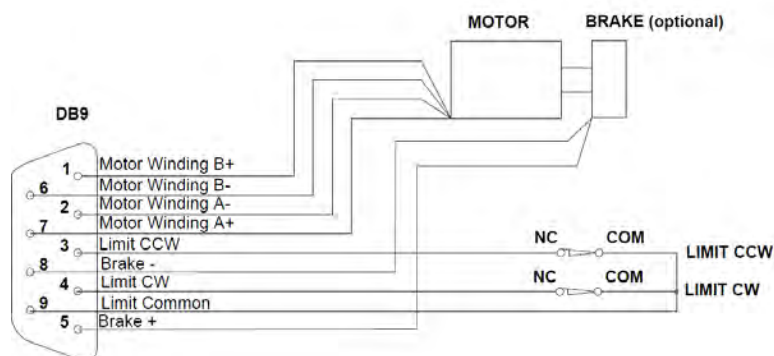
\*For eccentric maximum load, contact ADC engineering

### Dimensions:



Model	300	400	565	700
Mounting Surface (mm)	270 x 218	284 x 307	300 x 300	300 x 300
Length (mm)	518	566	567	570
Width (mm)	347	411	337.5	636
Height (mm)	95	95	95	111
A (mm)	237.3	337	501	636
Curvature of Rails (mm)	300	400	565	700

### Electrical Connector:



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

### Ordering Information:

-300	-A	-N	-2PH
Model	Air Type	Encoder	Motor
-300	-A	-E	-2PH
-400	-HV	-N	-5PH
-565			-DC
-700			

### Travel Options

-300	+/-8° of Travel
-400	+/-7° of Travel
-565	+/-4° of Travel
-700	+/-4° of Travel

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, 10 <sup>-7</sup> torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

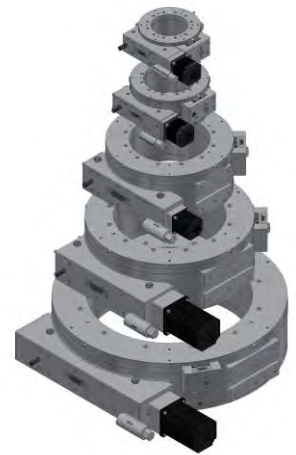
### Example Order

#### **TS-300-A-N-2PH**

This is an order for a TS-300 Precision Goniometer with 8° of travel, in air, without an encoder, and a 2-phase motor.

## Rotation Stages

The Precision Mechanical Rotation Stages are precision rotation stages are built upon an industry leading, preloaded, duplexed angular contact bearing set. These stages not only give an exceptionally high running accuracy but allow for large radial and thrust loads as well. Each stage is driven by a precision ground worm gear set and a high resolution, high torque stepper motor. Backlash is reduced by employing a flexure style shimming technique to preload the worm and worm wheel.



### Key Features:

- Precision Repeatability
- Large Axial Load Capacity
- Precision Ground Worm Gear
- Minimized Backlash

### Mechanical:

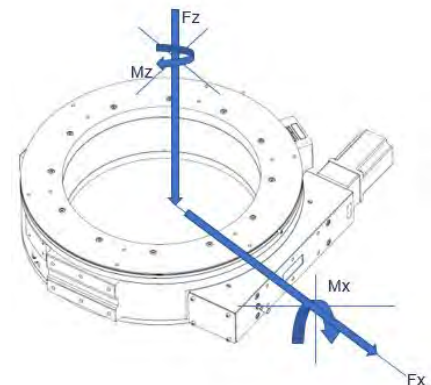
Description	100	200	300	400	500
Travel Range (°)	+/-360	+/-360	+/-360	+/-360	+/-360
Accuracy (μrad)	150	125	125	100	125
Repeatability (μrad RMS)	1.5	1.0	1.0	1.0	3.0
Gear Reduction	360:1	356:1	364:1	380:1	260:1
Runnout (μm)	7.5	7.5	10	15	15
Load Capacity Radial (kg)	23	39	103	123.5	243.5
Stiffness (μrad/Nm)	1.26	.556	.112	.051	.021
Mass (kg)	4.6	6.8	25.3	48	76
Optional Linear Encoder	Yes	Yes	Yes	Yes	Yes

