

Full line of vane type and radial piston type air motors for a wide variety

TAV1: Compact, lightweight, high speed air motor.

TAM4: Compact, economical air motor with grease mounted system.

TAM2: High-reliability general oil-bath-type air motor.

TAM1: Low-speed, high-torque air motor with the longest history of use.

CAT. **A11**-195e



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VANE TYPE AIR MOTOR

TAV1

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RADIAL PISTON TYPE AIR MOTOR

TAM4

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TAM2

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TAM1

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FEATURES

COMPLETE EXPLOSION-PROOF WITH NO SPARK

As motor works with compressed air, there is no danger even if it is used at place where ignitable, explosive gas is generated, and the explosion-protected system can be simply adopted with all-air control.

ROTATION CONFORMS TO LOAD TORQUE, NO INFLAMMABLE DAMAGE CAUSED BY OVERLOAD

Overload causes no inflammable damage, and deceleration or stop is available even in the case of sharp increase of load. With the decrease of load, it is automatically returned.
Even if it stops for long time due to overload, there is no problem, and it can be used for clamp, for which the retention of torque is necessary for stop.

WIDE-RANGE ADJUSTMENT AVAILABLE FOR ROTATION

The rotation is widely adjusted by the flow adjustment with throttle valve. The variability of high, low speed with only one motor is also conducted very simply.

INSTANT START, STOP, CLOCKWISE ROTATION AVAILABLE WITH NO SHOCK

Flywheel effect (GD^2) of air motor is small, and the smooth start, stop, clockwise rotation are simply performed only with directional control valve by the cushioning effect of air pressure. There is no problem even if the frequency of start, stop, clockwise rotation is sharp.

ENDURABLE TO HIGH TEMPERATURE WITH SELF-COOLING

The motor can be used up to 70°C of ambient temperature with the self-cooling effect resulting from the adiabatic expansion of air pressure.

USABLE IN BAD ENVIRONMENT OF MOISTURE, DUST

Internal pressure of air motor prevents the entry of moisture and dust in motor.

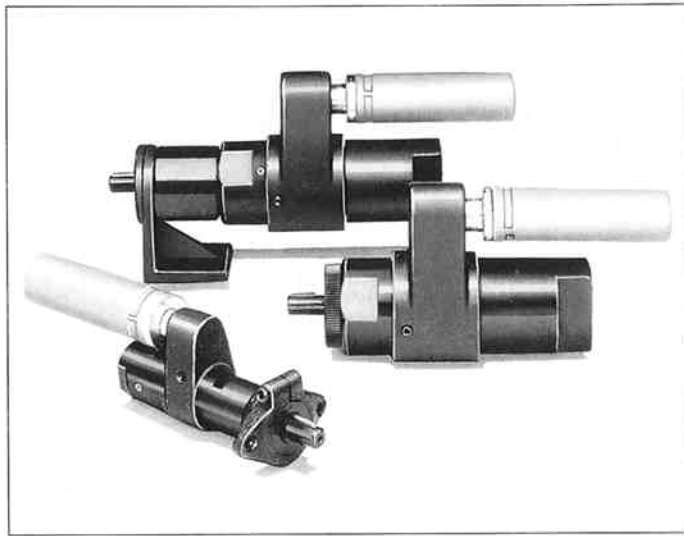
APPLICABLE FOR EMERGENCY DRIVING

The motor can be utilized for emergency driving in power suspension if it is charged at pneumatic tank.

EASY REMOTE, AUTOMATIC CONTROL AVAILABLE

Control instruments of pneumatic cylinder can be used, and the application for automatic devices and control with all-air circuit are also easy.

TAV1 VANE TYPE AIR MOTOR



LIGHT, COMPACT, HIGH-SPEED ROTARY TYPE AIR MOTOR

- The output ratio against body weight is high, the number of movable parts in inner structure is set at the minimum, and all rotors are retained by ball bearing at front and rear.
- Planetary gear decelerator is used.
- Connection port is mounted at rear or side of motor housing.
- Counter-clockwise, clockwise rotation type air motor.

SPECIFICATIONS

Item Model code		Deceleration ratio	Rotating direction	at Maximum output(0.5MPa)				Stop torque N·m	Start torque N·m	Allowable axial load		Weight	
				Power W	Torque N·m	Rotation R·P·M	Air consumption ℓ/min (ANR)			Radial load N	Thrust load N	F type kg	L type kg
TAV 1※ - 10	TAVIS-10※	—	Counter-clockwise rotation	66.2	0.053	12000	190	0.115	0.069	49.0	49.0	0.41	0.54
	TAVIS-10※G005	1/5	Counter-clockwise rotation	66.2	0.265	2400	190	0.475	0.284	88.3	88.3	0.41	0.54
	TAVIR-10※	—	Counter-clockwise, clockwise rotation	73.5	0.050	14000	210	0.108	0.065	39.2	39.2	0.41	0.54
	TAVIR-10※G005	1/5	Counter-clockwise, clockwise rotation	73.5	0.250	2800	210	0.461	0.277	78.5	78.5	0.41	0.54
TAV 1※ - 20	TAVIS-20※	—	Counter-clockwise rotation	147	0.127	11000	340	0.222	0.134	157	108	0.76	0.88
	TAVIS-20※G005	1/4.83	Counter-clockwise rotation	147	0.624	2250	340	1.07	0.642	235	177	0.76	0.88
	TAVIS-20※G023	1/23.3	Counter-clockwise rotation	147	2.96	475	340	5.16	3.10	412	216	0.90	1.02
	TAVIR-20※	—	Counter-clockwise, clockwise rotation	132	0.115	11000	350	0.177	0.108	157	108	0.76	0.88
	TAVIR-20※G005	1/4.83	Counter-clockwise, clockwise rotation	132	0.562	2250	350	0.852	0.512	235	177	0.76	0.88
	TAVIR-20※R023	1/23.3	Counter-clockwise, clockwise rotation	132	2.66	475	350	4.11	2.47	412	216	0.90	1.02
TAV 1※ - 45	TAVIS-45※	—	Counter-clockwise rotation	331	0.316	10000	710	0.610	0.366	157	147	1.18	1.30
	TAVIS-45※G003	1/5.4	Counter-clockwise rotation	331	1.08	2940	710	2.08	1.24	245	235	1.18	1.30
	TAVIS-45※G005	1/5.96	Counter-clockwise rotation	331	1.76	1800	710	3.38	2.03	284	275	1.18	1.30
	TAVIS-45※G019	1/18.9	Counter-clockwise rotation	331	5.96	530	710	11.5	6.88	451	422	1.42	1.54
	TAVIS-45※G031	1/30.9	Counter-clockwise rotation	331	9.73	325	710	18.8	11.3	520	500	1.42	1.54
	TAVIR-45※	—	Counter-clockwise, clockwise rotation	279	0.314	8500	560	0.536	0.322	167	157	1.18	1.30
	TAVIR-45※G003	1/5.4	Counter-clockwise, clockwise rotation	279	1.07	2500	560	1.82	1.09	255	235	1.18	1.30
	TAVIR-45※G005	1/5.96	Counter-clockwise, clockwise rotation	279	1.75	1530	560	2.98	1.78	294	284	1.18	1.30
	TAVIR-45※G019	1/18.9	Counter-clockwise, clockwise rotation	279	5.93	450	560	10.1	6.08	461	431	1.42	1.54
	TAVIR-45※G031	1/30.9	Counter-clockwise, clockwise rotation	279	9.71	275	560	16.6	9.90	539	510	1.42	1.54
TAV 1※ - 65	TAVIS-65※	1/1	Counter-clockwise rotation	500	0.51	9300	1050	1.04	0.83	343	382	1.37	1.53
	TAVIS-65※G004	1/2	Counter-clockwise rotation	500	2.04	2325	1050	4.16	3.32	539	598	1.37	1.53
	TAVIS-65※G007	1/4.3	Counter-clockwise rotation	500	3.78	1250	1050	7.73	6.16	666	735	1.37	1.53
	TAVIS-65※G016	1/16	Counter-clockwise rotation	500	8.16	580	1050	16.64	13.28	843	941	2.41	2.57
	TAVIS-65※G030	1/20.7	Counter-clockwise rotation	500	15.15	310	1050	30.89	24.65	1049	1166	2.41	2.57
	TAVIR-65※	1/1	Counter-clockwise, clockwise rotation	360	0.54	6300	940	1.06	0.85	382	421	1.37	1.53
	TAVIR-65※G004	1/2	Counter-clockwise, clockwise rotation	360	2.16	1575	940	4.24	3.4	588	666	1.37	1.53
	TAVIR-65※G007	1/4.3	Counter-clockwise, clockwise rotation	360	4.0	840	940	7.88	6.31	745	823	1.37	1.53
	TAVIR-65※G016	1/16	Counter-clockwise, clockwise rotation	360	8.64	390	940	16.96	13.6	941	1058	2.41	2.57
	TAVIR-65※G030	1/20.7	Counter-clockwise, clockwise rotation	360	16.03	210	940	31.48	25.24	1176	1303	2.41	2.57

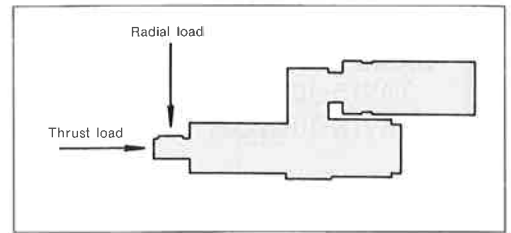
Note) Air motor performance values shown apply when the pressure on the exhaust side is atmospheric pressure.

