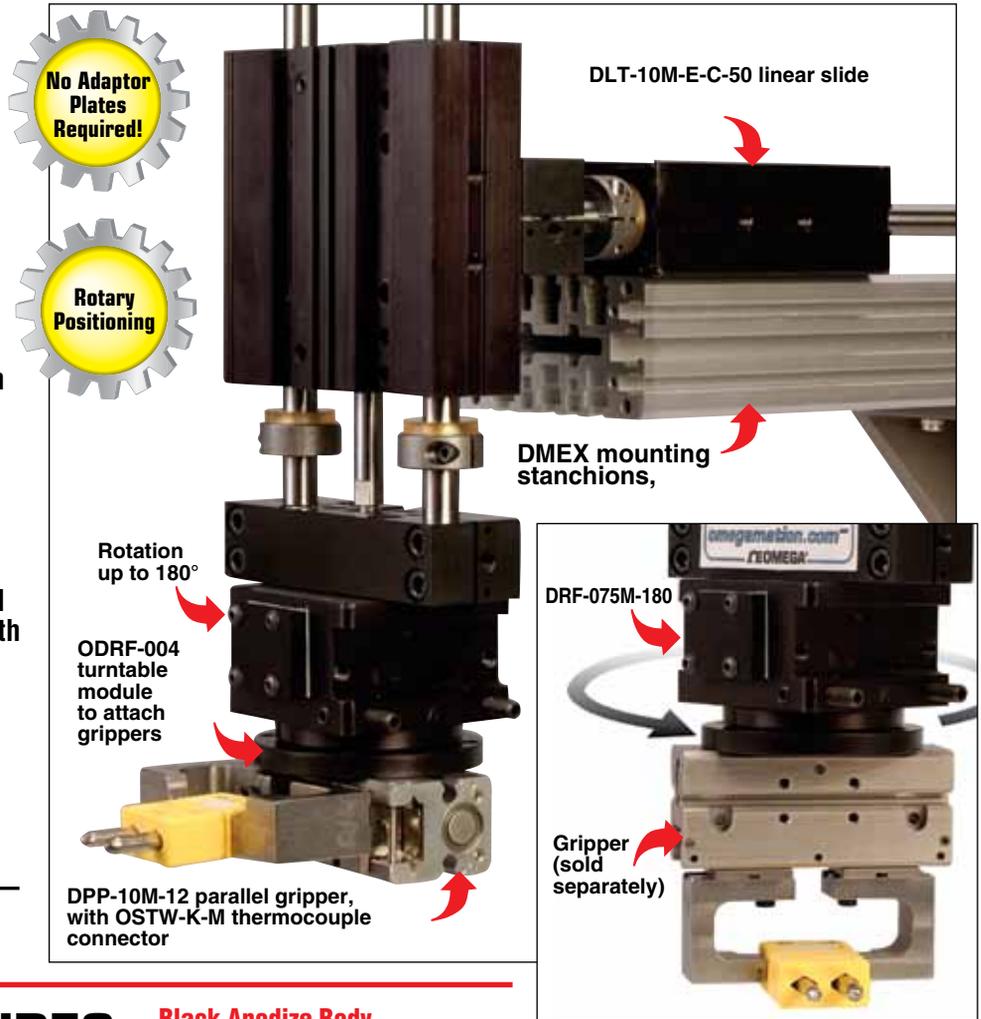


# ROTARY ACTUATORS—PNEUMATIC, FLANGE MOUNTABLE DRF DIRECTCONNECT™ SERIES



## DRF Series

- Rotary Motion Actuator— Precision End Stop Position and Zero Backlash
- Adjustable Rotation with a Maximum of 180° Full Rotation
- Repeatability  $\pm 0.02^\circ$  of Rotation
- Highly Configurable Modular Automation, Exclusive DirectConnect Technology
- Multiple Mounting Locations— Tapped and Through the Flange on Top and Bottom Surfaces
- Up to 5 Million Cycles in Typical Application, Up to 10 Million with Maintenance
- Temperature Operating Range -35 to 80°C (-30 to 180°F)
- Double Acting Air Cylinder
- System Requires 3 to 7 bar (40 to 100 psi) Dry Filtered (40 Micron or Better) Air Supply
- Accessory Equipment Required— 4-Way, 2 Position Pneumatic Direction Control Valve



## PRODUCT FEATURES

### Sensor Mounting Slots

Standard mounting slots for Magneto Resistive Sensors magnet mounted in piston standard (sensors sold separately).

### Extremely Rugged Design

Pinion is supported with upper and lower sealed ball bearings.

### End Stop Deceleration (-A Option)

Shock absorbers decelerates load at end of stroke.

### Case Hardened

Rack and pinion are case hardened for wear and long life.

### Black Anodize Body

The body and End Plates are Black anodized, steel parts are black oxide.

### Flange Mounting

Turntable has DIRECTCONNECT mounting pattern

### One Piece Body

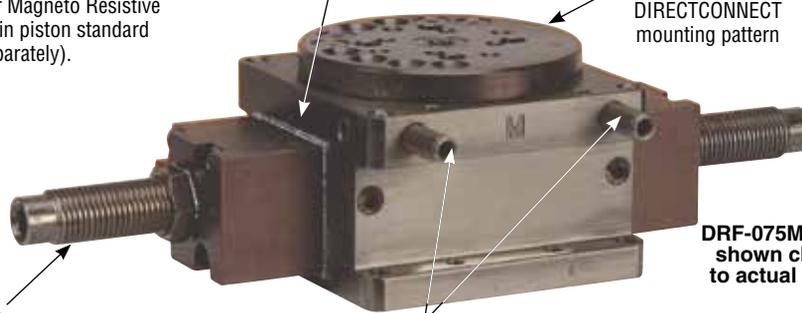
One piece lightweight aircraft quality aluminum body.