### Electrical:

Description	
Motor	2-Phase, 5-Phase Stepper; DC
Limit Switches	Mechanical, Normally Closed
Optical Encoder Type	Renishaw Tonic ( <a href="http://www.renishaw.com">www.renishaw.com</a> )

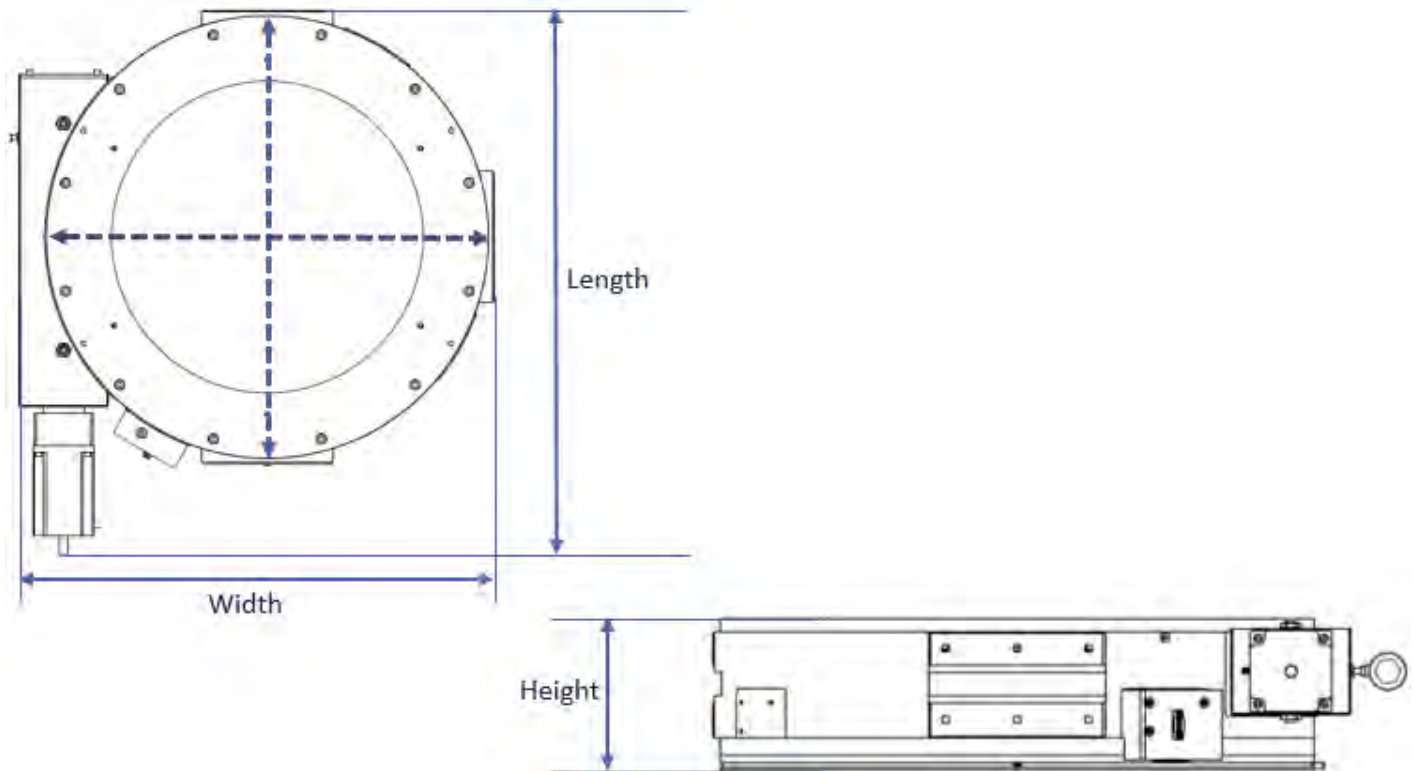
### Load Characteristics:

Model	F <sub>x</sub> (N)	F <sub>z</sub> (N)	M <sub>x</sub> (Nm)	M <sub>z</sub> (Nm)
RS100	221	351	26	16
RS200	412	650	62	39
RS300	1015	1627	237	148
RS400	1213	2008	395.5	239
RS500	2390	4050	1130	645



