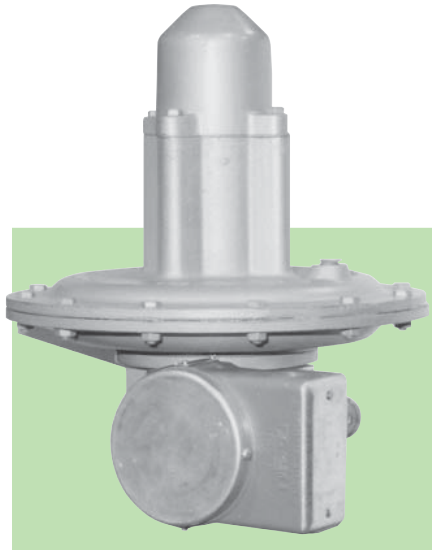




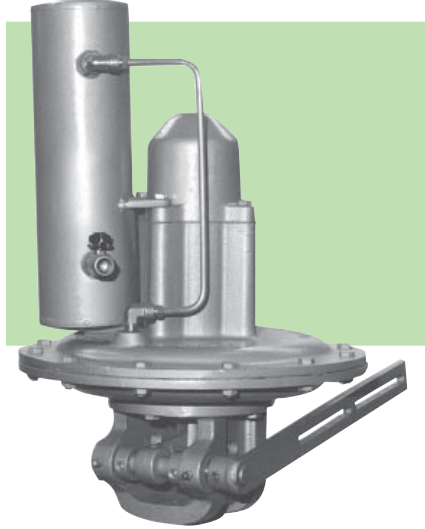
*1600 Air Motor
with butterfly valve*



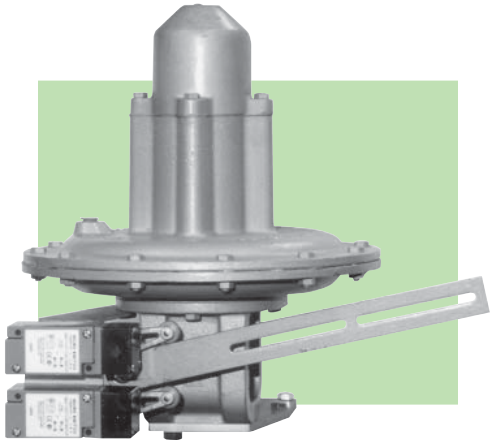
*1600 Air Motor
with top mount positioner*



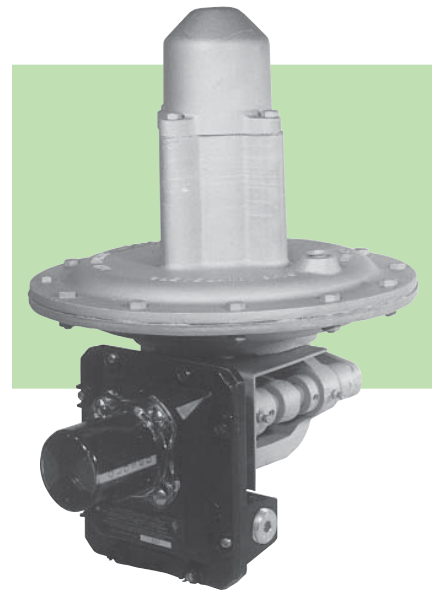
*1600-A Air Motor
with auxiliary switch*



*1600-B and 1600-BP
Air Motor with speed control*



*1600-HL Air Motor
with high and low
NEMA 4 limit switches*



*1600-M Air Motor
with dual monitor display*

- **For actuating all types of control valves.**
- **12 psi standard span.**
- **1" stroke on diaphragm stem.**
- **Easy field adjustment.**
- **Factory adjusted for 3 psi start, 15 psi full travel.**
- **Integral top-mounted positioner available to provide seven times as much torque for better response.**



Figure 1. 1600 Diaphragm Air Motor with Wafer Type Butterfly Valve.

The 1600 Air Motor is used to drive butterfly, adjustable port, or other type of control valve, using pneumatic signals from a temperature controller or other source.

The motor produces 200 pound-inches of torque for each 1 psi control air pressure, or a total of 3000 pound-inches for a standard 1600 Air Motor with a 15 psi control signal. 2800 of the total 3000 pound-inches produced is utilized in compressing the internal spring, leaving 200 pound-inches useful torque at motor arm. **Useful** torque is measured at the motor arm while **available** torque is measured at the control valve. Available torque is the maximum torque left to move the control valve after all losses have been considered.

The following figures are based on 26° movement of the air motor arm and 90° movement of the control valve.

Maximum AVAILABLE TORQUE*

- 35 pound-inches for standard 1600 Air Motor**
- 245 pound-inches for motor with optional top mounted positioner**

CONSTRUCTION

1600 Air Motors are compact and lightweight, with cast aluminum housings. Diaphragms are synthetic rubber impregnated duck.

All bearing surfaces are large to assure long life. Total slack in a properly assembled linkage between motor and valve is 0.015", which converts to a valve motion angular slack of only 0.296°. Motor and valve assemblies can be mounted in any position without affecting operation.

The 1600 Air Motor is factory set to go from fully closed to fully open with an air pressure signal of 3-15 psi. When the standard positioner is used, the "zero" point, or minimum actuating control pressure, while factory set at 3 psi, can be field adjusted between 0 and 9 psi. Factory assembled motor and valve combinations have linkage set for full travel and will open on control air pressure increase. Reverse action is available if specified.