### Dowel Holes

Slip fit dowel pin holes in bottom body, and on turntable.

### Piston

Made of Delrin® for extended life.



DRF-075M-90-A shown close to actual size.

### Rotational Adjustments

All rotational adjustments made from front face. Adjustments are locked with set screw on side.

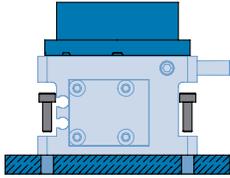
### DIRECTCONNECT™

### Mounting Patterns

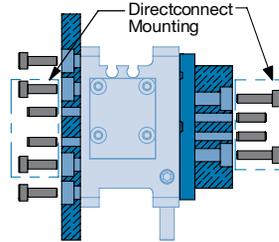
Tapped and Dowel mounting surface on bottom of body and on turntable.

# MOUNTING INFORMATION

Rotaries can be mounted and operated in any orientation.

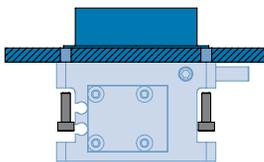
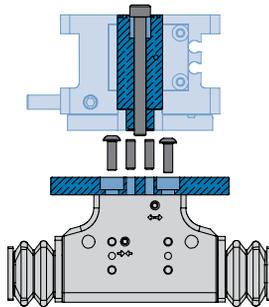


Mounting through bottom flange clearance holes into tapped holes in customer application.

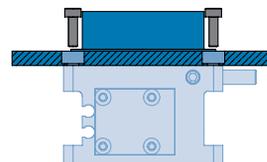


Body mounts with screws and slip fit dowels from bottom. Payload is attached with screw and slip fit dowels.

**DIRECTCONNECT Mounting:** Gripper is mounted from the underside of Turntable with Button Head screws and slip fit dowels. Turntable is then mounted to rotary with one screw through the center of the pinion and two slip fit dowel pins.



Mounting through top flange clearance holes into tapped holes in customer application.



Top mounting from underside of table using tapped holes in body top flange.

## SPECIFICATIONS

### PNEUMATIC SPECIFICATIONS

**Pressure Operating Range:** 3 to 7 bar (40 to 100 psi)

**Cylinder Type:** Double acting

**Dynamic Seals:** Internally lubricated buna-N

**Valve Required to Operate:** 4-way, 2-position

### AIR QUALITY REQUIREMENTS

**Air Filtration:** 40 micron or better

**Air Lubrication:** Not necessary\*

**Air Humidity:** Low moisture content (dry)

### Temperature Operating Range:

**Buna-N Seals (Standard):** -35 to 80°C (-30 to 180°F)

**With Shocks:** 0 to 66°C (32 to 150°F)

### MAINTENANCE SPECIFICATIONS

#### Expected Life:

**Normal Application:** 5 million cycles

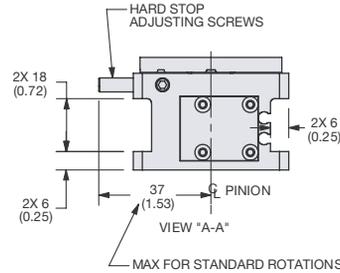
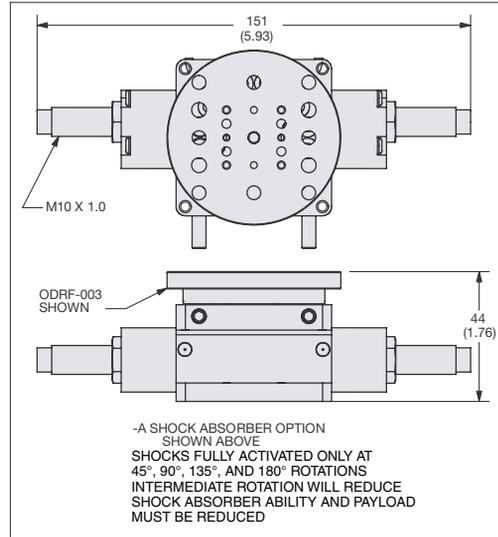
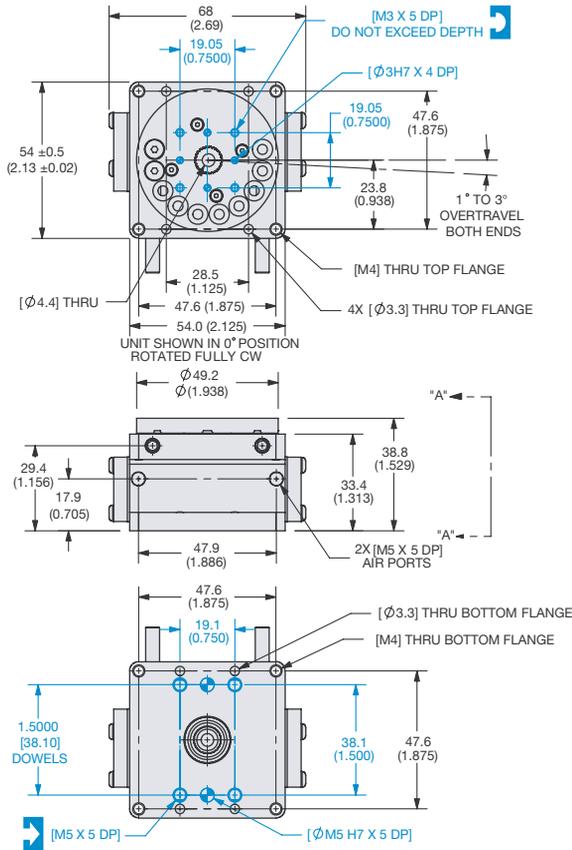
**With Preventative Maintenance:** 10+ million cycles\*

**Field Repairable:** Yes

**Seal Repair Kits Available:** Yes

\* Addition of lubrication will greatly increase service life.