- Stop torque : When load increases during rotation of an air motor, rotation of the motor decreases linearly, and the air motor stops when the rotation is balanced with the load torque. This torque is called the stop torque.

VANE TYPE AIR MOTOR TAV1

COMMON ITEMS

- Working fluid : Air
- Operating pressure : 0.3~0.7MPa
- Ambient temperature : -10~+70°C (Use in unfrozen condition)
- Lubricating oil : Inside mounting grease ... Daphne Eponex No. 1 (Idemitsu Kosan Co., Ltd.)
Airline lubrication ... JIS K2213-1 (Natural oil ISO VG32) or equivalent
- Continuous use : An air motor needs lubrication
In case of the continuous use without stop time, use with less than 70% of rotation at the maximum output.



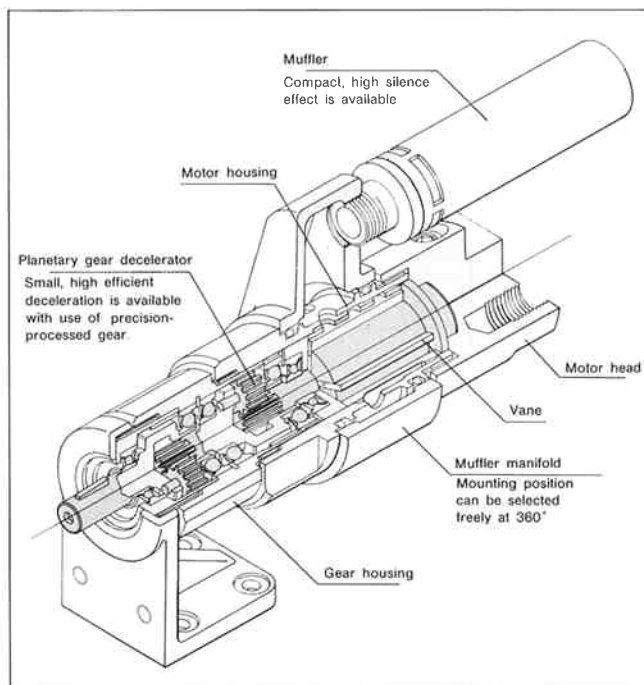
CODE

For order, specify the following code.

TAV1 S - 65 F G004

Series	Type	Deceleration ratio
Rotating direction S : Counter-clockwise rotation R : Counter-clockwise, clockwise rotation	Mounting type F : Flange type L : Foot type	

SECTIONAL DRAWING



HANDLING INSTRUCTIONS

PRECAUTIONS FOR USE

MOUNTING

TAV1※-10 Series

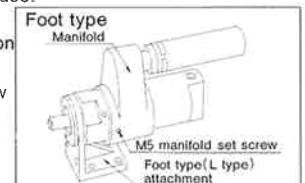
- Bolt with hexagonal hole shall be fastened with torque of 1~1.6N·m for use.

TAV1※-20 Series

- Screw for mounting accessories is left-handed screw. Special cautions shall be taken for mounting and removing.
- Mounting accessories shall be fastened with torque of 20~24N·m for use.

TAV1※-45 Series

- Screw for mounting accessories is right-handed screw. It shall be fastened with torque of 30~38 N·m for use.
- For mounting Foot type (L type) attachment, the type with deceleration ratio of 1/1, 1/3, 1/5 interferes with manifold. After loosening a set screw of M5 manifold, it shall be mounted while manifold is rotated.



TAV1※-65 Series

- Screw for mounting accessories is right-handed screw. It shall be fastened with torque of 30~38 N·m for use.

LUBRICATION

- With air lubricator set at air pressure supply side, the spray lubrication shall be conducted.
- JIS K2213-1 (Natural oil ISO VG32) or equivalent shall be used as lubricating oil for lubrication.
- For lubrication, about two drops of oil per minute are appropriate.

PIPING

- Pneumatic equipment (air filter, air regulator, air lubricator, directional control valve, etc.) shall be mounted near air motor as much as possible.
- Trouble of pneumatic equipment is mostly caused by dust, foreign matters, etc. Before piping, the inside of pipe shall be cleaned with compressed air 0.2MPa in order that sludge, tape seal scrap, dust, rust, etc. will be absolutely prevented from entering pipe.
- For piping bore and pneumatic equipment (air filter, air regulator, air lubricator, directional control valve, etc.), a bore suitable for air consumption of air motor shall be used.
Necessary output may not be available inasmuch as pressure loss becomes large if thin pipe and pneumatic equipment with smaller bore than that of air motor are used. Piping with larger bore than the port bore of air motor is appropriate.
- In case of use at high speed, precaution shall be taken for the circuit configuration so that back pressure will not rise.

PRECAUTIONS FOR RUN

- In test run, increase the rotation gradually up to the required level by adjusting the orifice. If the rotation should exceed max. output rotation, break of the air motor will be caused. Be sure to check the rotation on the tachometer.
- The vane type air motor is of high speed type. But, its use at rotation largely exceed the max. output rotation will extremely shorten the air motor service life. Further, its use at low rotation worsens the motor efficiency. The recommended rotation range is (0.3~1) x Max. output rotation.

⚠ PRECAUTION

Insufficient lubrication will cause troubles such as shortening of life and seizure of break of the vane and motor housing. Set an air lubricator near the air motor as much as possible.

TAV1 VANE TYPE AIR MOTOR

DIMENSIONAL DRAWINGS/TAV1✕-10

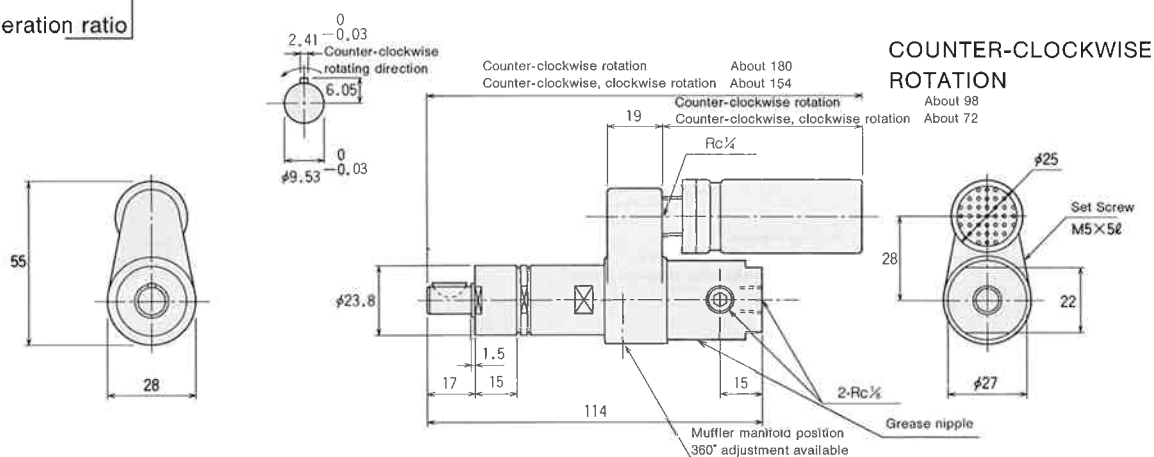
Unit : mm

BASIC TYPE

TAV1S-10※

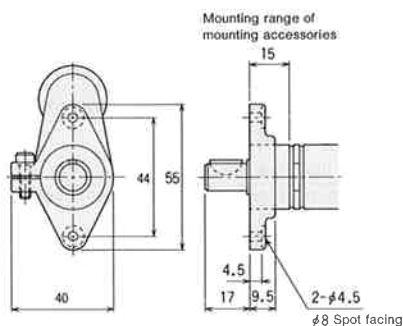
TAV1S-10※G005

Deceleration ratio



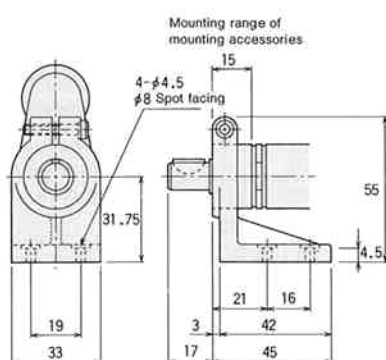
FLANGE TYPE

TAV1※-10F

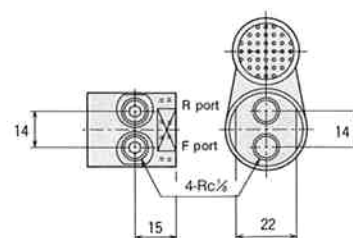


FOOT TYPE

TAV1※-10L



COUNTER-CLOCKWISE,
CLOCKWISE ROTATION
TAV1R-10※



● FOR SUPPLY

F port...Counter-clockwise rotation

R port... Clockwise rotation

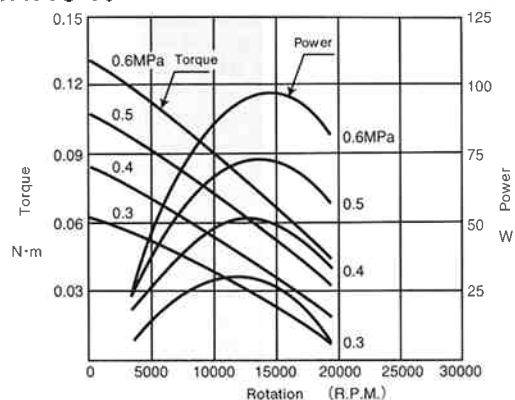
Note) Mounting accessories shall be mounted in the mounting range of mounting accessories shown in the drawings and then used.