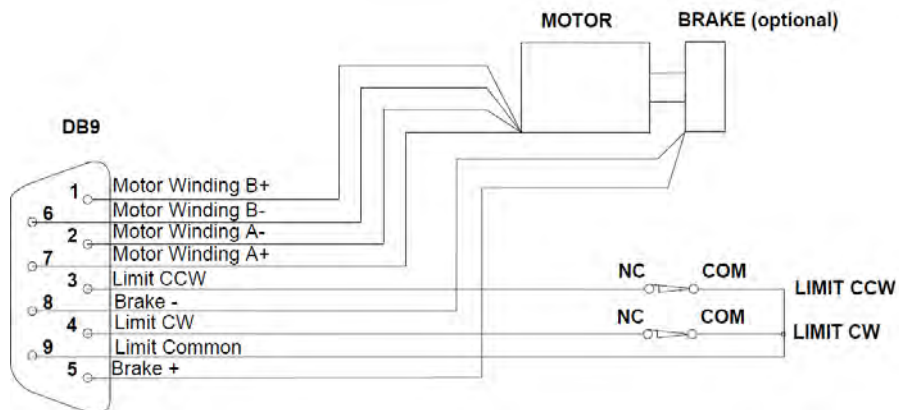


### Dimensions:



Model	100	200	300	400	500
Inner Diameter	100	140	215	300	400
Outer Diameter	165.1	209.5	340	450	625
Length	272	294.25	435	610	770
Width	191	239	367.5	500	670
Height	71.75	94.05	147	158.75	158

### Electrical Connector:



ADC uses a standard male DB-9 Connector for both the motor and limit switches.

### Ordering Information:

-25	-A	-N	-B	-2PH	-G
Model	Air Type	Encoder	Brake	Motor	Gearbox
-100	-A	-E	-B	-2PH	3:1
-200	-HV	-N	-N	-5PH	to
-300				-DC	100:1
-400					ratio
-500					

### Travel Options

-100	100 Model
-200	200 Model
-300	300 Model
-400	400 Model
-500	500 Model

### Air Preparation Options

-A	Standard Air Stage
-HV	High Vacuum Air Stage, $10^{-7}$ torr

### Optical Encoder Options

-E	With Optical Encoder
-N	Without Optical Encoder

### Motor Options

-2PH	Standard 2 Phase Bi-Polar Stepper Motor
-5PH	5 Phase Stepper Motor
-DC	DC Motor

### Gearbox Option

Available from 3:1 to 100:1 ratios

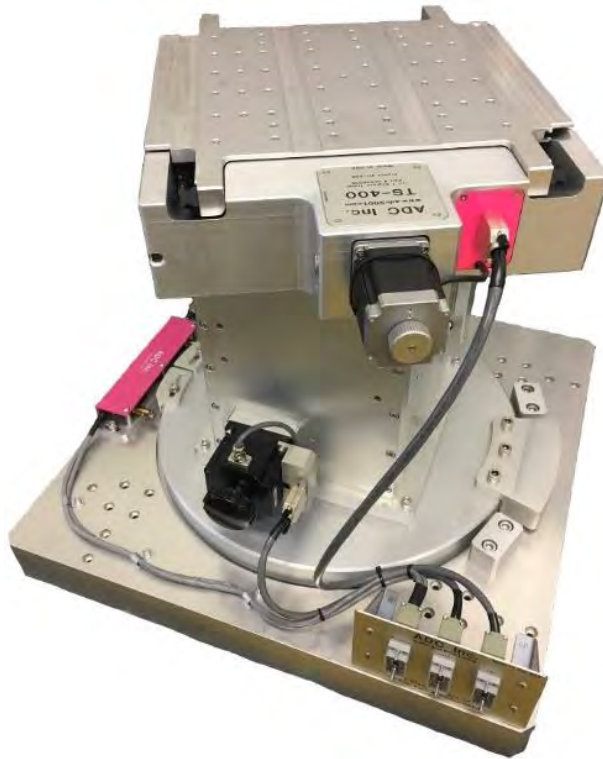
### Example Order

#### **RS200-A-N-B-2PH**

This is an order for a RS200 Precision Rotation Stage, in air, with no encoder, with a brake, and a 2-phase motor.