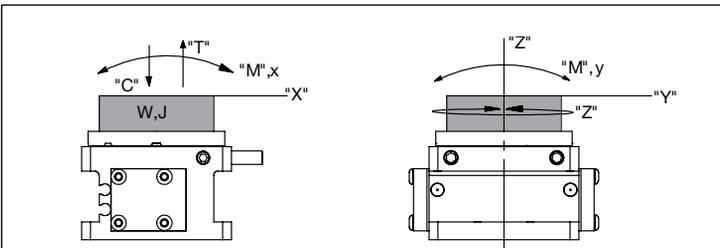
# DRF-075M



## UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS SHOWN BELOW

Dimensions are symmetrical about centerline	Third Angle Projection	All Dowel Holes are SF (Slip Fit). Locational Tolerance ±0.0005" or [±0.013 mm]	Metric Threads Course Pitch	<b>Imperial inch</b> 0.00 = ±0.01 0.000 = ±0.005 0.0000 = ±0.000	<b>Metric mm</b> 0. = ±0.25 0.0 = ±0.13 0.00 = ±0.013
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Dimensions: mm (inch)  
DIRECTCONNECT™ dimensions shown in blue



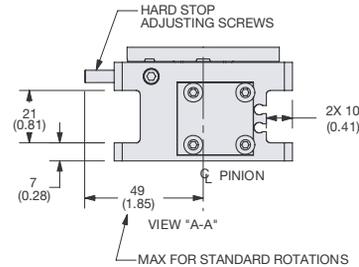
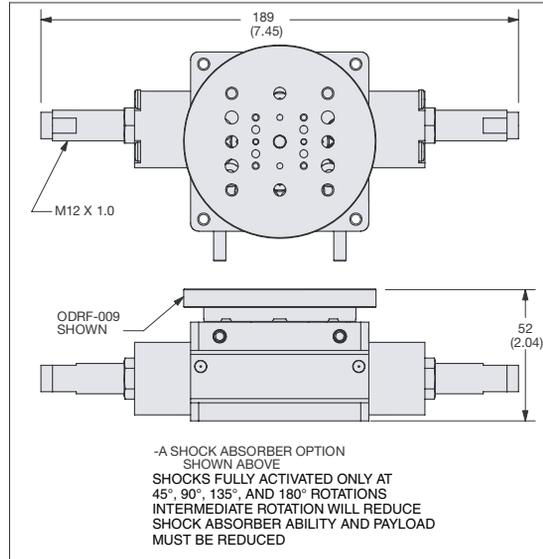
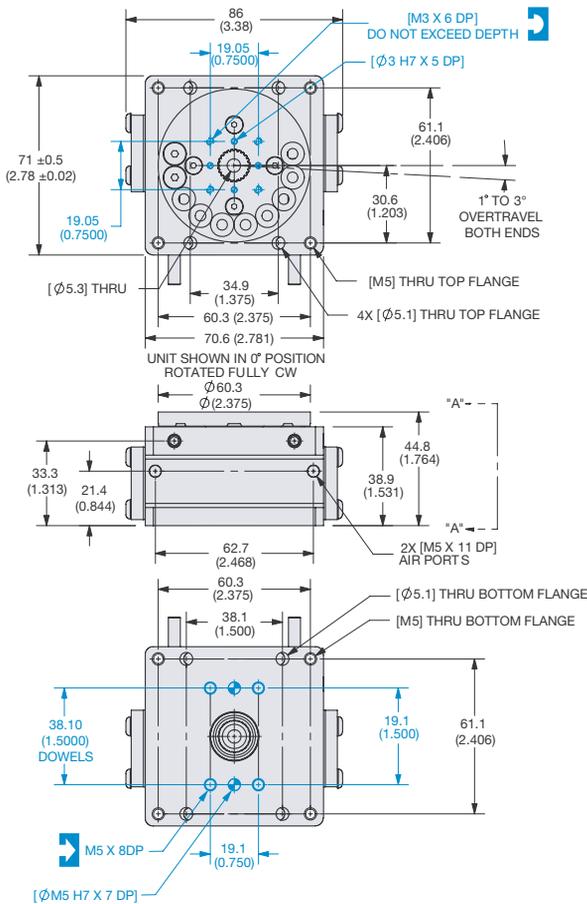
Loading Capacity	Static	Dynamic
Maximum Tensile T	44 N (10 lb)	9 N (2 lb)
Maximum Compressive C	89 N (20 lb)	18 N (4 lb)
Maximum Moment Mx	2.3 Nm (20 in-lb)	0.5 Nm (4 in-lb)
Maximum Moment My	2.3 Nm (20 in-lb)	0.5 Nm (4 in-lb)
Maximum Payload W (with Shocks)		0.45 kg (1.0 lb)
Maximum Inertia J (with Shocks)		1.8 x 10 <sup>-4</sup> N-m-sec <sup>2</sup> (0.0016 in-lb-sec <sup>2</sup> )

Note: Higher payloads and inertia possible with external shocks and stops.