● Bolt with hexagonal hole shall be fastened with torque of 1~1.6 N·m for use.

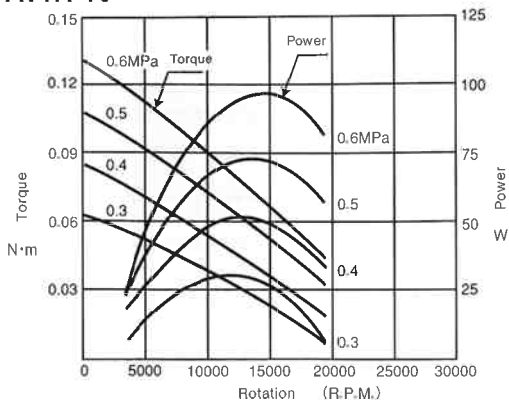
PERFORMANCE CURVE (DECELERATION RATIO 1 : 1)

Range of Recommended rotation

TAV1S-10



TAV1R-10



VANE TYPE AIR MOTOR TAV1

DIMENSIONAL DRAWINGS/TAV1※-20

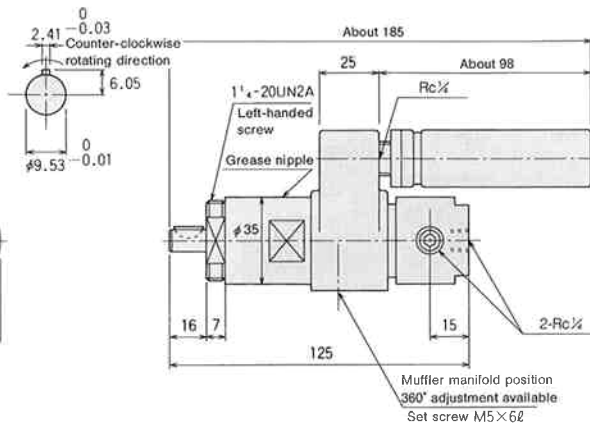
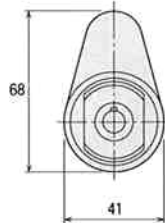
Unit : mm

BASIC TYPE

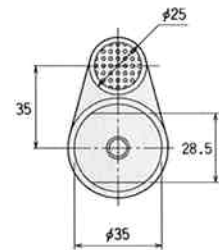
TAV1S-20※

TAV1S-20※G005

Deceleration ratio

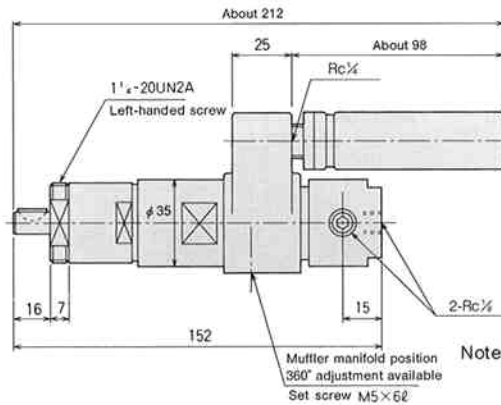
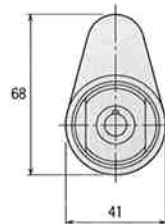


COUNTER-CLOCKWISE ROTATION

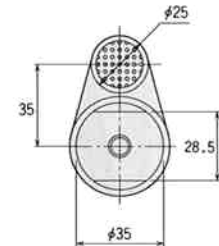


TAV1S-20※G023

Deceleration ratio



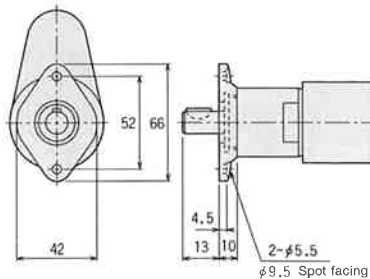
COUNTER-CLOCKWISE ROTATION



Note) When mounting accessories are mounted, the port position may differ from the position in drawings in some case.

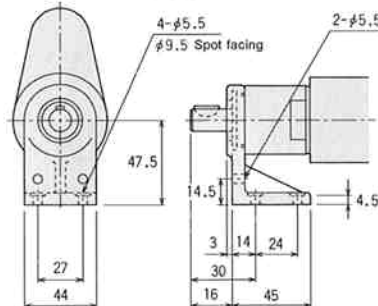
FLANGE TYPE

TAV1※-20F



FOOT TYPE

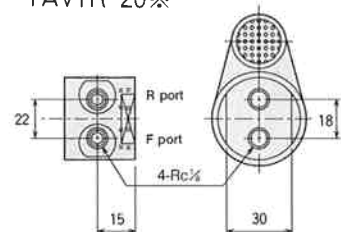
TAV1※-20L



Note) Mounting accessories shall be fastened with torque of 20~24N·m and then used.
Screw for mounting accessories of TAV1※-20 is left-handed screw.
For mounting and removing, precautions shall be taken.

COUNTER-CLOCKWISE, CLOCKWISE ROTATION

TAV1R-20※



●FOR SUPPLY

F port...Counter-clockwise rotation

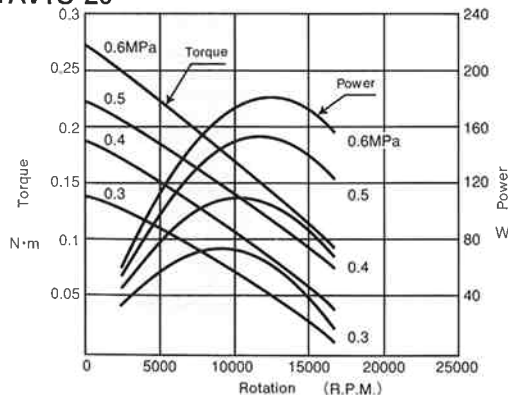
R port...Clockwise rotation

Note) When mounting accessories are mounted, the port position may differ from the position in drawings in some case.

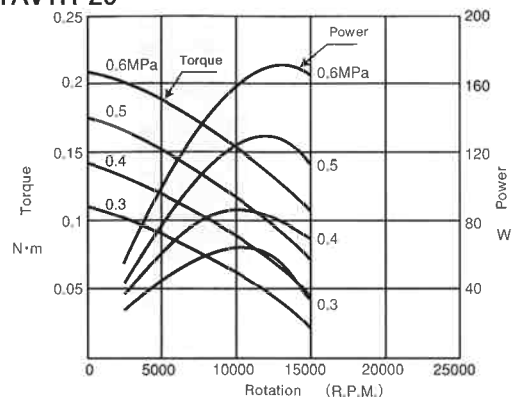
PERFORMANCE CURVE (DECELERATION RATIO 1 : 1)

Range of Recommended rotation

TAV1S-20



TAV1R-20



TAV1 VANE TYPE AIR MOTOR

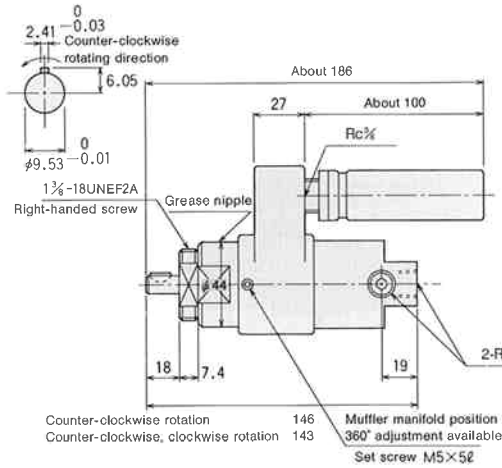
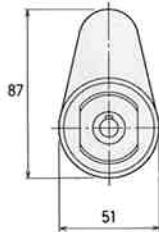
DIMENSIONAL DRAWINGS/TAV1※-45

Unit : mm

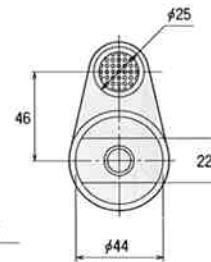
BASIC TYPE

TAV1S-45※
TAV1S-45※G003
TAV1S-45※G005

Deceleration ratio

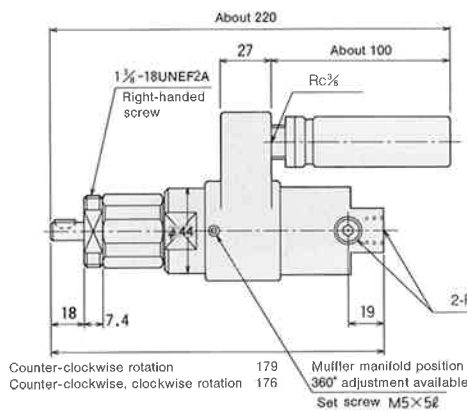
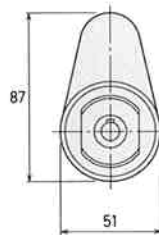


COUNTER-CLOCKWISE
ROTATION

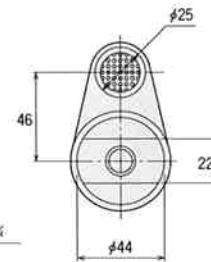


TAV1S-45※G019
TAV1S-45※G031

Deceleration ratio

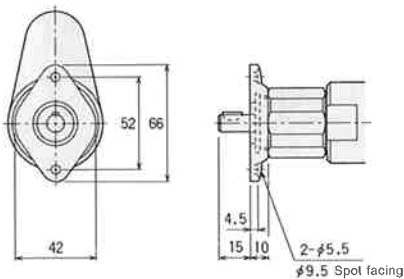


COUNTER-CLOCKWISE
ROTATION

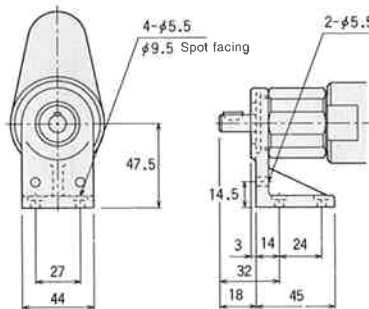


Note) When mounting accessories are mounted, the port position may differ from the position in drawings in some case.

