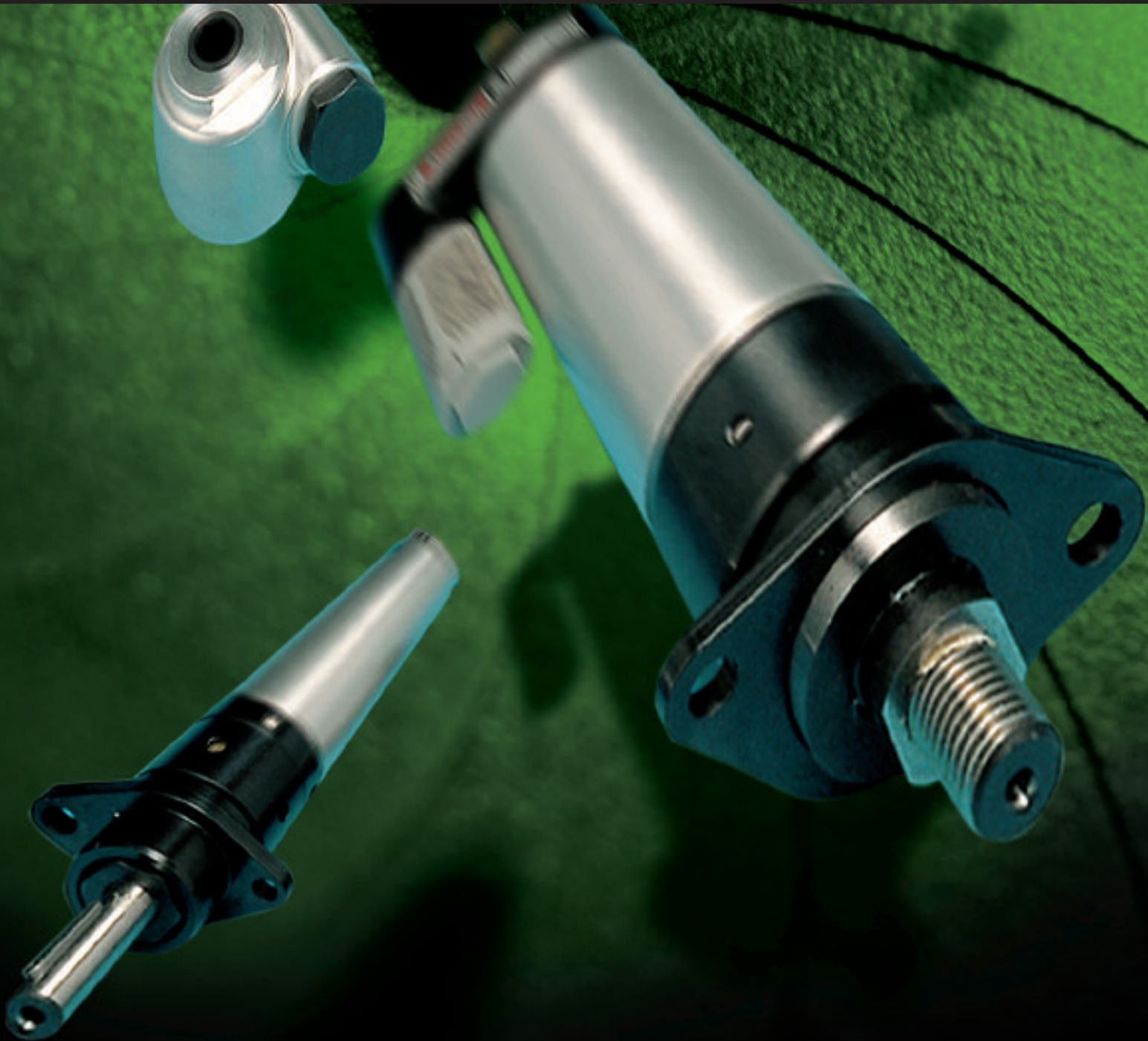




# Air Motors<sup>Tools</sup>



**Air Motors**

**The Ultimate Power Tools**

# Introduction

*Air motors are versatile power sources which can be used to power many kinds of operations requiring a rotational drive. They have many advantages over electric motors, and often become the only feasible method of operation.*



## Advantages

CP offers a wide range of rotating vane type air motors within a power range of 0.35 hp to 0.85 hp. Most motors can be supplied as single rotation or reversible. Reversible motors have keyed shafts, while single direction motors can be supplied with threaded shafts or alternatives.

1. Compact, with high power to weight ratio. An air motor will often be one third or less than the size of a comparable electric motor. An air motor can be used in a portable application where the weight and/or physical size of the electric motor would preclude portable operations. For example, a 0.85 hp air motor running at 2000 rpm weighs 3 lbs and is approximately 8" long and just over 2" in diameter.
2. The output speed and torque can be simply controlled by regulating either the air pressure or air flow. No expensive control equipment is required.
3. If a motor is loaded to a stalled condition, and held there for any length of time, no damage is caused to the motor. In certain applications, such as tightening fasteners, one acceptable method of control is to regulate the air pressure so that the motor stalls at the required torque.
4. When the load is released, the air motor will reach free running speed usually within one third to one half of a revolution.
5. No risk of overheating either when continuously run or frequent stop/starts or reversing. Note that this condition assumes the use of an inline lubrication system.
6. Reversing motors require simple control of air pressure into ports in the control top of the motor to determine direction of rotation. To reverse the direction of rotation takes milliseconds to complete.
7. Resists moisture, dust, heat. Is generally explosion proof and can be used safely in most hazardous situations.

## Terms

The following terminology is used in this publication:

**No load speed** – maximum speed attained at a given air pressure under a no-load condition.

**Maximum power** – with a vane type air motor, the maximum power output is achieved at nearly one half of the no load speed. This is the point at which the motor will run most efficiently.

**Dynamic torque** – the output torque of the motor at any stage during the operating cycle. The dynamic torque increases virtually in a straight line from zero at no load to a maximum at the stalled condition.

**Stall torque** – output torque achieved when the load applied causes the motor to stall.

**Starting torque** – to obtain the proper sealing of the rotor blades against the cylinder walls for maximum efficiency, and to

overcome inertia, it takes more torque to start an air motor than when it is running. Starting torque is approximately 75% of stall torque.