## SPECIFICATIONS

- Maximum Payload with Shocks (-A): 0.45 kg (1 lb)
- Maximum Payload without Shocks: 0.23 kg (0.5 lb)
- Maximum Payload Inertia with Shocks (-A): 1.8 x 10<sup>-4</sup> N-m-sec<sup>2</sup> (0.0016 in-lb-sec<sup>2</sup>)
- Maximum Payload Inertia without Shocks: 9.0 x 10<sup>-5</sup> N-m-sec<sup>2</sup> (0.0008 in-lb-sec<sup>2</sup>)
- Maximum Torque @ 7 bar (100 psi): 0.9 N-m (8.3 lb-in)
- Maximum Rotation: 180°
- Pitch Diameter of Pinion: 9.5 mm (0.375")
- Weight with Shocks (-A Option): 0.34 kg (0.72 lb)
- Weight without Shocks: 0.24 kg (0.54 lb)
- Pressure Range: 3 to 7 bar (40 to 100 psi)
- Bore: 19.1 mm (0.750")
- Displacement (180°): 5.1 cm<sup>3</sup> (0.31 in<sup>3</sup>)
- Actuation Time [180° @ 7 bar (100 psi)]: 0.38 sec (0.38 sec)
- Actuation Time [90° @ 7 bar (100 psi)]: 0.29 sec (0.29 sec)
- Over Travel (Each End): 1 to 3°
- Temperature Range without Shocks: -35 to 82°C (-30 to 180°F)
- Temperature Range with Shocks (-A): 0 to 66°C (32 to 150°F)
- End Stop Adjustability (Each End): 23°
- Repeatability: ±0.02°
- Valve Required to Actuate: 4-way, 2-position

# DRF-094M



**UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS SHOWN BELOW**

				<b>Imperial inch</b>	<b>Metric mm</b>
Dimensions are symmetrical about centerline	Third Angle Projection	All Dowel Holes are SF (Slip Fit). Locational Tolerance ±0.0005" or [±0.013 mm]	Metric Threads Course Pitch	0.00 = ±0.01 0.000 = ±0.005 0.0000 = ±0.000	0. = ±0.25 0.0 = ±0.13 0.00 = ±0.013

**Dimensions: mm (inch)**  
**DIRECTCONNECT™ dimensions shown in blue**

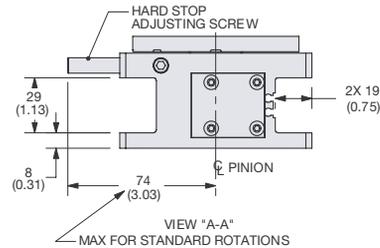
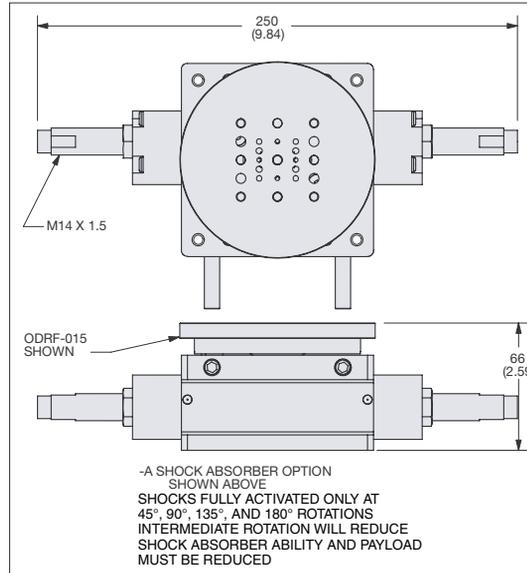
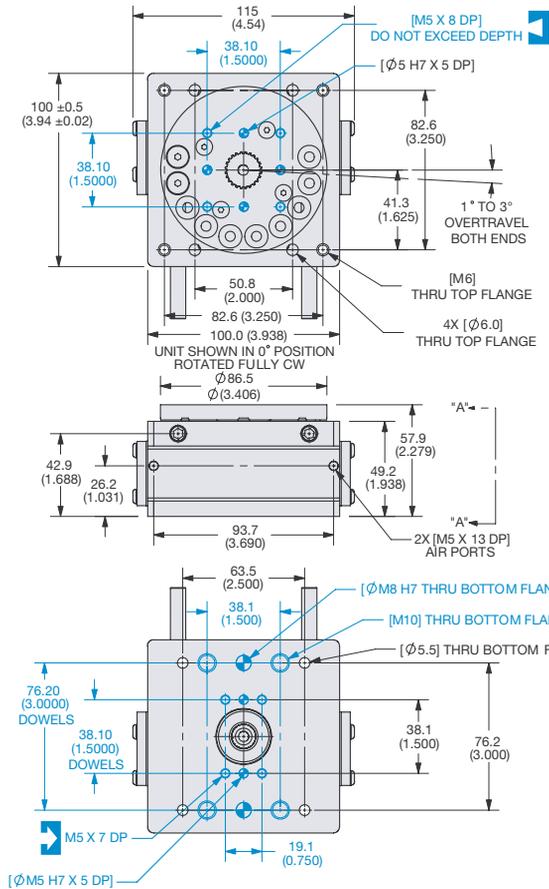
	Static	Dynamic
<b>Loading Capacity</b>		
<b>Maximum Tensile T</b>	67 N (15 lb)	13 N (3 lb)
<b>Maximum Compressive C</b>	133 N (30 lb)	27 N (6 lb)
<b>Maximum Moment Mx</b>	5.6 Nm (50 in-lb)	1.1 Nm (10 in-lb)
<b>Maximum Moment My</b>	5.6 Nm (50 in-lb)	1.1 Nm (10 in-lb)
<b>Maximum Payload W (with Shocks)</b>		1.4 kg (3 lb)
<b>Maximum Inertia J (with Shocks)</b>		1.3 x 10 <sup>-3</sup> N-m-sec <sup>2</sup> (0.0111 in-lb-sec <sup>2</sup> )