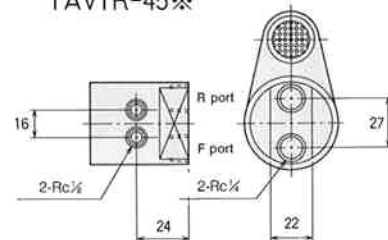
FLANGE TYPE TAV1※-45F



FOOT TYPE TAV1※-45L



COUNTER-CLOCKWISE, CLOCKWISE ROTATION TAV1R-45※



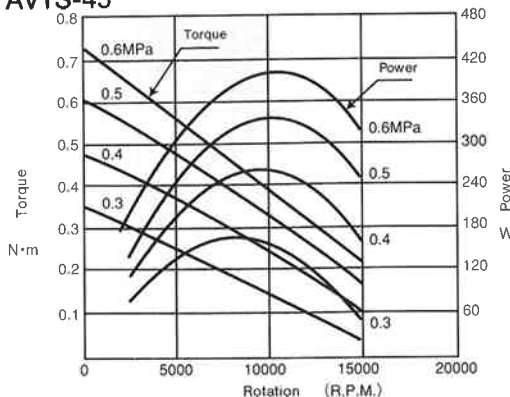
● FOR SUPPLY
F port...Counter-clockwise rotation
R port...Clockwise rotation
Note) When mounting accessories are mounted, the port position may differ from the position in drawings in some case.

Note) Mounting accessories shall be fastened with torque of 30~38N·m and then used.

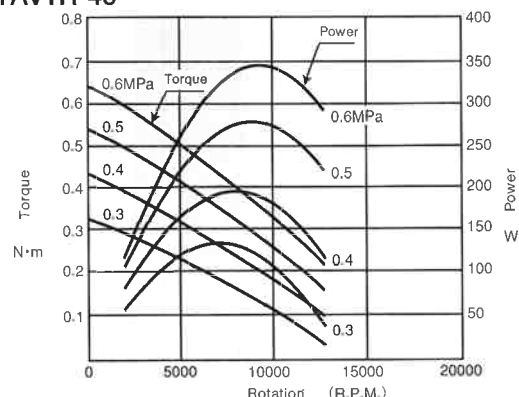
PERFORMANCE CURVE (DECELERATION RATIO 1 : 1)

Range of Recommended rotation

TAV1S-45



TAV1R-45



VANE TYPE AIR MOTOR TAV1

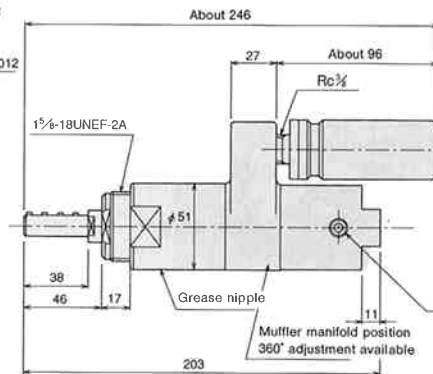
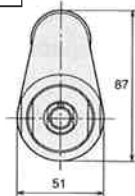
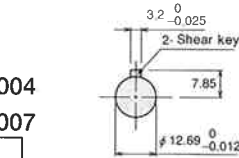
DIMENSIONAL DRAWINGS/TAV1※-65

Unit : mm

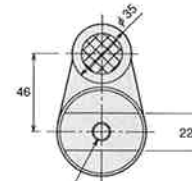
BASIC TYPE

TAV1S-65※
TAV1S-65※G004
TAV1S-65※G007

Deceleration ratio

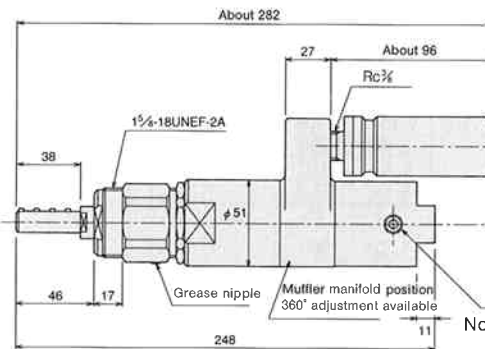
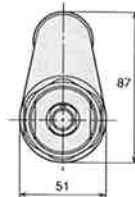


COUNTER-CLOCKWISE
ROTATION

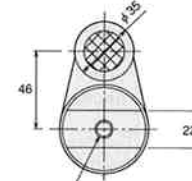


TAV1S-65※G016
TAV1S-65※G030

Deceleration ratio



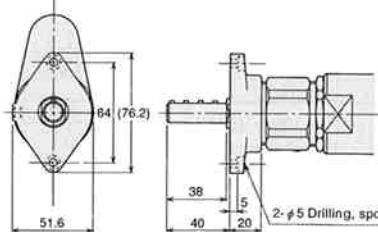
COUNTER-CLOCKWISE
ROTATION



Note) When mounting accessories are mounted, the port position may differ from the position in drawings in some case.

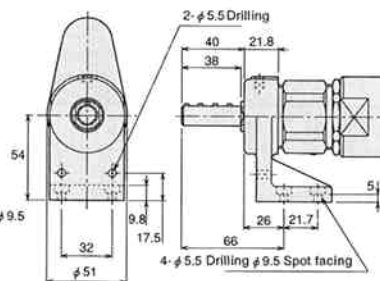
FLANGE TYPE

TAV1※-65F



FOOT TYPE

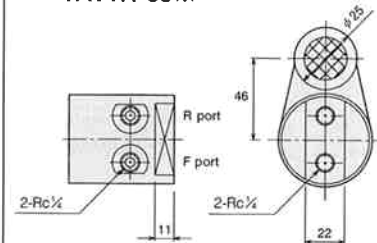
TAV1※-65L



Note) Mounting accessories shall be fastened with torque of 30~38N·m and then used.

COUNTER-CLOCKWISE, CLOCKWISE ROTATION

TAV1R-65※



● FOR SUPPLY

F port...Counter-clockwise rotation

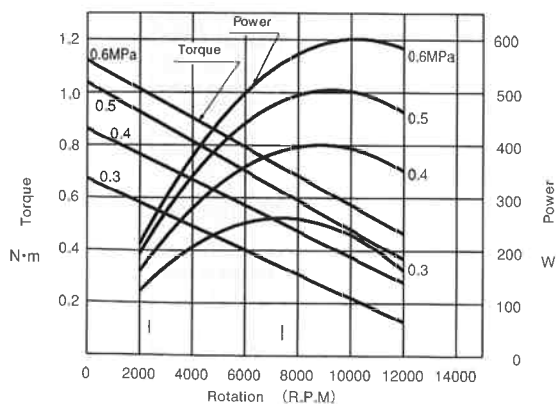
R port...Clockwise rotation

Note) When mounting accessories are mounted, the port position may differ from the position in drawings in some case.

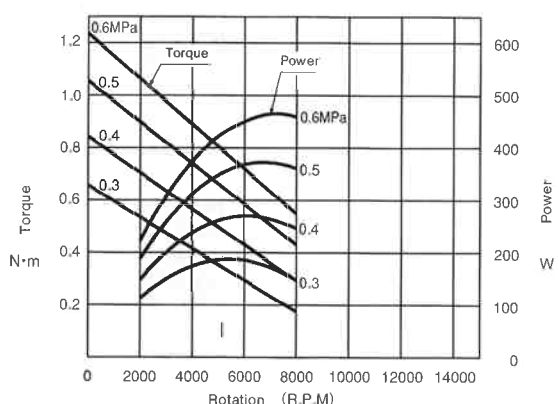
PERFORMANCE CURVE (DECELERATION RATIO 1 : 1)

Range of Recommended rotation

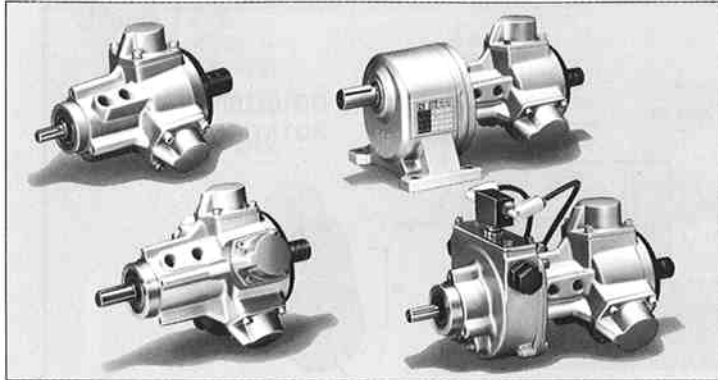
TAV1S-65



TAV1R-65



TAM4 RADIAL PISTON TYPE AIR MOTOR



• Fundamental • With brake • With decelerator

Air motor with free mounting direction because of grease-mounted system

- Small, lightweight.
- Mounting direction is free with grease-mounted system.
(The oil lubrication with air lubricator is necessary.)
- With balancer structure contained, smooth working with little vibration is available.