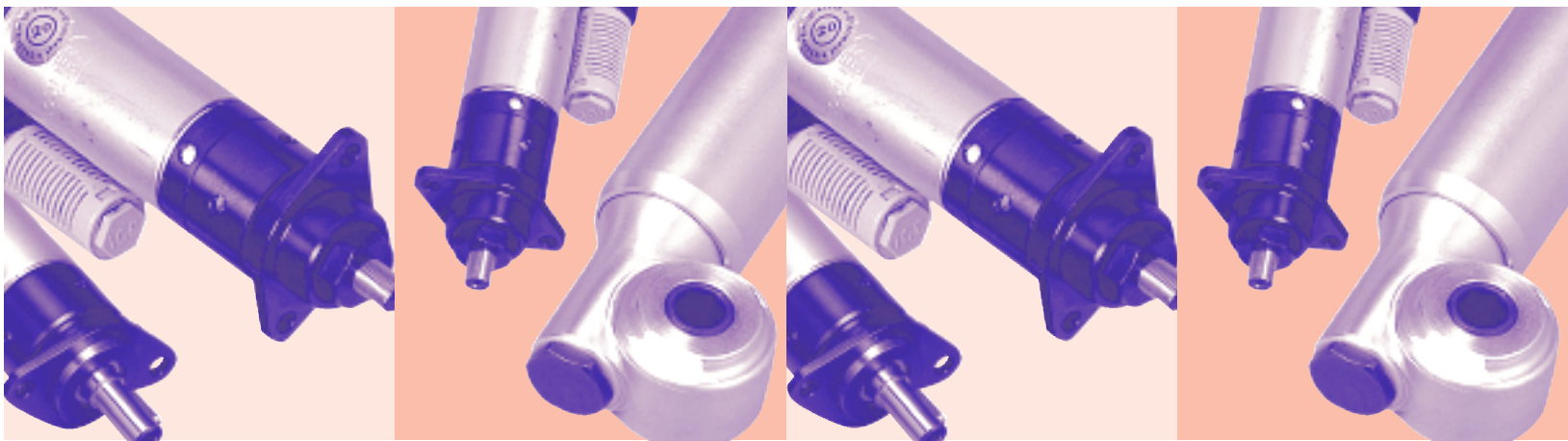
**Air consumption** – measured in the no-load condition. Air consumption is maximum at no load, and is approximately three quarters of this figure at maximum power. Air consumption reduces as the working air pressure is reduced. For example at 50 p.s.i. the air consumption is almost one half that at 90 p.s.i.

**Performance specifications** – are normally shown with an air inlet pressure of 6.3 bar at the air motor, unless otherwise stated. Note that there is approximately a 14% drop in power for every 10% reduction in air inlet pressure.

**Rotation** – non-reversible motors rotate in a clockwise direction if the motor is viewed from the air inlet end with the spindle pointing away from you.



- 4 Selecting an Air Motor
- 5 DM6/DM65 Series  
(0.35 hp, Non Reversible, Torque 0 - 5.9 lbf ft)
- 6 2DM6 Series  
(0.35 hp, Reversible, Torque 0 - 5.9 lbf ft)
- 7 HM Series  
(0.60 hp, Non Reversible, Torque 0 - 30 lbf ft)
- 8 HM55 Series  
(0.85 hp, Non Reversible, Torque 0 - 30 lbf ft)
- 9 2HM5 Series  
(0.85 hp, Reversible, Torque 0 - 30 lbf ft)
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## General Information

- Air Motors are supplied as "Machinery to be incorporated" – Customer is responsible for safe incorporation into the complete machine.
- Always refer to Operating and Warning instructions supplied with the tool before operating the tool.
- All accessories and those tools marked with an asterisk (\*) are supplied outside the scope of CP's ISO9001 registration, but are sourced from firms meeting CP's supplier quality assurance requirements.
- Sound levels quoted in this catalogue were obtained from measurements made according to the EN ISO15744 Test Code. Nominal values are quoted, sound levels of individual tools may vary by  $\pm 3\text{dB(A)}$ .
- All dimensions are calculated from metric values.



# Selecting an Air Motor

After first determining whether a single direction or a reversible motor is required, the next step is to consider the required output speed and torque together with the operational conditions.

As a general rule try to select a motor with twice the free running speed of the speed required under load.

By using the performance graphs indicated on the following pages it is then possible to ensure that the motor meets the requirements specified.

**Example:** What motor is required to produce an output torque of 4.5 lbf ft at 300 rpm. The motor should be reversible and 6 bar supply pressure is available.

## Step One – Select the motor type

The maximum dynamic torque of the DM Series motor is 5.9 lbf ft. Since a reversible motor is required the 2DM6 will be used.

## Step Two – Select the appropriate motor speed

As a rule try to select a motor with twice the free running speed of the speed required since this will usually coincide with the high power band of the motor.

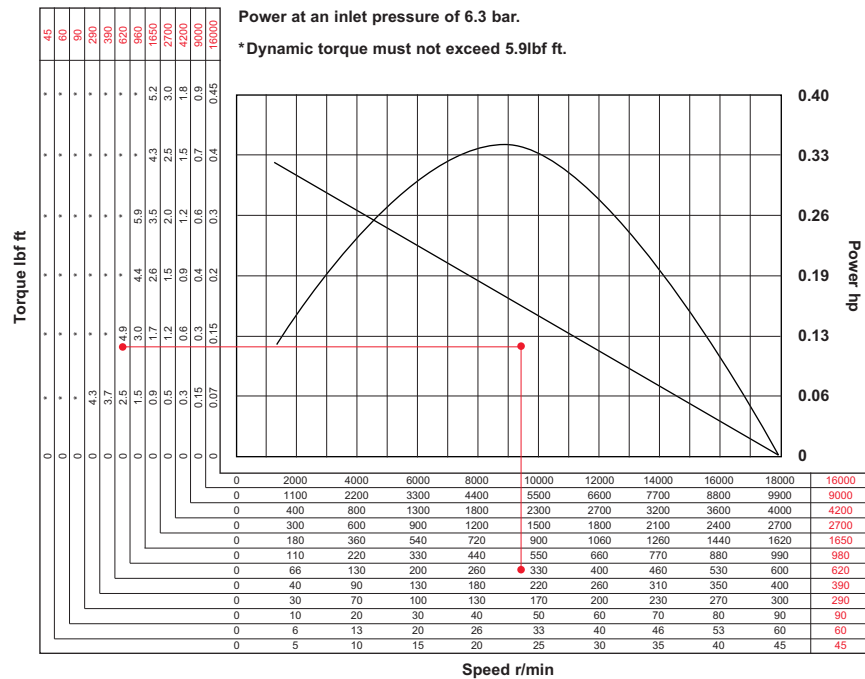
For this example we require 300 rpm so use a motor of about 600 rpm free running speed. The closest is 620 rpm so try the 2DM6-620.