## Custom System

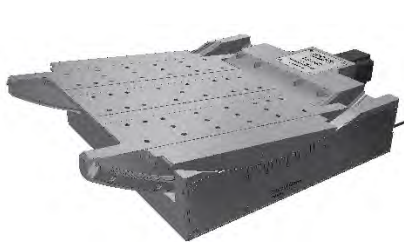
### 3-Axis Stage Stack



**Customer:**

CHESS  
Wilson Laboratory  
161 Synchrotron Drive  
Ithaca, NY 14853

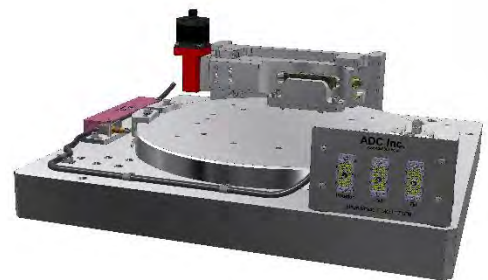
A set of five (5) vertical lift stages (jacks), three (3) tilt stages (horizontal rotation axis), and three (3) rotation stages (vertical rotation axis) were delivered to the Cornell High Energy Synchrotron Source (CHESS) as three stacks containing one of each stage type, and two more lone jacks. This equipment was part of the CHESS-U upgrade effort, with the 3-axis stacks supporting and moving components to divert the x-ray beam and allow multiple experimental stations to be served by a single front end. The system was designed as an assembly of standard or semi-standard components and remains very modular. Each axis of motion was provided by an independent stage which could be separated and used elsewhere. All were driven by stepper motors, and no position feedback was required by the customer, though it could easily have been supplied.



*Tilt Stage*



*Jack*



*Rotation Stage*

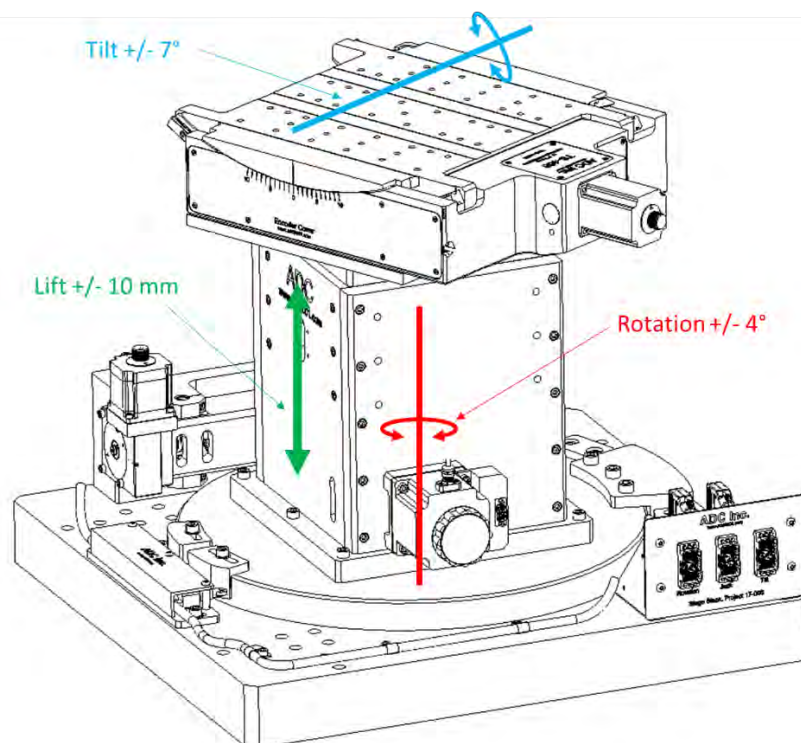
The tilt stages were the latest generation of ADC standard TS-400, but with the encoder omitted at the customer's request. These updated standard stages were improved with a reduced parts count to simplify manufacturing, assembly, and maintenance, and to increase robustness. The default orientation of the tilt axis relative to the rotation stage base was set using a special adapter plate, with two different angles set amongst the three stacks of stages.

The jacks were a slight modification to ADC's standard BJ25 series of jacks. Developed from the BJ25-50, these BJ25-20 jacks traded travel for stiffness by adding rollers to the roller pack of each set of crossed-roller bearings guiding the vertical trajectory. Adjustability of hard stops required by the customer was accommodated through provision of attachment points on the exterior of the jack to mount customer-produced shims which could further limit the jack's travel.