SPECIFICATIONS

Model code \ Item		Type	Deceleration ratio	at Maximum output(0.5MPa)				Stop torque	Start torque	Brake torque	Allowable axial load KN		Weight kg			
				power	Torque	Rotation	Air consumption				Radial load	Thrust load	Basic type	Flange type	Foot type	
				W	N·m	R.P.M.	ℓ/min (ANR)	N·m	N·m	N·m						
TAM 4 - 010	※	Fundamental	1/1	73.5	0.637	1100	200	1.18	0.686	—	0.098	0.059	1.45	1.5	2.1	
	※G005	With decelerator	1/5	66.2	2.84	220		4.90	2.94		0.245	0.147	—	4.0	3.5	
	※G010		1/10		5.69	110		9.81	5.88		0.539	0.245				
	※G015		1/15		8.53	73.3		15.7	8.83		0.785	0.343				
	※G020		1/20		11.5	55		20.6	11.8		1.08	0.441				
TAM 4 - 015	※	Fundamental	1/1	125	1.37	900	260	2.94	1.96	—	0.137	0.098	2.5	2.6	3.4	
	※B	With brake	1/1	110	5.88	180		12.7	8.83		14.7	0.392	0.245	—	6.7 (8.0)	6.2 (8.5)
	※※G005	1/5	26.5					17.7	29.4		0.785	0.343				
	※※G010	1/10	39.2					26.5	44.1		1.08	0.539				
	※※G015	1/15	53.0					35.3	58.8		1.37	0.686				
	※※G020	1/20	78.5					53.0	88.3		2.16	1.13				
	※※G030	1/30	106					70.6	118		2.26	1.23				
	※※G040	1/40	132					79.4	147		2.35	1.32				
	※※G050	1/50	157					106	177		2.45	1.37				
	※※G060	1/60	206					139	235		2.55	1.47				
	※※G080	1/80	250					175	283		4.61	2.26				
	※※G100	1/100	300					206	339		4.71	2.55				
	※※G120	1/120	373					261	453		5.00	2.84				
	※※G160	1/160	500					350	567		5.10	3.14				
	※※G200	1/200														
TAM 4 - 030	※	Fundamental	1/1	228	2.94	750	400	5.88	4.71	—	0.196	0.137	4.6	4.8	6.4	
	※B	With brake	1/1	199	12.7	150		26.5	20.6		29.4	0.490	0.294	—	10.5 (13.5)	10.0 (13.0)
	※※G005	1/5	53.0					41.2	58.8		0.981	0.441				
	※※G010	1/10	79.4					61.8	88.3		1.37	0.637				
	※※G015	1/15	106					82.4	118		1.77	0.834				
	※※G020	1/20	159					124	177		3.97	1.42				
	※※G030	1/30	212					165	235		4.17	1.57				
	※※G040	1/40	265					206	294		4.32	1.67				
	※※G050	1/50	318					247	353		4.41	1.81				
	※※G060	1/60	402					314	471		4.51	1.96				
	※※G080	1/80	490					392	549		6.47	2.55				
	※※G100	1/100	598					471	657		6.62	2.75				
	※※G120	1/120	785					628	873		6.91	2.94				
	※※G160	1/160	981					785	1100		7.06	3.14				
	※※G200	1/200														

Note) • Make inquiries about larger deceleration ratio than 1/20 in TAM4-010 series.
• The above specifications indicate performance at ambient temperature of 20°C. The rotation will lower if the ambient temperature lowers due to the viscosity change of grease.
• Air motor performance values shown apply when the pressure on the exhaust side is atmospheric pressure.

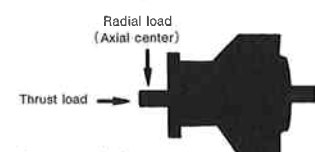
Figure in parenthesis is the weight with brake/decelerator.

COMMON ITEMS

- Working fluid : Air
- Operating pressure : 0.2~0.6MPa
- Lubrication : JIS K2213-1 (Natural turbine oil ISO VG32) or equivalent.
- Ambient temp. : -10~+70°C (Use in unfrozen condition)
- Paint color : Metallic silver green
- Lubricating : Inside mounting grease --- Air motor body---Daphne Eponex No.1 grease for high load.
- Continuous use : In case of the continuous use without stop time, use with less than 80% of rotation at the maximum output.
- Range of recommended rotation=(0.2~1)×Rotation at maximum output.

ALLOWABLE AXIAL LOAD

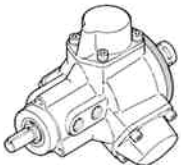
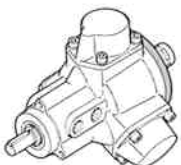
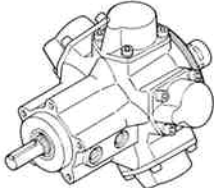
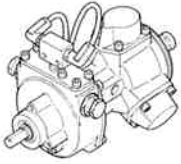
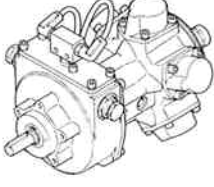
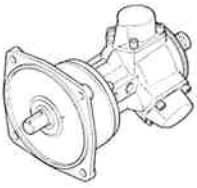
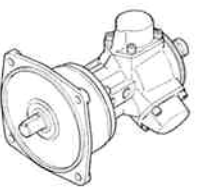
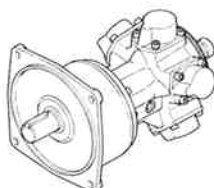
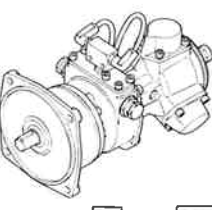
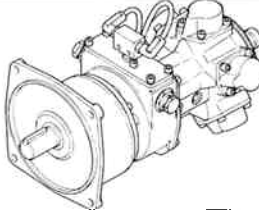
Allowable axial load in the above specifications indicates the allowable value of load in the drawing given below.



RADIAL PISTON TYPE AIR MOTOR **TAM4**

TYPE OUTLINE • CODE

For order, specify the following code.

Series Type	TAM4—010	TAM4—015	TAM4—030
Fundamental	 TAM4-010 S 	 TAM4-015 S 	 TAM4-030 S 
With brake	 TAM4-015 S B  With brake	 TAM4-030 S B  With brake	
With decelerator	 TAM4-010 F G 020  With decelerator	 TAM4-015 F G 020  With decelerator	 TAM4-030 F G 020  With decelerator
With brake/ decelerator	 TAM4-015 F BG 020  With brake/ decelerator	 TAM4-030 F BG 020  With brake/ decelerator	

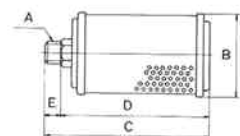
SYMBOL EXPLANATION

①	Mounting type			
	S	Basic type		
	F	Flange type		
	L	Foot type		
②	Deceleration ratio			
	005	$\frac{1}{5}$	060	$\frac{1}{60}$
	010	$\frac{1}{10}$	080	$\frac{1}{80}$
	015	$\frac{1}{15}$	100	$\frac{1}{100}$
	020	$\frac{1}{20}$	120	$\frac{1}{120}$
	030	$\frac{1}{30}$	160	$\frac{1}{160}$
	040	$\frac{1}{40}$	200	$\frac{1}{200}$
	050	$\frac{1}{50}$		

Note) ● Make inquiries about larger deceleration ratio than 1/20 in TAM4-010 series.
 ● Models for fundamental - with brake are delivered without assembling the mounting accessories and silencer.
 ● Models with decelerator, brake/ decelerator are mounted with mounting accessories. But, silencer is delivered without assembling.

ACCESSORIES

- Auto-muffler
The muffler weakens exhaust noise and does not harm the air motor performance.



Unit : mm

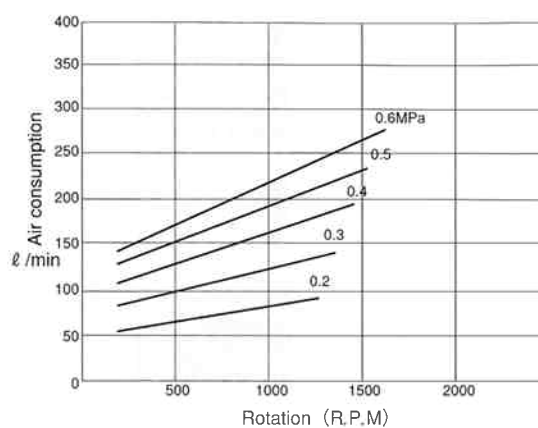
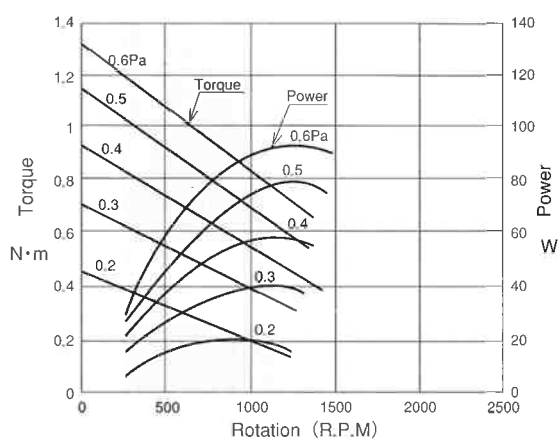
Model code	A	B	C	D	E	Weight(kg)	Exhaust area(mm ²)
M02	R $\frac{1}{4}$	48	102	89	13	0.14	4580
M00	R $\frac{3}{8}$	67	121	108	13	0.23	7870