## Step Three – Confirm the motor is suitable for the application

By plotting both the torque (4.5 lbf ft) and speed (300 rpm) on the graph an intersection is found.

Provided the intersection is below the torque line for the motor (straight line) then the motor is suitable for the application.

## 2DM6 Series Air Motors Reversible



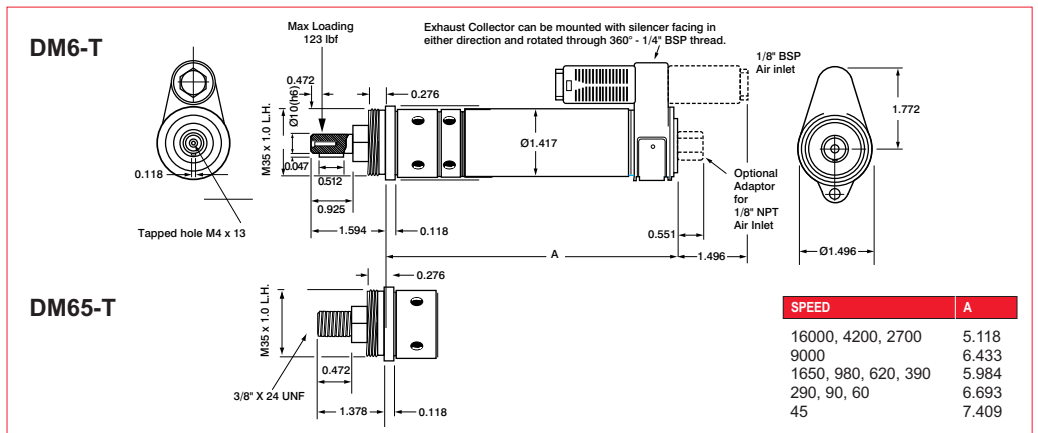
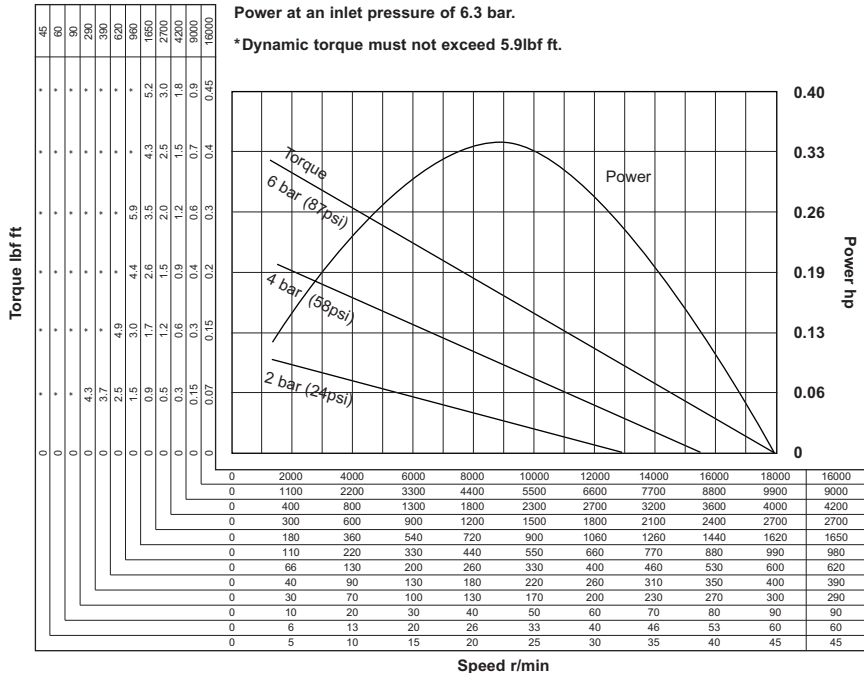
# DM6, DM65 Series

## DM6, DM65 Series

0.35 hp,  
Maximum Torque 5.9 lbf ft,  
Non Reversible



MOTOR TYPE		NO LOAD SPEED	MAX. POWER	TORQUE AT MAX. POWER	AIR CONSUMPTION AT MAX. POWER	MIN. HOSE BORE	WEIGHT	SOUND LEVEL
THREADED SHAFT / THREADED NOSE	KEYED SHAFT / THREADED NOSE							
		r/min.	hp	lbf ft	cfm	ins	lbs	dB(A)
DM65-1600T	DM6-1600T	16000		0.17			1.4	
DM65-9000T	DM6-9000T	9000		0.30			1.4	
DM65-4200T	DM6-4200T	4200		0.90			1.4	
DM65-2700T	DM6-2700T	2700		1.33			1.4	
DM65-1650T	DM6-1650T	1650		2.21			1.6	
DM65-980T	DM6-980T	980	0.35	3.70	19.9	3/8	1.6	76
DM65-620T	DM6-620T	620		5.90			1.6	
DM65-390T	DM6-390T	390		5.90			1.6	
DM65-290T	DM6-290T	290		5.90			1.8	
DM65-90T	DM6-90T	90		5.90			1.8	
DM65-60T	DM6-60T	60		5.90			1.8	
DM65-45T	DM6-45T	45		5.90			2.0	