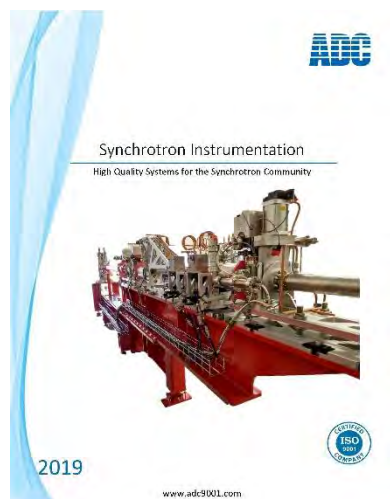
The rotation stage was a new design based on an update of existing ADC worm driven stages. The base and electrical panel were custom to this application, but the large ball bearing had been used previously. Improvements to the worm drive increased stiffness, robustness, and tunability. An electrical panel with connectors for each of the three stages in the stack was added to one corner of the rotation stage.

#### Key Specifications:

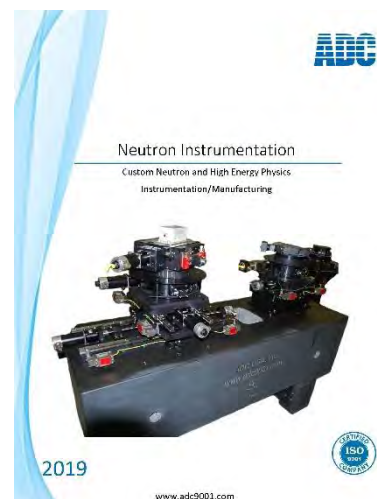
Description	Value	Units
Rotation Range	+/- 4	°
Tilt Range	+/- 7	°
Vertical Travel Range	+/- 0.393 [10]	In [mm]
System Weight/Mass	450 [210]	lbf [kg]
Max. Lifted Load	275 [125]	lbf [kg]
Max. Tilted Load	150 [203]	lbf*ft [N*m]



For more information on ADC's products, go to [adc9001.com](http://adc9001.com) to download all of ADC's catalogs.