*Note: Higher payloads and inertia possible with external shocks and stops.*

## SPECIFICATIONS

- Maximum Payload with Shocks (-A):** 1.4 kg (3 lb)
- Maximum Payload without Shocks:** 0.68 kg (1.5 lb)
- Maximum Payload Inertia with Shocks (-A):** 1.3 x 10<sup>-3</sup> N-m-sec<sup>2</sup> (0.0111 in-lb-sec<sup>2</sup>)
- Maximum Payload Inertia without Shocks:** 6.3 x 10<sup>-4</sup> N-m-sec<sup>2</sup> (0.0056 in-lb-sec<sup>2</sup>)
- Maximum Torque @ 7 bar (100 psi):** 1.9 N-m (17.3 lb-in)
- Maximum Rotation:** 180°
- Pitch Diameter of Pinion:** 12.7 mm (0.500")
- Weight with Shocks (-A Option):** 0.64 kg (1.4 lb)
- Weight without Shocks:** 0.50 kg (1.1 lb)
- Pressure Range:** 3 to 7 bar (40 to 100 psi)
- Bore:** 23.8 mm (0.938")
- Displacement (180°):** 9.0 cm<sup>3</sup> (0.55 in<sup>3</sup>)
- Actuation Time [180° @ 7 bar (100 psi)]:** 0.38 sec (0.38 sec)
- Actuation Time [90° @ 7 bar (100 psi)]:** 0.29 sec (0.29 sec)
- Over Travel (Each End):** 1 to 3°
- Temperature Range without Shocks:** -35 to 82°C (-30 to 180°F)
- Temperature Range with Shocks (-A):** 0 to 66°C (32 to 150°F)
- End Stop Adjustability (Each End):** 23°
- Repeatability:** ±0.02°
- Valve Required to Actuate:** 4-way, 2-position

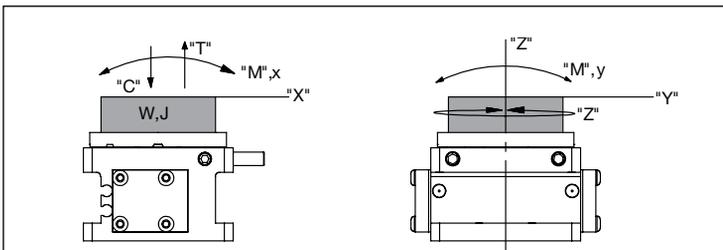
# DRF-106M



**UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS SHOWN BELOW**

				<b>Imperial inch</b>	<b>Metric mm</b>
Dimensions are symmetrical about centerline	Third Angle Projection	All Dowel Holes are SF (Slip Fit). Locational Tolerance ±0.0005" or ±0.013 mm	Metric Threads Course Pitch	0.00 = ±0.01 0.000 = ±0.005 0.0000 = ±0.000	0. = ±0.25 0.0 = ±0.13 0.00 = ±0.013

Dimensions: mm (inch)  
DIRECTCONNECT™ dimensions shown in blue



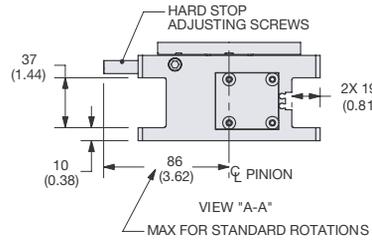
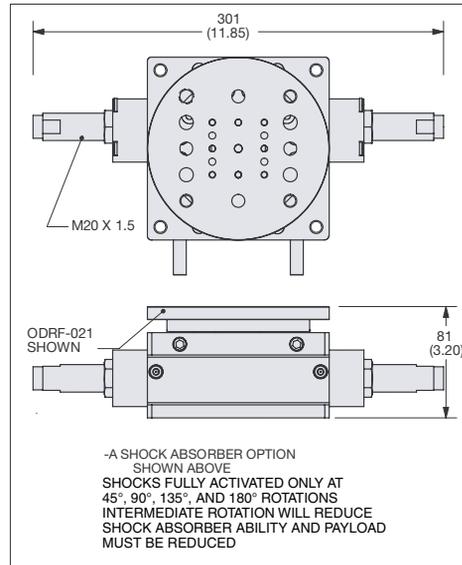
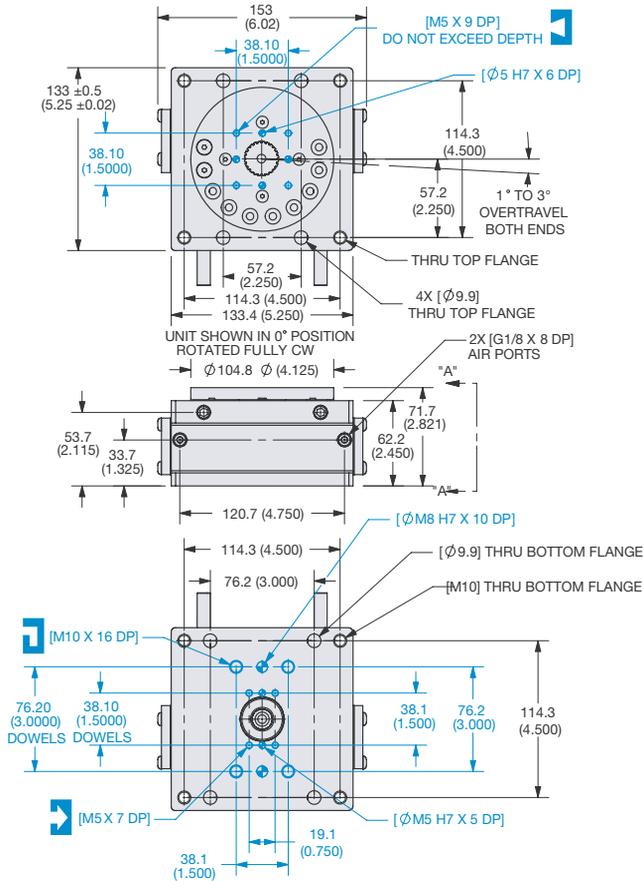
	Static	Dynamic
<b>Loading Capacity</b>		
<b>Maximum Tensile T</b>	111 N (25 lb)	22 N (5 lb)
<b>Maximum Compressive C</b>	89 N (50 lb)	44 N (10 lb)
<b>Maximum Moment Mx</b>	8.5 Nm (75 in-lb)	1.7 Nm (15 in-lb)
<b>Maximum Moment My</b>	8.5 Nm (75 in-lb)	1.7 Nm (15 in-lb)
<b>Maximum Payload W (with Shocks)</b>		3.6 kg (8 lb)
<b>Maximum Inertia J (with Shocks)</b>		4.7 x 10 <sup>-3</sup> N-m-sec <sup>2</sup> (0.0414 in-lb-sec <sup>2</sup> )