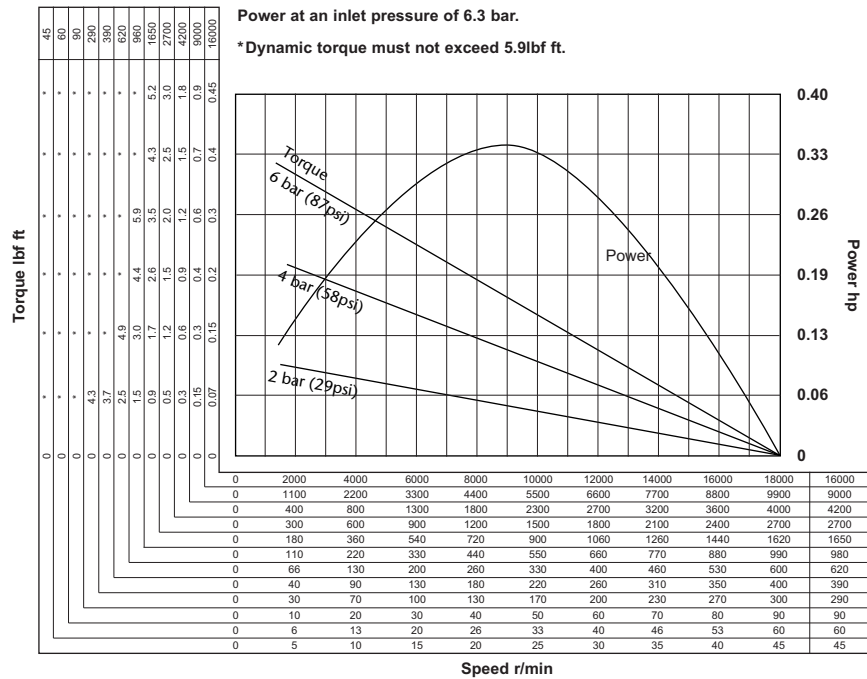
# 2DM6 Series

**2DM6 Series**  
**0.35 hp,**  
**Maximum Torque 5.9 lbf ft,**  
**Reversible**

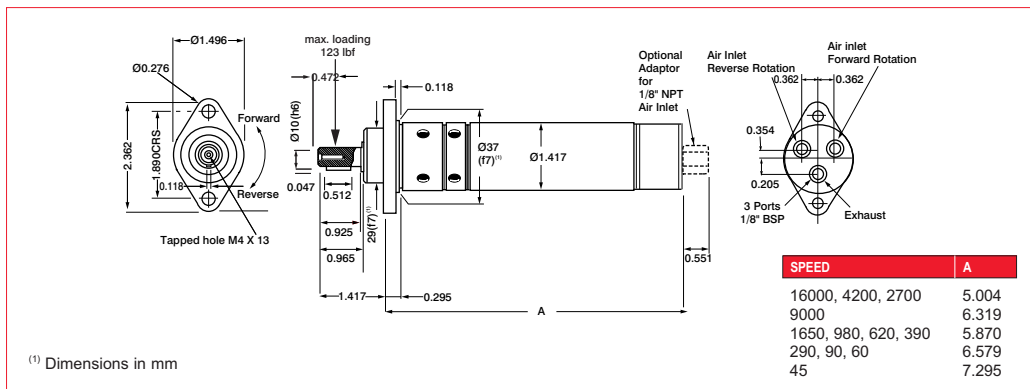


MOTOR TYPE	NO LOAD SPEED	MAX. POWER	TORQUE AT <sup>1)</sup> MAX. POWER	AIR CONSUMPTION AT MAX. POWER	MIN. HOSE BORE	WEIGHT	SOUND
	r/min.	hp	lbf ft	cfm	ins	lb	dB(A)
2DM6-16000	16000		0.17			1.3	
2DM6-9000	9000		0.30			1.3	
2DM6-4200	4200		0.90			1.3	
2DM6-2700	2700		1.33			1.3	
2DM6-1650	1650		2.21			1.5	
2DM6-980	980	0.35	3.70	19.9	3/8	1.5	73 <sup>1)</sup>
2DM6-620	620		5.90			1.5	
2DM6-390	390		5.90			1.5	
2DM6-290	290		5.90			1.7	
2DM6-90	90		5.90			1.7	
2DM6-60	60		5.90			1.7	
2DM6-45	45		5.90			1.7	

<sup>1)</sup> It is recommended that a suitable air diffuser is fitted downstream of any control valve through which exhaust air exits.



**Note:** Exhaust is through common exhaust port and opposite rotation inlet port. Blocking or restricting these ports will reduce the performance of the motor.

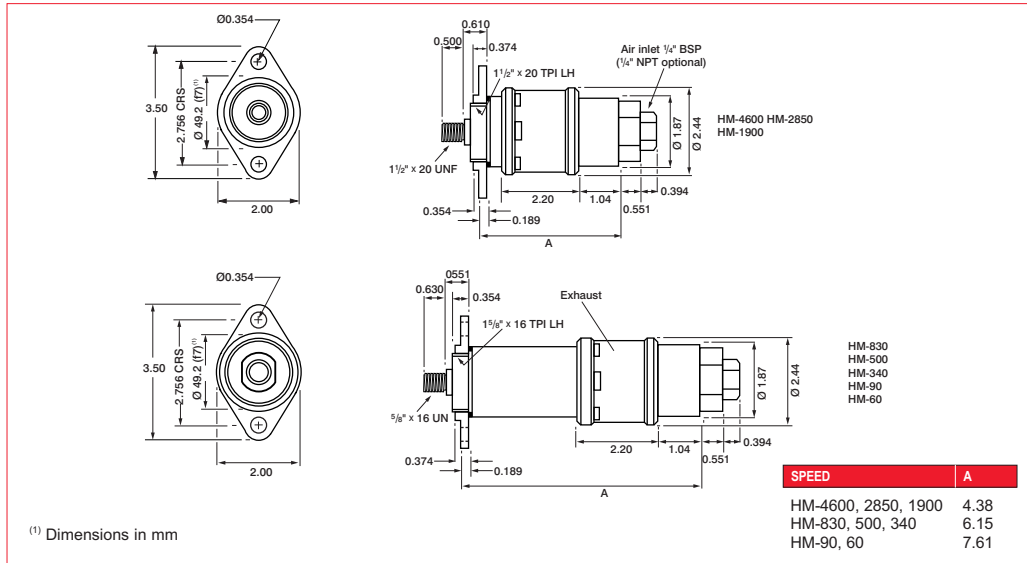
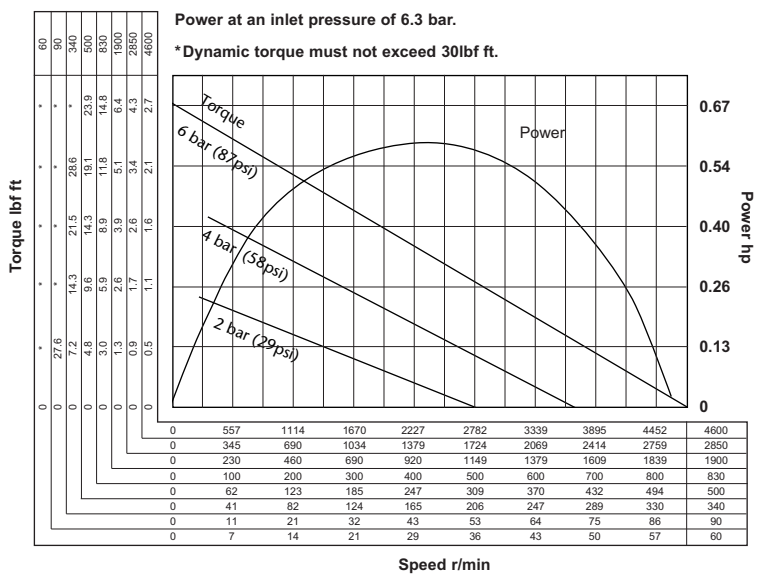