TAM4 RADIAL PISTON TYPE AIR MOTOR

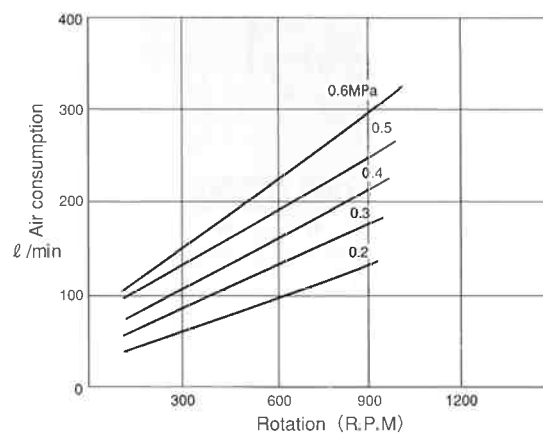
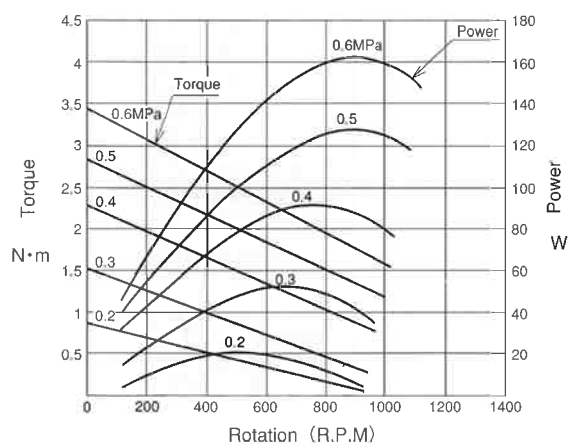
PERFORMANCE CURVE (DECELERATION RATIO 1 : 1)

□ Range of Recommended rotation

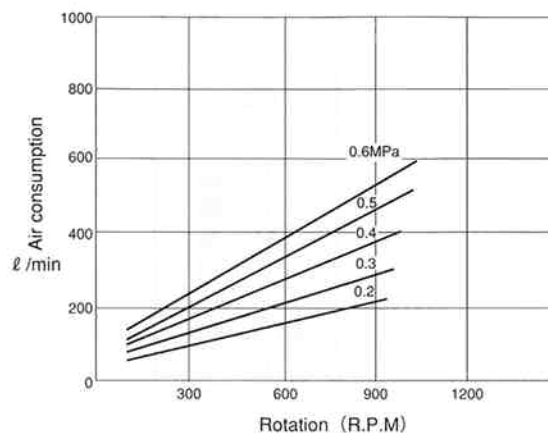
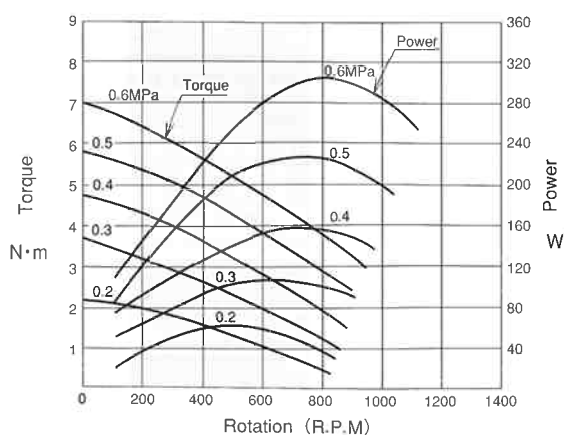
TAM4-010



TAM4-015



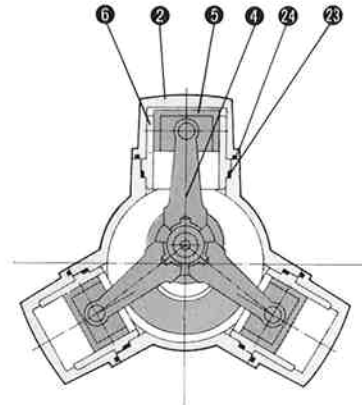
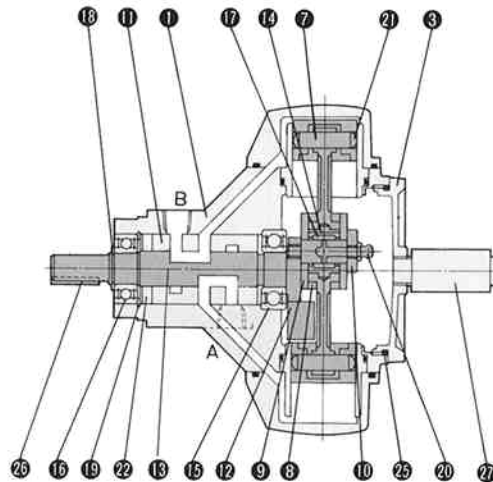
TAM4-030



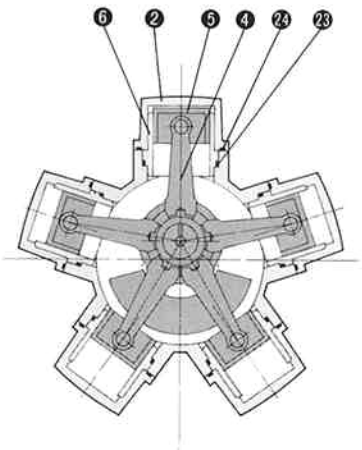
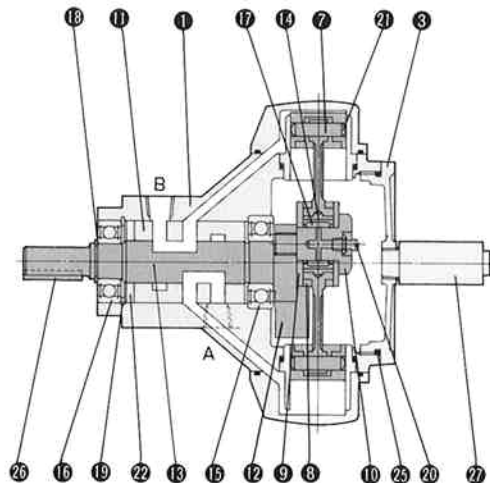
RADIAL PISTON TYPE AIR MOTOR **TAM4**

SECTIONAL DRAWINGS

TAM4-010-015



TAM4-030



The above drawings are the sectional drawings for fundamental.

PARTS LIST

No.	Name	Material	Q'ty
①	Casing	Aluminum alloy casting	1
②	Cylinder cover	Aluminum alloy die casting	3(5)
③	End cover	Synthetic resin	1
④	Connecting rod	Aluminum alloy die casting	3(5)
⑤	Piston	Brass casting	3(5)
⑥	Sleeve	Grey cast iron	3(5)
⑦	Piston pin	Carbon tool steel	3(5)
⑧	Ring	Carbon steel	2
⑨	Thrust washer	Carbon steel	2
⑩	Crank pin	Chromium-molybdenum steel	1
⑪	Valve bush	Grey cast iron	1
⑫	Balance weight	Carbon steel	1
⑬	Shaft	Chrome molybdenum steel	1
⑭	Liner	Synthetic resin	3(5)

No.	Name	Material	Q'ty
⑮	Bearing	—	1
⑯	Bearing	—	1
⑰	Needle bearing	—	1
⑱	Snap ring	—	1
⑲	Snap ring	—	1
⑳	Grease nipple	—	1
㉑	Copper rivet	—	6(10)
㉒	Oil seal	Nitrile rubber	1
㉓	O-ring	Nitrile rubber	3(5)
㉔	O-ring	Nitrile rubber	3(5)
㉕	O-ring	Nitrile rubber	1
㉖	Parallel single key	—	1
㉗	Silencer	—	1

Figure in parenthesis is the quantity of TAM4-030.

TAM4 RADIAL PISTON TYPE AIR MOTOR

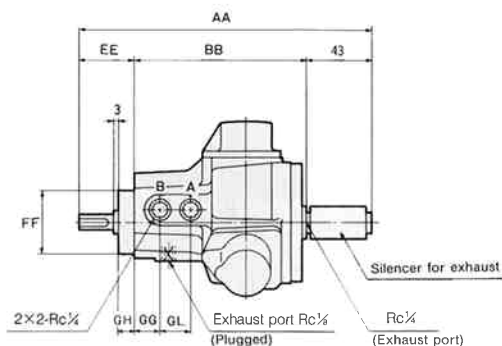
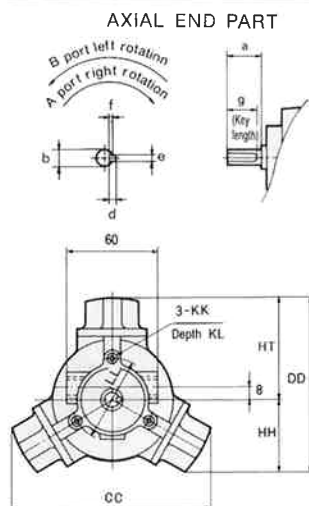
DIMENSIONAL DRAWINGS/FUNDAMENTAL/TAM4-010·015

Unit : mm

BASIC TYPE

TAM4-010S

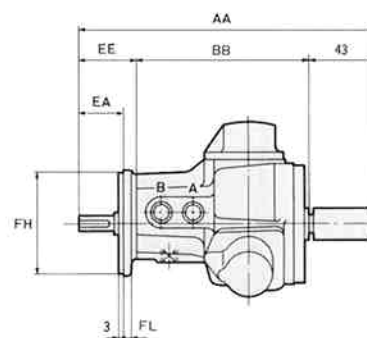
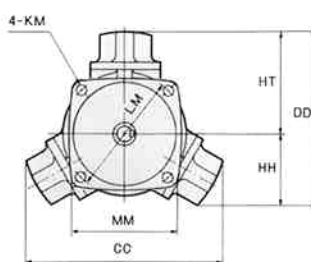
TAM4-015S