*Note: Higher payloads and inertia possible with external shocks and stops.*

## SPECIFICATIONS

- Maximum Payload with Shocks (-A):** 3.6 kg (8 lb)
- Maximum Payload without Shocks:** 1.8 kg (4 lb)
- Maximum Payload Inertia with Shocks (-A):** 4.7 x 10<sup>-3</sup> N-m-sec<sup>2</sup> (0.0414 in-lb-sec<sup>2</sup>)
- Maximum Payload Inertia without Shocks:** 2.3 x 10<sup>-5</sup> N-m-sec<sup>2</sup> (0.0207 in-lb-sec<sup>2</sup>)
- Maximum Torque @ 7 bar (100 psi):** 3.8 N-m (33.2 lb-in)
- Maximum Rotation:** 180°
- Pitch Diameter of Pinion:** 19.1 mm (0.750")
- Weight with Shocks (-A Option):** 1.4 kg (3.1 lb)
- Weight without Shocks:** 1.1 kg (2.5 lb)
- Pressure Range:** 3 to 7 bar (40 to 100 psi)
- Bore:** 27.0 mm (1.063")
- Displacement (180°):** 19.0 cm<sup>3</sup> (1.16 in<sup>3</sup>)
- Actuation Time [180° @ 7 bar (100 psi)]:** 0.60 sec (0.60 sec)
- Actuation Time [90° @ 7 bar (100 psi)]:** 0.45 sec (0.45 sec)
- Over Travel (Each End):** 1 to 3°
- Temperature Range without Shocks:** -35 to 82°C (-30 to 180°F)
- Temperature Range with Shocks (-A):** 0 to 66°C (32 to 150°F)
- End Stop Adjustability (Each End):** 23°
- Repeatability:** ±0.02°
- Valve Required to Actuate:** 4-way, 2-position

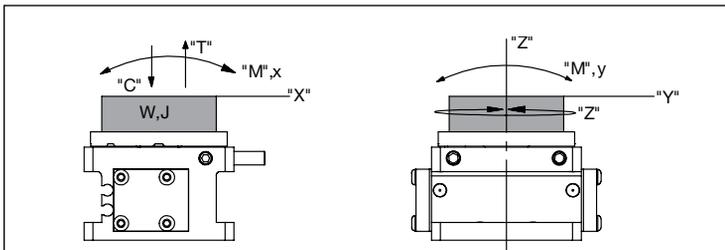
# DRF-131M



**UNLESS OTHERWISE NOTED ALL TOLERANCES ARE AS SHOWN BELOW**

				<b>Imperial inch</b>	<b>Metric mm</b>
Dimensions are symmetrical about centerline	Third Angle Projection	All Dowel Holes are SF (Slip Fit). Locational Tolerance ±0.0005" or [±0.013 mm]	Metric Threads Course Pitch	0.00 = ±0.01 0.000 = ±0.005 0.0000 = ±0.000	0. = ±0.25 0.0 = ±0.13 0.00 = ±0.013

Dimensions: mm (inch)  
DIRECTCONNECT™ dimensions shown in blue



Loading Capacity	Static	Dynamic
Maximum Tensile T	222 N (50 lb)	44 N (10 lb)
Maximum Compressive C	445 N (100 lb)	89 N (20 lb)
Maximum Moment Mx	11.3 Nm (100 in-lb)	2.3 Nm (20 in-lb)
Maximum Moment My	11.3 Nm (100 in-lb)	2.3 Nm (20 in-lb)
Maximum Payload W (with Shocks)		6.8 kg (15 lb)
Maximum Inertia J (with Shocks)		1.1 x 10 <sup>-2</sup> N-m-sec <sup>2</sup> (0.0970 in-lb-sec <sup>2</sup> )

Note: Higher payloads and inertia possible with external shocks and stops.

## SPECIFICATIONS

Maximum Payload with Shocks (-A): 6.8 kg (15 lb)

Maximum Payload without Shocks: 3.4 kg (7.5 lb)

Maximum Payload Inertia with Shocks (-A):

1.1 x 10<sup>-2</sup> N-m-sec<sup>2</sup> (0.0970 in-lb-sec<sup>2</sup>)

Maximum Payload Inertia without Shocks:

5.5 x 10<sup>-3</sup> N-m-sec<sup>2</sup> (0.0485 in-lb-sec<sup>2</sup>)

Maximum Torque @ 7 bar (100 psi): 7.6 N-m (67.6 lb-in)

Maximum Rotation: 180°

Pitch Diameter of Pinion: 25.4 mm (1.000")

Weight with Shocks (-A Option): 3.1 kg (6.8 lb)

Weight without Shocks: 2.9 kg (6.3 lb)

Pressure Range: 3 to 7 bar (40 to 100 psi)

Bore: 33.4 mm (1.313")

Displacement (180°): 34.6 cm<sup>3</sup> (2.11 in<sup>3</sup>)

Actuation Time [180° @ 7 bar (100 psi)]: 0.87 sec (0.87 sec)

Actuation Time [90° @ 7 bar (100 psi)]: 0.68 sec (0.68 sec)

Over Travel (Each End): 1 to 3°

Temperature Range without Shocks: -35 to 82°C (-30 to 180°F)