# HM Series

**HM Series**  
0.6 hp,  
Maximum Torque 30 lbf ft,  
Non Reversible



MOTOR TYPE	NO LOAD SPEED	MAX. POWER	TORQUE AT MAX. POWER	AIR CONSUMPTION AT MAX. POWER	MIN. HOSE BORE	WEIGHT	SOUND
	r/min.	hp	lbf ft	cfm	ins	lb	dB(A)
HM-4600	4600		1.5			2.4	
HM-2850	2850		2.2			2.4	
HM-1900	1900		3.3			2.4	
HM-830	830	0.6	7.7	27.5	3/8	3.5	82
HM-500	500		12.4			3.5	
HM-340	340		18.4			3.5	
HM-90	90		30.0			4.2	
HM-60	60		30.0			4.2	



(1) Dimensions in mm



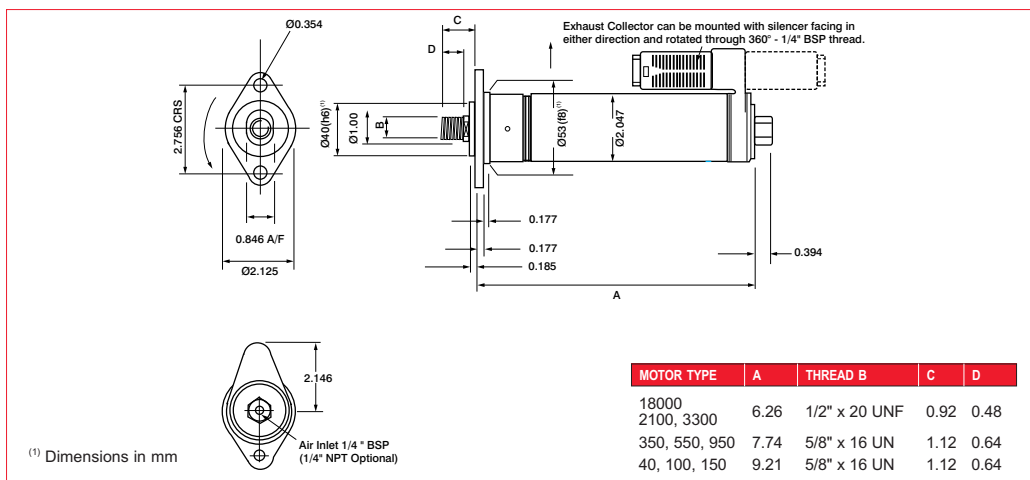
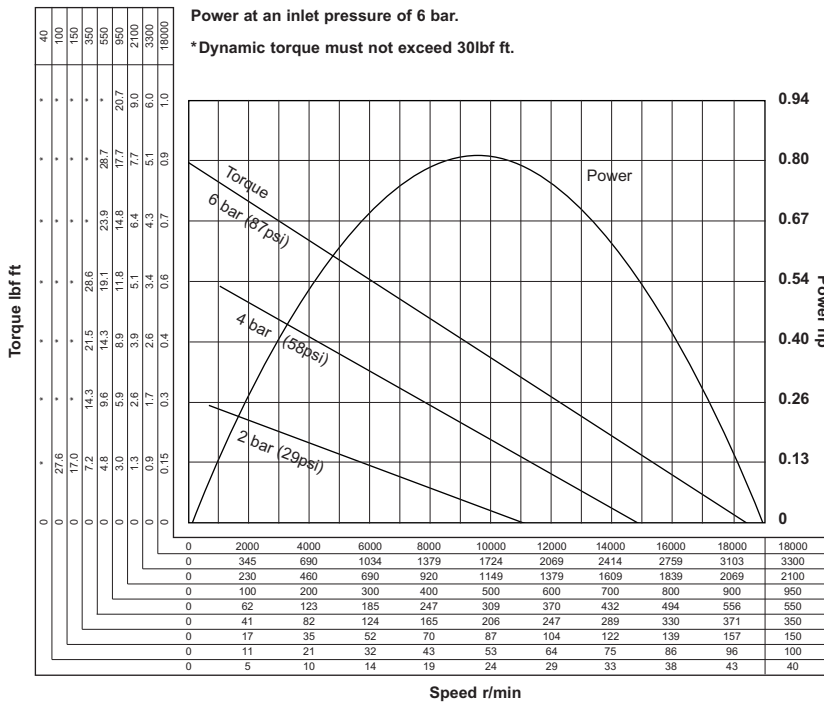
# HM55 Series

## HM 55 Series

0.85 hp,  
Maximum Torque 30 lbf ft,  
Non Reversible



THREADED SHAFT	NO LOAD SPEED	MAX. POWER	TORQUE AT MAX. POWER	AIR CONSUMPTION AT MAX. POWER	MIN. HOSE BORE	WEIGHT	SOUND
	r/min.	hp	lbf ft	cfm	ins	lb	dB(A)
HM55-18000	18000		0.4			3.1	
HM55-3300	3300		2.6			3.1	
HM55-2100	2100		3.8			3.1	
HM55-950	950	0.85	8.9	32.8	3/8	3.7	78
HM55-550	550		14.3			3.7	
HM55-350	350		21.5			3.7	
HM55-150	150		30			4.6	
HM55-100	100		30			4.6	
HM55-40	40		30			4.6	