FLANGE TYPE

TAM4-010F

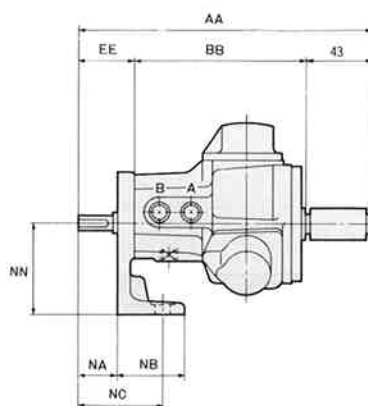
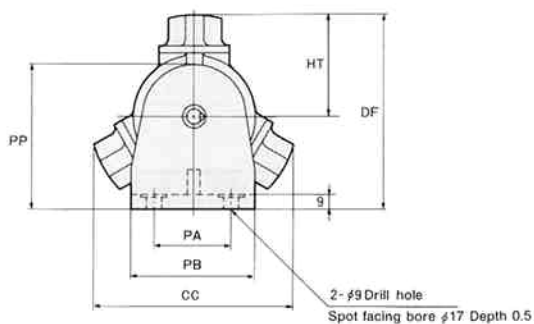
TAM4-015F



FOOT TYPE

TAM4-010L

TAM4-015L



DIMENSIONAL TABLE

Symbol Model code	AA	BB	CC	DD	DF	EA	EE	FF	FH	FL	GG	GH	GL	HH	HT	KK	KL	KM
TAM4-010	192	113	130	115	127	29	36	φ42h7	φ68h7	5	17	10	20	48	67	M5×0.8	8	φ6
TAM4-015	225	137	164	142	152	36	45	φ48h7	φ78h7	7	19	12	28	60	82	M6×1	12	φ7

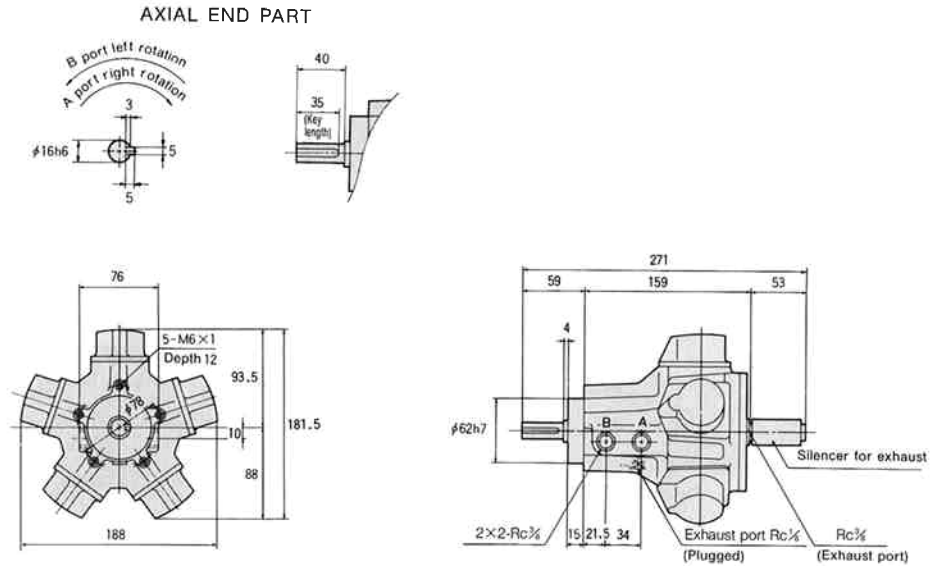
Symbol Model code	LL	LM	MM	NA	NB	NC	NN	PA	PB	PP	Axial end part						
											a	b	d	e	f	g	
TAM4-010	φ55	φ80	□72	26	45	56	60±0.1	50	80	94	23	φ10h6	3	3	1.8	20	
TAM4-015	φ62	φ92	□86	33	50	63	70±0.1	70	100	110	30	φ12h6	4	4	2.5	27	

RADIAL PISTON TYPE AIR MOTOR **TAM4**

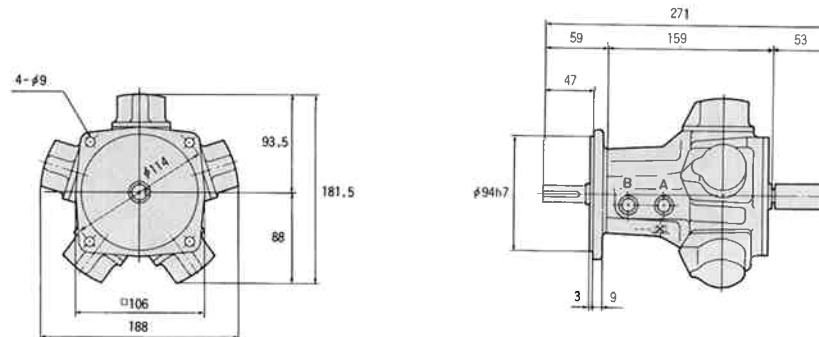
DIMENSIONAL DRAWINGS/FUNDAMENTAL/TAM4-030

Unit : mm

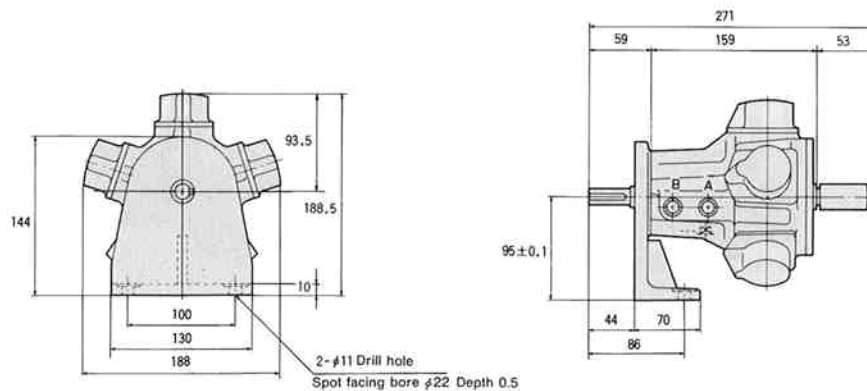
BASIC TYPE TAM4-030S



FLANGE TYPE TAM4-030F



FOOT TYPE TAM4-030L

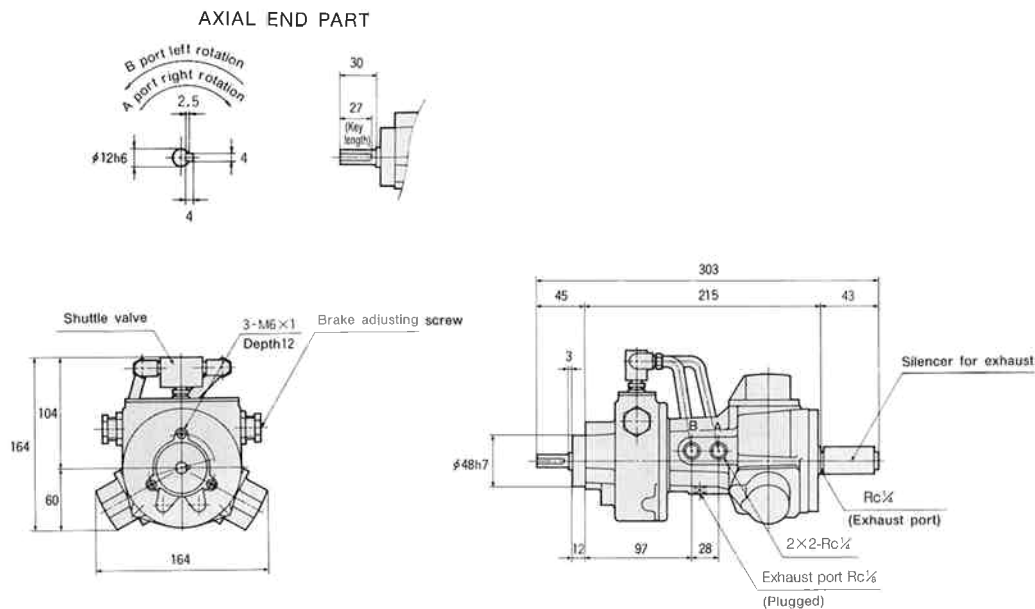


TAM4 RADIAL PISTON TYPE AIR MOTOR

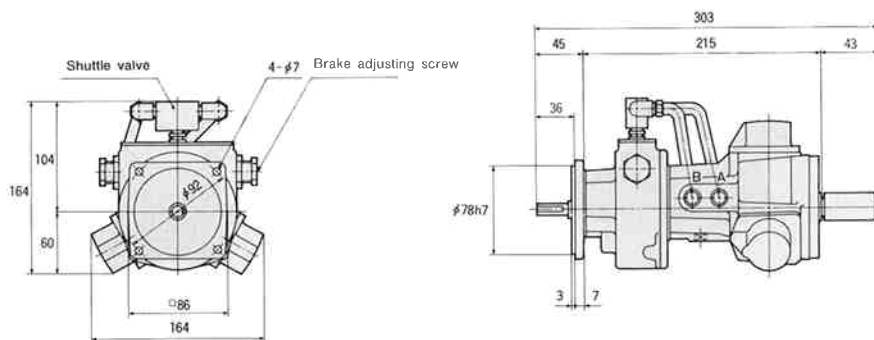
DIMENSIONAL DRAWINGS/WITH BRAKE/TAM4-015