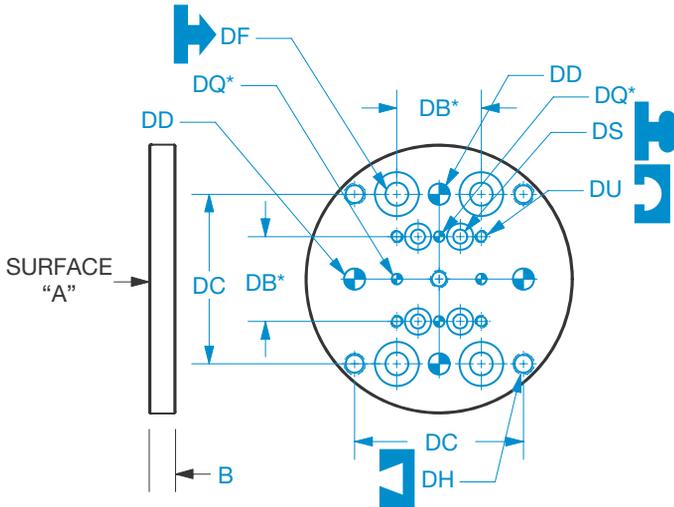
Temperature Range with Shocks (-A): 0 to 66°C (32 to 150°F)

End Stop Adjustability (Each End): 23°

Repeatability: ±0.02°

Valve Required to Actuate: 4-way, 2-position

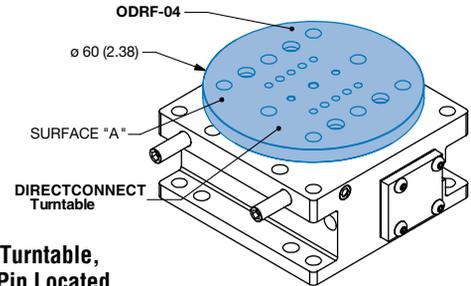
# DRF-075M, 094M, 106M



\* DIMENSIONS ALSO APPLY TO BLANK  
TURNABLE  
C'BORE FOR BUTTON HEAD SCREWS

## Turntable

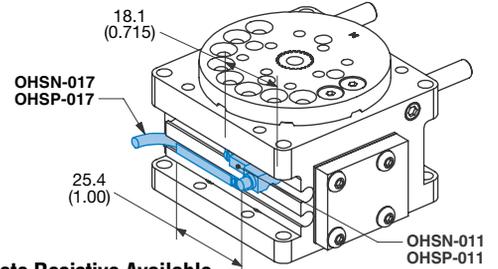
Dimensions:  
mm (inch)



- DIRECTCONNECT Turntable, Easily Removed, Pin Located
- High Quality Aircraft Aluminum, Black Anodized Finish
- Mounts Through Pinion with One Screw and Two Dowels
- No Machining Required, DIRECTCONNECT Grippers Mount Directly
- 90° and 180° Orientations in Stock

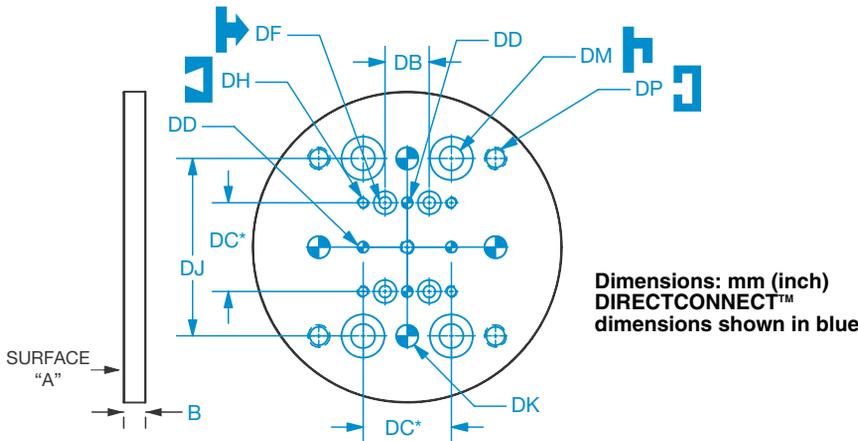
## Sensor and Flow Controls

Dimensions:  
mm (inch)



- PNP and NPN Magneto Resistive Available
- Sensors Are Slot Mounted, No Mounting Kits Required
- Precision Rotary Adjustments Made from Face and Locked with Set Screws

# DRF-131M



Dimensions: mm (inch)  
DIRECTCONNECT™  
dimensions shown in blue

\* DIMENSIONS ALSO APPLY TO BLANK  
TURNABLE  
C'BORE'S FOR BUTTON HEAD SCREWS

## DIRECTCONNECT DIMENSIONS STANDARD MOUNTING PATTERN FOR ALL SIZES

DA	9.5 mm
DB	19.1 mm
DC	38.1 mm
DD	5 mm THRU
DF	C'BORE FOR M5 BUTTON HEAD SCREW
DH	M5 THRU
DJ	76.2 mm
DK	10 mm THRU
DM	C'BORE FOR 10 mm BUTTON HEAD SCREW
DP	M10 THRU
DQ	3 H7 THRU
DS	C'BORE FOR M3 BUTTON HEAD SCREW
DU	M3 THRU

## TURNTABLE PLATE DIAMETER AND THICKNESS "B"

MODEL NO.	TURNTABLE NO.	THICKNESS mm (inch)	DIAMETER mm (inch)
DRF-075M	ODRF-002/004	5.9 (0.23)	60 ±0.8 (2.38 ±0.03)
DRF-094M	ODRF-008/010	7.1 (0.281)	76 ±0.8 (3.00 ±0.03)
DRF-106M	ODRF-014/016	7.9 (0.313)	102 ±0.8 (4.00 ±0.03)
DRF-131M	ODRF-020/022	9.5 (0.375)	133 ±0.8 (5.25 ±0.03)