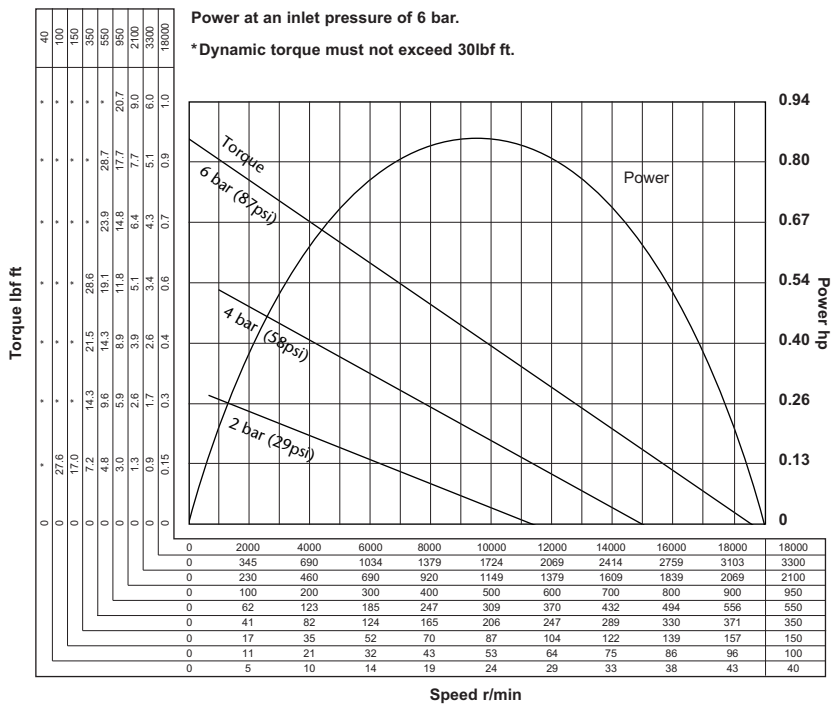


# 2HM5 Series

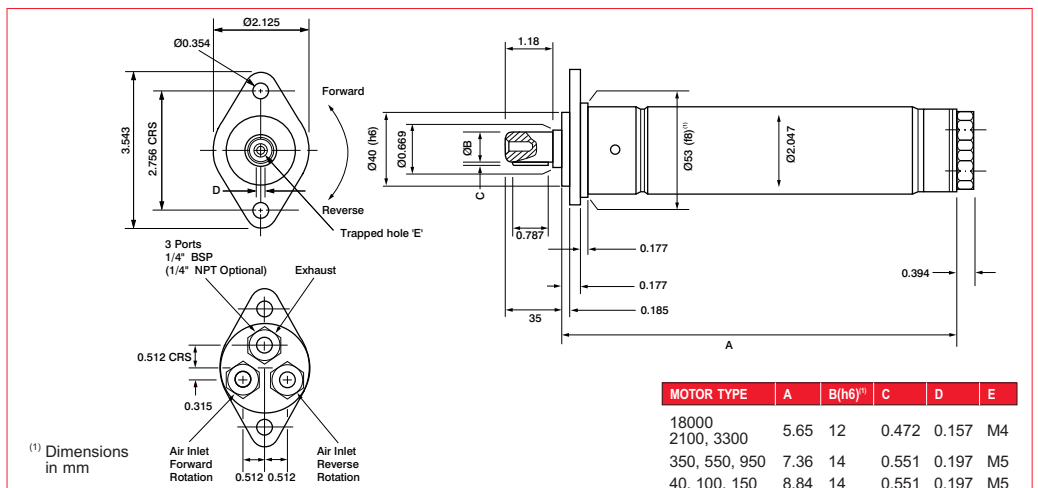
**2HM5 Series**  
**0.85 hp,**  
**Maximum Torque 30 lbf ft,**  
**Reversible**



MOTOR TYPE	NO LOAD SPEED	MAX. POWER	TORQUE AT MAX. POWER	AIR CONSUMPTION AT MAX. POWER	MIN. HOSE BORE	WEIGHT	SOUND
	r/min.	hp	lbf ft	cfm	ins	lb	dB(A)
2HM5-18000	18000		0.5			3.1	
2HM5-3300	3300		2.8			3.1	
2HM5-2100	2100		4.1			3.1	
2HM5-950	950		9.6			3.7	
2HM5-550	550	0.85	15.5	35.0	3/8	3.7	87
2HM5-350	350		23.2			3.7	
2HM5-150	150		30			4.6	
2HM5-100	100		30			4.6	
2HM5-40	40		30			4.6	



Note: Exhaust is through common exhaust port and opposite rotation inlet port. Blocking or restricting these ports will reduce the performance of the motor.



# 2H410 Series

**2H410 Series**  
**0.85 hp,**  
**Maximum Torque 78 lbf ft,**  
**Worm Drive Motors**

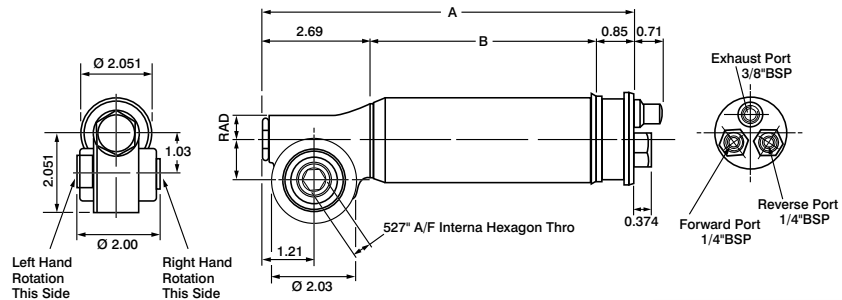


MOTOR TYPE	NO LOAD SPEED	MAX. POWER	MAX. STALL TORQUE	MIN. SAFE WORKING PRESSURE	MAX. AIR CONSUMPTION	MIN. HOSE BORE	WEIGHT	SOUND
	r/min	hp	lbf ft	bar	cfm	ins	lbs	dB(A)
2H410-500	500		29	6	36	1/2	3.8	
2H410-350	350		37	6	36	1/2	3.8	
2H410-150	150	0.85	78	6	36	1/2	4.4	87
2H410-90	90		78	4	22	3/8	4.4	
2H410-60	60		78	2.8	19	3/8	4.4	

A version of the 2HM5 motor can be supplied equipped with a worm drive gearbox, allowing the drive to be taken from each side of the head for either right hand or left hand rotation.

Standard drive is a .525" A/F Female Hexagon, but adaptors can be supplied to convert this to either 3/8" or 1/2" square drive. An alternative head is available to provide a No. 1 morse taper drive.

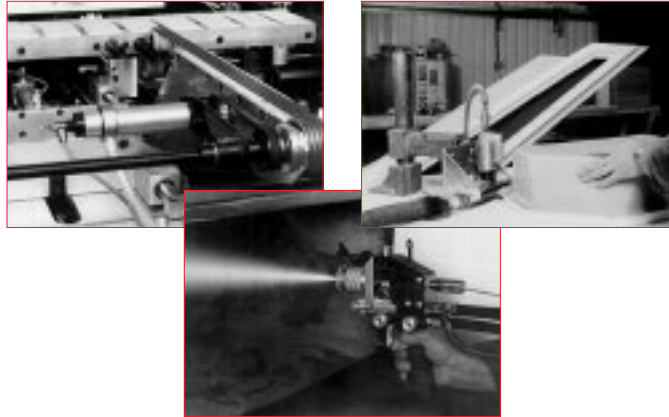
**Note:** Exhaust is through common exhaust port and opposite rotation inlet port. Blocking or restricting these ports will reduce the performance of the motor.