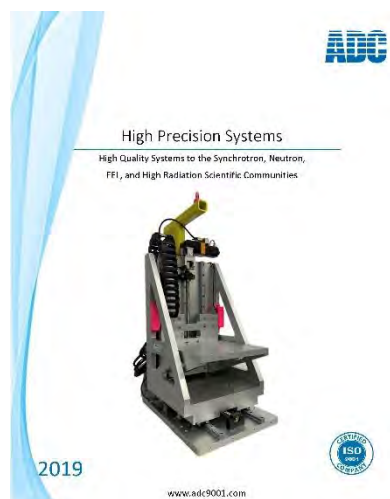
Synchrotron Instrumentation



Neutron Instrumentation



High Precision Engineered  
Experimental Tables



High Precision Systems



High Precision Slits

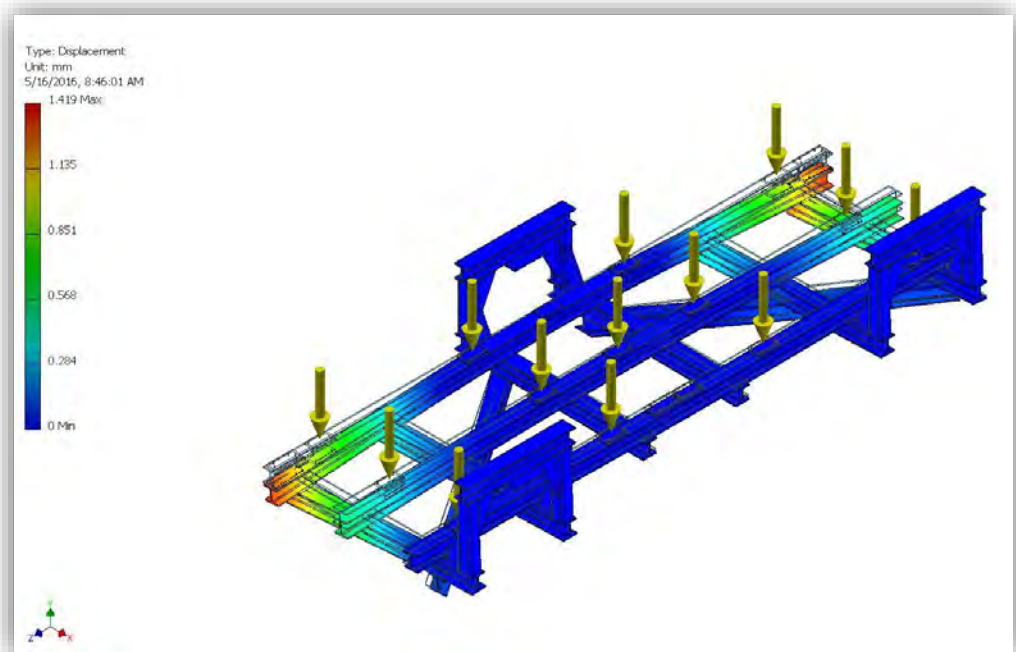


## Company Capabilities

### Engineering Design and Analysis

The Engineering Design and Analysis group is a multi-disciplinary team of engineers with unique training and creativity, and dedication to meeting the needs of our customers. ADC uses the latest computational and graphics software and hardware to approach the most challenging problems in the Aerospace, Automotive, Nuclear, Ultra-High Vacuum, Automated Machinery, Electro-Optical Products, synchrotron, high energy physics, and neutron diffraction communities.

- Finite Element Analysis
- Magnetic Design
- Optics Design
- Conceptual Design
- Materials Selection
- Tooling Design
- Fabrication Specifications
- Virtual Prototyping
- Design Analysis and Optimization
- Detailed Design
- Component Design



## Electronics, Instrumentation and Software

ADC has several electrical/software engineers and techs capable of providing custom circuit design and complete turn-key control systems. Some of our skills include integrated PLC design and programming, analog and digital circuit design, logic design (including PLA and FPGA programming), stepper and servo motor applications, microprocessor, RFID, serial and RF communications, and system controllers. The standard motor controls and driver that we offer is the Aerotech Ensemble™ series controllers. However, many of our customers have requirements for custom integration of these components into a functioning system, fully debugged, documented, and ready for operation. Software skills and development platforms include Microsoft Visual C++, LabView, EPICS, Visual Basic, CNC, and generic PLC (AB, NAIS, GE-Fanuc, Schneider, etc.) and Parker ACR and Accroloop. Our primary skill, however, is the integration of these components into a functioning system, fully debugged, documented, and ready for operation.



## Vacuum Assembly & Testing

ADC is well equipped to handle any stand-alone fabrication and machining requirement. It is often the integration of these talents, combined with higher level assembly and testing, that brings the value added our customers demand. We have developed processes and employ qualified personnel and systems that allow ADC to assemble and test to challenging requirements. Examples include state-of-the-art, high-resolution, extreme-ultraviolet-light (EUV) microscope making measurements in Nano range for Lawrence Berkeley National Laboratory (LBNL); 26 tone, 20-meter-long, 2.3 meter in diameter complex Time-of-Flight Small Angle Neutron Scattering (ToF SANS) instrument for ANSTO, Australia; and Jefferson Lab 12 GeV Upgrade Cavity Parts Project.

ADC utilizes some of the most advanced measurement equipment available to control the requirements that our customer's complex projects require. This is accomplished through the use of Coordinate Measuring Machines (CMM's) equipped with model-based inspection software, providing us with the ability to verify results using customer supplied CAD models, Elcomat 3000 Autocolimator, and Keyence Optical non-contact Micrometer.

## Advanced Manufacturing

ADC provides machining systems and products to our diverse customers from structural metal fabrication to turn key design products with complex control systems. ADC is fully equipped with a CNC precision machine shop; and over the past 4 years our unique ability to fabricate/provide parts for precision vacuum machining equipment has grown immensely. Our process begins with providing quotes, which we prepare, based on specific drawing requirements given to us by the customer.

The following are views of ADC manufacturing and major assembly areas.



## Equipment

We use precision equipment to verify each order and are committed to delivering precision machined parts. We are very proud of our shop and the capabilities we can offer because of our state-of-the-art precision CNC milling and CNC turning machines. Equipment used for inspections include a Brown & Sharpe CMM, a Jones & Lamson Optical Comparator, and an extensive selection of gauges. We ensure calibrations are performed and are traceable to meet our standards. Our inspection room is temperature controlled to enable the utmost accuracy and consistency in measurements. We can provide a Certificate of Conformance for all processes as required. These are stored electronically and attached to each job for future reference.