*Use available torque figures when determining if a positioner is required.

OPTIONS

1600-P - Integral Top-mounted Positioner

When increased torque is necessary to operate large valves or valves controlling dirty or high pressure fluids, maximum accuracy of valve response to minute variations of impulse air pressure can be obtained by using a top-mounted positioner with the 1600 Air Motor. (See Bulletin 1600-P).

1600-B Optional Speed Control for Air Motor

Because of system design or slow span-step and response-time rating of the instrument, some control instruments require slow responding air motors to dampen oscillations associated with poor system performance.

1600-B and 1600-BP (with positioner) Air Motors have a special volume chamber with needle valve that can be adjusted for full travel speeds of 31 to 81 seconds. Consult North American for details. (See Bulletin 1600-BP).

1600-A Air Motor with SPDT limit switches in a general purpose enclosure. (See Bulletin 1600-A)

1600-HL Air Motor with NEMA 4 high and low limit switches. (See Bulletin 1600-HL).

1600-M Air Motor with dual display monitor and position transmitter. (See Bulletin 1600-M).

1600 Air Motor Greasing Instructions

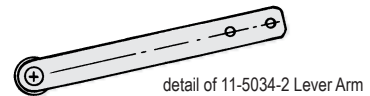
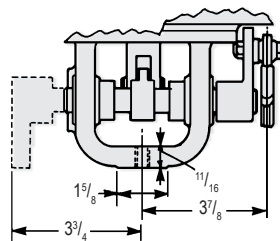
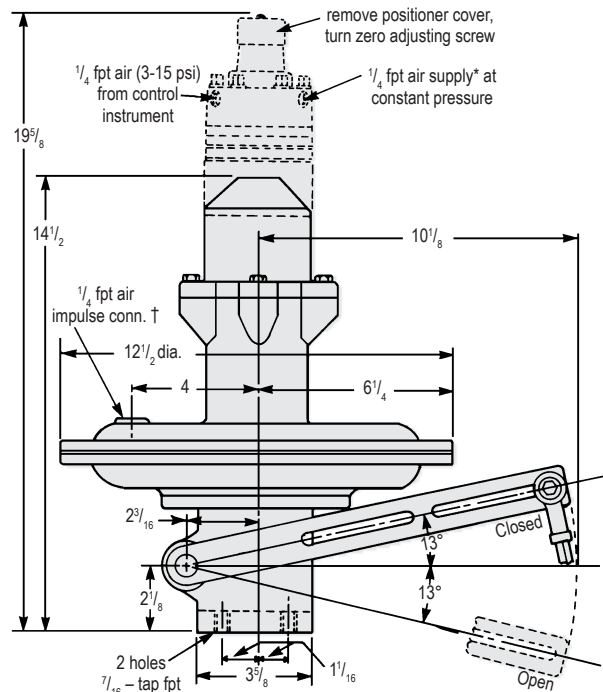
Any soda base grease of a No. 2 or medium hard consistency can be used. The ambient temperature range for a grease of this type is -40 F to 250 F. The motor should be re-greased at least once each month. Grease should be forced in until new grease appears outside the bearing ends. Even if the air motor is not used, grease should not be allowed to stay in the unit more than 48 months.

Air Motor Lever Arms

Air Motor design.	Arm part no.	Valves	shaft ϕ to end	slot width	Effective Arm length	
					min.	max.
1600-5	2-2207-5	1126, 1001/2/9/12 1004/14 B thru G	$12\frac{5}{16}$	$\frac{9}{32}$	$3\frac{7}{8}$ 11	$\frac{13}{16}$
1600-6	2-2207-6	1136, 1146, 1156	$12\frac{5}{16}$	$\frac{13}{32}$	$6\frac{5}{16}$ 11	$\frac{13}{16}$
1600-2 1	1-4823-2	4/5/6/131 Burners (except "G" model)	$7\frac{1}{2}$	$\frac{9}{32}$, $\frac{13}{32}$ (holes)	$5\frac{1}{2}$	$6\frac{7}{16}$
1600-1	"G"	model burners--(two arms)				
	11-5034-2 (outer)	air shutters and oil valve	$9\frac{13}{16}$	$\frac{13}{32}$ (holes)	$7\frac{3}{16}$	$9\frac{3}{16}$
(inner)	11-5033-1	gas valve	$4\frac{3}{8}$	$\frac{13}{32}$ (hole)	$3\frac{3}{4}$	$3\frac{3}{4}$

Order must specify: complete Air Motor designation
 Examples: 1600-5 Air Motor with 2-2207-5 Lever Arm
 1600-1 Air Motor with 11-5034-2 and
 1-5033-1 Lever Arms

	wt, lb	maximum ambient
1600 Air Motor only	28	220 F
1600 Air Motor with positioner	$30\frac{1}{2}$ 180	F
1600 Air Motor with auxiliary switch	31	220 F



* Maximum allowable air pressure to motor housing = 50 psi.
 † Impulse connection plugged when air motor is supplied with positioner.

DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

WARNING: Situations dangerous to personnel and property may exist with the operation and maintenance of an combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American urges compliance with National Safety Standards and insurance Underwriters recommendations, and care in operation.