TYPE	SPEED	A	B
2H410-500	500	8.22	4.68
2H410-350	350	8.22	4.68
2H410-150	150	9.68	6.14
2H410-90	90	9.68	6.14
2H410-60	60	9.68	6.4



# Special Applications and Application Questionnaire


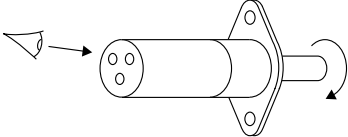







## Special Applications

Desoutter can produce special motors to specifically suit your application whether through modification of the control method or output drive. Please provide details should your application require a special type.

## Selection Questionnaire

The following questionnaire is for use either by the engineer for his/her own calculations or can be completed and returned to the local CP Sales Office.

Specification				
Torque Required _____		lbf ft		
Speed Required _____		RPM		
Rotation	Forward		<input type="checkbox"/>	
	Reverse		<input type="checkbox"/>	
	Reversible		<input type="checkbox"/>	
Output Type	Keyed		<input type="checkbox"/>	(DM6-T/2DM6/2HM5)
	Threaded		<input type="checkbox"/>	(DM65-T/HM55/HM only)
	0.525" Hexagon		<input type="checkbox"/>	(2H410 only)
Air Line Pressure _____		bar (to convert psi to bar x 14.504)		
Lubrication Available		Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Number of Motors Required _____				
<small>OFFICE USE ONLY</small>				
Recommended Motor Type _____				
Accessories (see pages 12-15)			<small>OFFICE USE ONLY</small>	
			Recommended Accessories	
Chucks		<input type="checkbox"/>	_____	
Collet Holders		<input type="checkbox"/>	_____	
Screwdriver Bit Adaptor		<input type="checkbox"/>	_____	
Flange (DM6/65-T)		<input type="checkbox"/>	_____	
Exhaust Collector (HM)		<input type="checkbox"/>	_____	
Stands		<input type="checkbox"/>	_____	
Air Service Equipment		<input type="checkbox"/>	_____	
Air Line Hoses		<input type="checkbox"/>	_____	



# Output Accessories

## Key Adjustable Chucks



MOTOR TYPE	CHUCK CAPACITY	CHUCK AND KEY
	ins	part no.
DM65-T	1/4	28942
	5/16	94502
	3/8	31132
HM-1900-4600 HM55-2100-18000	1/2	29142
HM-60-830 HM55-40-950	1/2	29122

## Collet Chucks



MOTOR TYPE	LENGTH	DIA.	1	2
	ins	ins	part no.	part no.
DM65-T	1.65	0.60	26932	26942
HM-1900-4600 HM55-2100-18000			26932	26952

COLLETS							
ins	part no.	ins	part no.	ins	part no.	ins	part no.
0.031	2892	0.075	3002	0.118	3112	0.161	3222
0.035	2902	0.079	3012	0.122	3122	0.165	3232
0.039	2912	0.083	3022	0.126	3132	0.169	3242
0.043	2922	0.087	3032	0.130	3142	0.173	3252
0.047	2932	0.091	3042	0.134	3152	0.177	3262
0.051	2942	0.094	3052	0.138	3162	0.181	3272
0.055	2952	0.098	3062	0.142	3172	0.185	3282
0.059	2962	0.102	3072	0.146	3182	0.189	3292
0.063	2972	0.106	3082	0.150	3192	0.193	3302
0.067	2982	0.110	3092	0.154	3202	0.197	3312
0.071	2992	0.114	3102	0.157	3212		

## Fixed Collet Drives



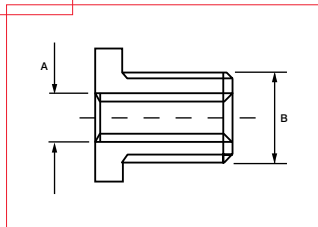
DIAMETER	MOTOR TYPE	LENGTH	DIA.	COLLET	NUT
		ins	ins	part no.	part no.
6mm	DM65-T	1.63	0.83	22362	22352
1/4"		1.63	0.83	22382	22352

## Screwdriver Bit Adaptor



DRIVE	MOTOR TYPE	LENGTH	DIA.	part no.
		ins	ins	
5/16" fem.	DM65-T	1.38	0.5	27532

## Thread Adaptor

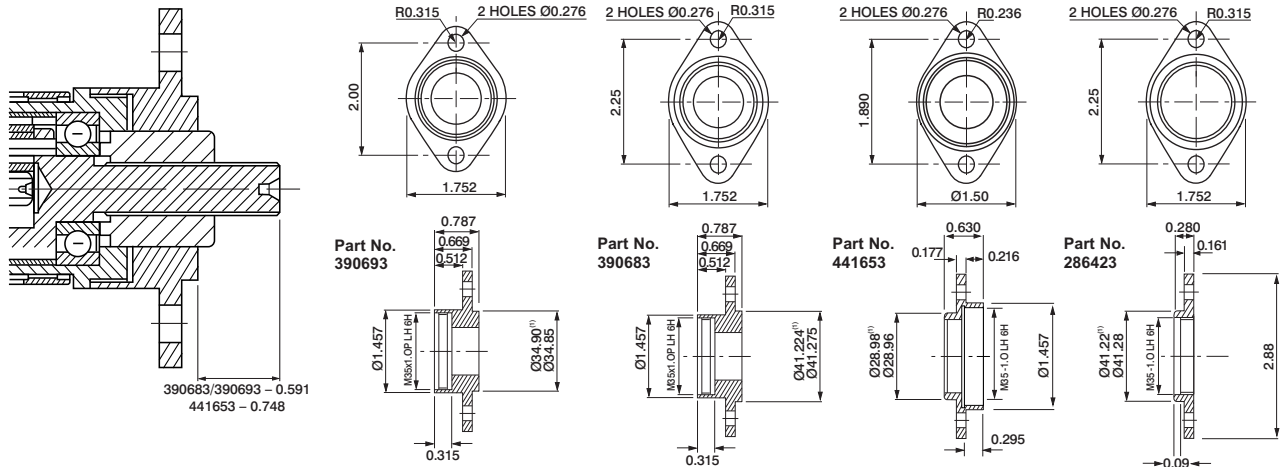


MOTOR TYPE	A	B	part no.
DM65-T	3/8" x 24 UNF	1/2" x 20 UN	68143



# Output Accessories

## Flange for DM6/65-T



Part No. 390683 provides same mounting dimensions as DM - 17700/5300/4000/3000/1600  
 Part No. 390693 provides same mounting dimensions as DM - 900/500/210/80/40  
 Part No. 441653 provides same mounting dimensions as DM6 and DM65 motors