<b>To Order</b>						
<b>MODEL NO.</b>	<b>DEPTH mm (inch)</b>	<b>WIDTH mm (inch)</b>	<b>HEIGHT mm (inch)</b>	<b>MAX PAYLOAD Kg (lbs)</b>	<b>MAX ROTATION</b>	<b>WEIGHT Kg (lbs)</b>
<b>DRF-075M-90</b>	54 (2.13)	69 (2.69)	37 (1.52)	0.23 (0.5)	90°	0.24 (0.54)
<b>DRF-075M-180</b>	54 (2.13)	69 (2.69)	37 (1.52)	0.23 (0.5)	180°	0.24 (0.54)
<b>DRF-075M-90-A</b>	54 (2.13)	151 (5.93)	37 (1.52)	0.45 (1)	90°	0.34 (0.72)
<b>DRF-075M-180-A</b>	54 (2.13)	151 (5.93)	37 (1.52)	0.45 (1)	180°	0.34 (0.72)
<b>DRF-094M-90</b>	71 (2.78)	86 (3.36)	49 (1.76)	0.68 (1.50)	90°	0.50 (1.10)
<b>DRF-094M-180</b>	71 (2.78)	86 (3.36)	49 (1.76)	0.68 (1.50)	180°	0.50 (1.10)
<b>DRF-094M-90-A</b>	71 (2.78)	189 (7.45)	49 (1.76)	1.4 (3.00)	90°	0.64 (1.40)
<b>DRF-094M-180-A</b>	71 (2.78)	189 (7.45)	49 (1.76)	1.4 (3.00)	180°	0.64 (1.40)
<b>DRF-106M-90</b>	100 (3.94)	115 (4.54)	58 (2.28)	1.8 (4.00)	90°	1.1 (2.50)
<b>DRF-106M-180</b>	100 (3.94)	115 (4.54)	58 (2.28)	1.8 (4.00)	180°	1.1 (2.50)
<b>DRF-106M-90-A</b>	100 (3.94)	250 (9.84)	58 (2.28)	3.6 (8.00)	90°	1.4 (3.10)
<b>DRF-106M-180-A</b>	100 (3.94)	250 (9.84)	58 (2.28)	3.6 (8.00)	180°	1.4 (3.10)
<b>DRF-131M-90</b>	133 (5.25)	153 (6.02)	72 (2.82)	3.4 (7.50)	90°	2.9 (6.30)
<b>DRF-131M-180</b>	133 (5.25)	153 (6.02)	72 (2.82)	3.4 (7.50)	180°	2.9 (6.30)
<b>DRF-131M-90-A</b>	133 (5.25)	301 (11.85)	72 (2.82)	6.8 (15.00)	90°	3.1 (6.80)
<b>DRF-131M-180-A</b>	133 (5.25)	301 (11.85)	72 (2.82)	6.8 (15.00)	180°	3.1 (6.80)

**Ordering Example: DRF-075M-90-A**, precision rotary actuator with 90° of rotation and built in shock absorber. Recommend accessories include 2 sensors and 2 pneumatic flow controls for each slide, along with a 4-way 2 position valve. **DRF-075M** models: actuation time [180° @ 7 bar (100 psi) 0.38 seconds], actuation time [90° @ 7 bar (100 psi) 0.29 seconds]. **DRF-094M** models: actuation time [180° @ 7 bar (100 psi) 0.38 seconds], actuation time [90° @ 7 bar (100 psi) 0.29 seconds]. **DRF-106M** models: actuation time [180° @ 7 bar (100 psi) 0.38 seconds], actuation time [90° @ 7 bar (100 psi) 0.29 seconds]. **DRF-131M** models: actuation time [180° @ 7 bar (100 psi) 0.38 seconds], actuation time [90° @ 7 Bar (100 psi) 0.29 seconds]. All models end stop adjustability 23°, over travel (each end) 1 to 3°.

## Accessories

<b>MODEL NO.</b>	<b>DESCRIPTION</b>
<b>SENSOR ACCESSORIES</b>	
<b>OHSP-011</b>	PNP magneto resistive sensor 90° barrell with quick disconnect fitting
<b>OHSN-011</b>	NPN magneto resistive sensor 90° barrell with quick disconnect fitting
<b>OHSP-017</b>	PNP magneto resistive sensor short barrell with quick disconnect fitting
<b>OHSN-017</b>	NPN magneto resistive sensor short barrell with quick disconnect fitting
<b>CABL-010</b>	Quick disconnect cable 2 m (6.6') long
<b>CABL-013</b>	Quick disconnect cable 5 m (16') long
<b>PNEUMATIC ACCESSORIES</b>	
<b>Pneumatic Tubing</b>	Polyurethane tubing in multiple diameters and colors available,
<b>Pneumatic Fittings</b>	Rotary sizes 075M to 106M use M5 threads, 131M use 1/8G threads
<b>Pneumatic Flow Controls</b>	Adjustable flow control fittings and directional control valves
<b>MECHANICAL ACCESSORIES</b>	
<b>ODRF-002</b>	Rotary size 075M blank turn table, machining required
<b>ODRF-004</b>	Rotary size 075, DirectConnect turntable metric, direct mounting for gripper, no machining necessary
<b>ODRF-008</b>	Rotary size 094M blank turn table, machining required
<b>ODRF-010</b>	Rotary size 094, DirectConnect turntable metric, direct mounting for gripper, no machining necessary
<b>ODRF-014</b>	Rotary size 106M blank turn table, machining required
<b>ODRF-016</b>	Rotary size 106M, DirectConnect turn table, direct mounting for grippers, no machining necessary
<b>ODRF-020</b>	Rotary size 131M blank turn table, machining required
<b>ODRF-022</b>	Rotary size 131M, DirectConnect turn table, direct mounting for grippers, no machining necessary
<b>DMM Series</b>	Aluminum extruded mounting stanchions for slides and thrusters