CLAUSING CSG-1224 ASDII SURFACE GRINDER, s/n E1TAJ0079, w/PLC Control, Magnetic Chuck

ADC's precision grinder CSG-1224 is especially suitable for heavy duty grinding. The large spindle is supported by four ball bearings to allow for durability.

## Welding Capabilities

At ADC, we offer full service custom metal fabrication which includes welding services for short and long production run jobs. Our extensive welding capabilities utilize both robotic welding and manual welding in MIG and TIG and mesh welding for wire products. We are experienced in welding aluminum, carbon steel, and stainless-steel materials. We also have complete resistance welding, also known as spot welding capabilities. Our unique welding shop supports our custom metal fabrication process.

The welding services at ADC support our full-service fabrication process with capabilities including:

- Resistance Welding / Spot Welding
- Gas Metal Arc Welding (GMAW) / Metal Inert Gas (MIG Welding) - This semi-automatic or automatic process uses a continuous wire feed.
- Gas Tungsten Arc Welding (GTAW) / Tungsten Inert Gas (TIG Welding) - A manual welding process that is extremely precise, especially useful for welding thin materials.
- Mesh Welding - electric flash butt welding where the two wires are pressed together, and the electric current is activated

### Benefits of TIG Welding

- Superior quality welds
- Welds can be made with or without filler metal
- Precise control of welding variables (heat)
- Free of spatter
- Low distortion

### Benefits of MIG Welding

- All position capability
- Higher deposition rates than SMAW
- Less operator skill required
- Long welds can be made without starts and stops
- Minimal post weld cleaning is required

### Benefits of Mesh Welding

- wires resist movement
- it is much faster than traditional welding
- it is a high-quality low-cost spot-welding solution



## ADC's Service and Support

ADC takes new approaches to shorten assembly and commissioning times. We create modular construction units which can be installed cost-effectively and extended easily when needed. Our customers can count-on ADC's continued service support after the commissioning stage.

Through intensive technical training sessions and our policy of involving customer personnel at an early stage, we can assure seamless and rapid familiarization with our new technologies. This approach has meant that, in many major projects, our customers have been able to operate their equipment independently and to their satisfaction within a very short period.

ADC Customer Service team provides installation, installation supervision, after sales support and service, troubleshooting and remote diagnostics. We believe that success is in the details and this philosophy delivers high customer satisfaction and instills a strong sense of loyalty. Our friendly and courteous customer service staff is always available for questions and order placement for the key replacement parts to keep ADCs systems running at peak efficiency. Whether it is a small replacement part or a new component, we are committed to the fastest resolution to customer needs.

ADC is uniquely positioned and invested in providing exceptional after-sales support. Available support and services including:

- Installation and start-up
- Service and repair – factory / service center / or onboard
- Service contracts
- Troubleshooting assistance over the phone
- Engineering and technical sales assistance
- Upgrade and retrofit parts and programs
- Spare and replacement parts
- Tailored factory and on-board training
- On-board system and spares analysis





**BUREAU VERITAS**  
Certification



## **ADVANCED DESIGN CONSULTING USA, INC.**

126 RIDGE RD  
LANSING, NY 14882 USA

*Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the management system standards detailed below*

### **ISO 9001:2015**

*Scope of certification*

**DESIGN, MANUFACTURE, AND DELIVERY OF DEVICES, INTEGRATED SYSTEMS, COMPONENTS AND INSTRUMENTS FOR COMMERCIAL, ACADEMIC, AND GOVERNMENT AGENCIES**

Original cycle start date: **31 December 2014**

Certification / Recertification cycle start date: **31 December 2017**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **30 December 2020**

**Certificate No. US010798** Version: **1**

**Signed on behalf BVCH SAS – UK Branch**

Certification body address: **5<sup>th</sup> Floor, 66 Prescott Street, London E1 8HG, United Kingdom**  
Local office: **16800 Greenspoint Park Drive, Suite 300S, Houston, TX 77060**

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity please call: **+(800) 937-9311**







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