(1) Dimensions in mm

## Exhaust Collector Ring for HM Series



Part No. 43093

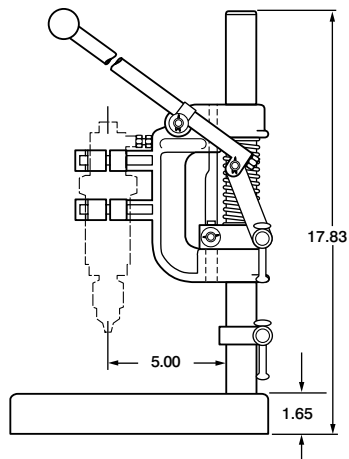


Part No. 72163

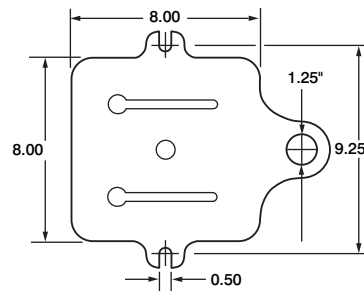
CONNECTION	PART NO.
Ø15mm barb	43093
3/8" BSP Female	72163

## Stands

### R55 Lever Operated Stand for HM Series



Part No. 903304



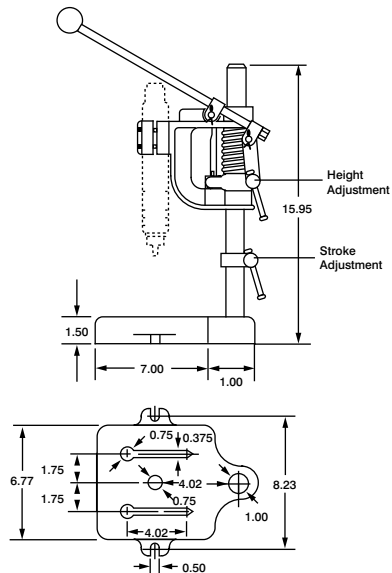
**Note:** Motor must be fitted with exhaust collector ring (see above)



# Air Motor Accessories

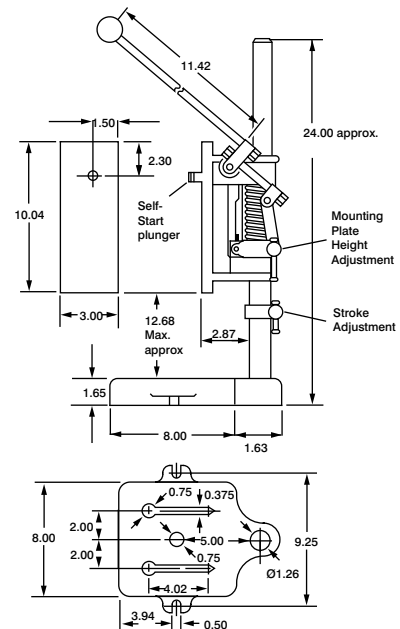
## D54 Lever-Operated Stand For DM6, DM65 and 2DM6 Motor

Part No. 901944  
Weight: 15.4 lbs  
Max. Stroke: 1.77 ins



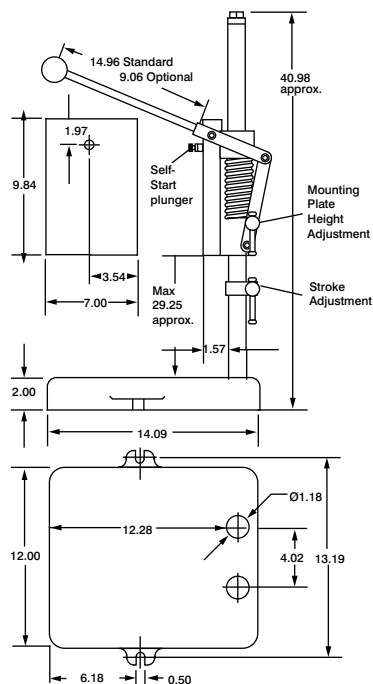
## R55-S Lever-Operated Stand

Part No. 903644  
Weight: 24.9 lbs  
Max. Stroke: 2.24 ins  
Max. Mounting Plate Load: 13.2 lbs



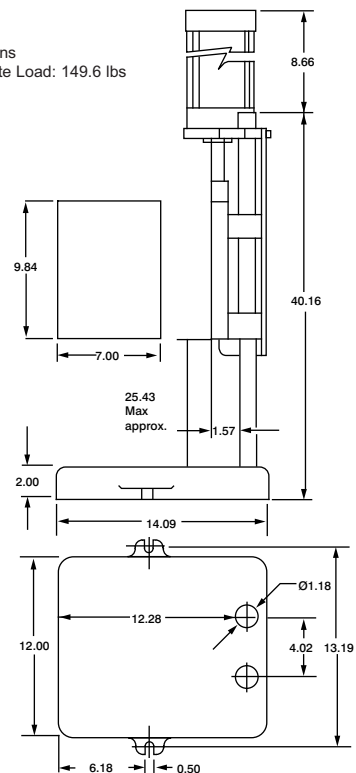
## M55A Lever-Operated Stand With Linear Bearings

Part No. 902594  
Weight: 35.2 lbs  
Max. Stroke: 2.56 ins  
Max. Mounting Plate Load: 15.95 lbs



## MC55 Cylinder-Operated Stand With Linear Bearings

Part No. 902914  
Weight: 70.4 lbs  
Max. Stroke: 3.94 ins  
Max. Mounting Plate Load: 149.6 lbs



## Operating the Motor

To obtain the longest life span of the vane type air motor, it is recommended that a clean, dry supply of air in sufficient quantity is supplied, with an automatic lubrication system to provide the correct amount of lubrication to the air motor at all times.

Controlling the motor can be achieved using pneumatic valves, either hand, foot, pilot air or solenoid operated. The valve used must have full flow capability to ensure unrestricted air flow to the motor.

Torque is controlled by changing the pressure, speed by air flow.

## A Typical Control Circuit