Unit : mm

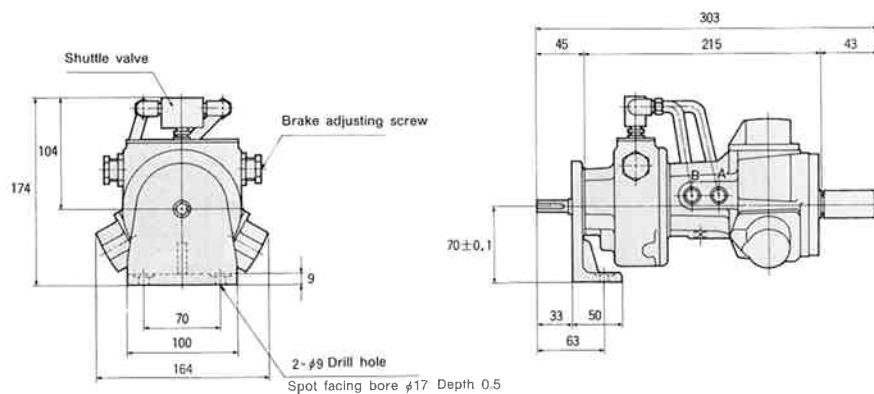
BASIC TYPE TAM4-015SB



FLANGE TYPE TAM4-015FB



FOOT TYPE TAM4-015LB

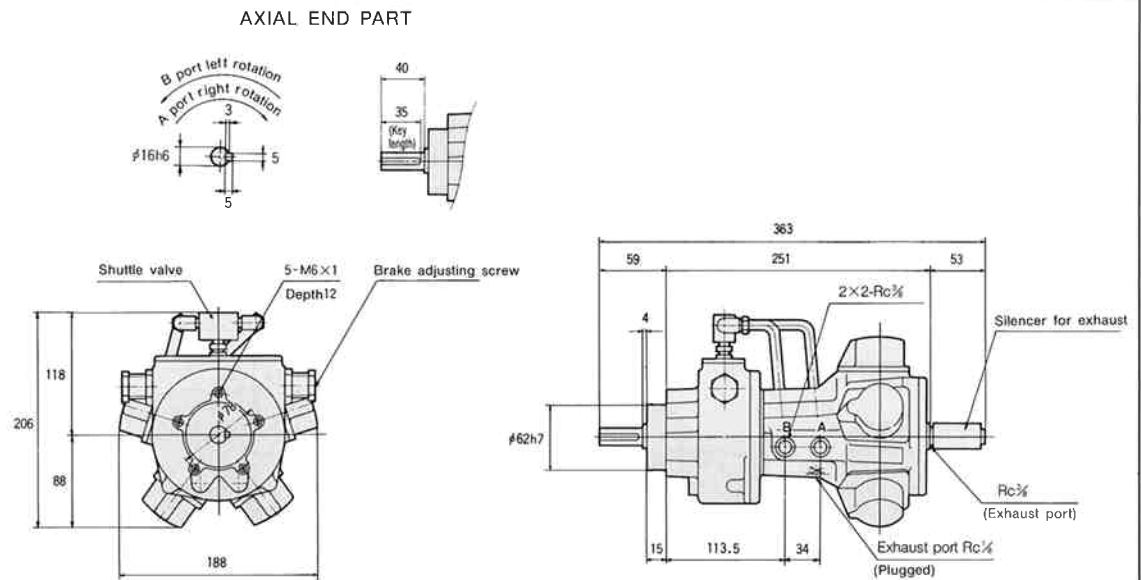


RADIAL PISTON TYPE AIR MOTOR **TAM4**

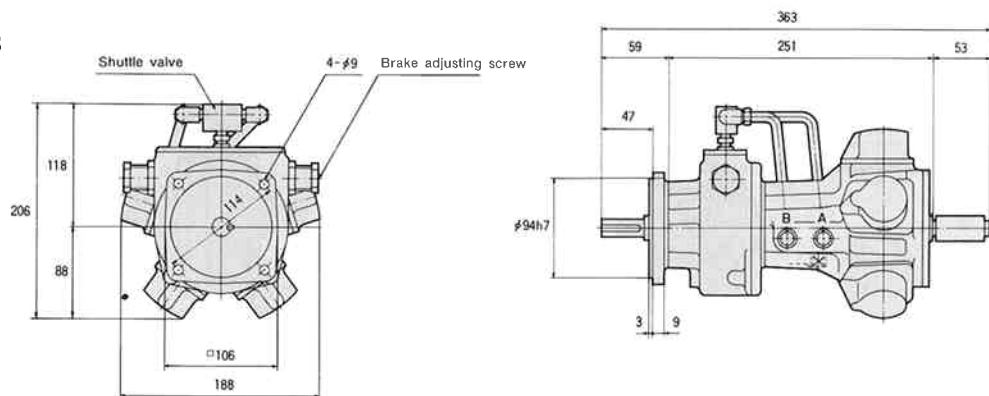
DIMENSIONAL DRAWINGS/WITH BRAKE/TAM4-030

Unit : mm

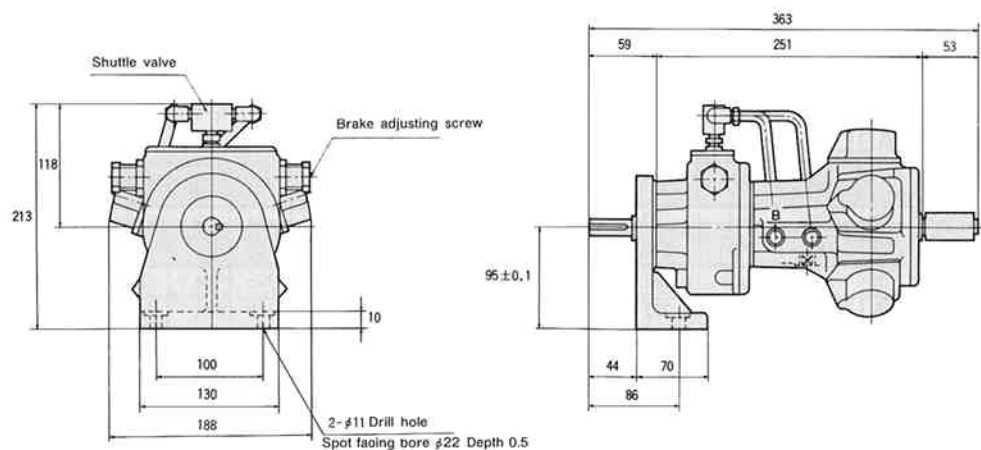
BASIC TYPE TAM4-030SB



FLANGE TYPE TAM4-030FB



FOOT TYPE TAM4-030LB



TAM4 RADIAL PISTON TYPE AIR MOTOR

DIMENSIONAL DRAWINGS/WITH DECELERATOR/TAM4-010·015

Unit : mm

FLANGE TYPE

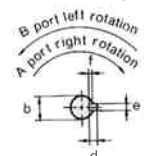
AXIAL END PART

TAM4-010FG***

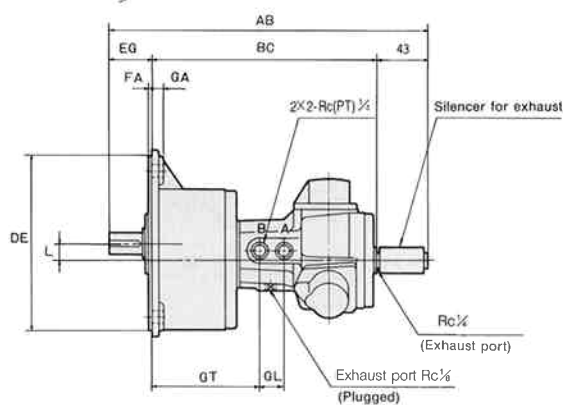
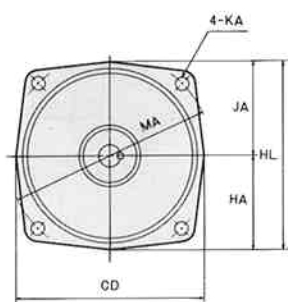
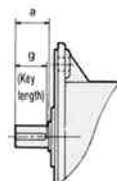
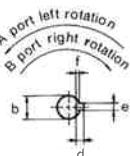
TAM4-015FG***

Deceleration ratio

Deceleration ratio $\frac{1}{5} \sim \frac{1}{10}$



Deceleration ratio $\frac{1}{50} \sim \frac{1}{200}$

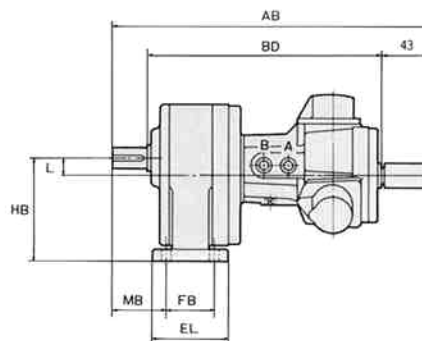
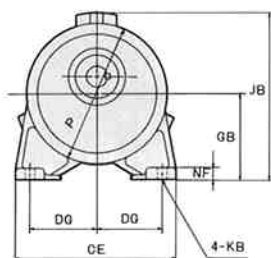


FOOT TYPE

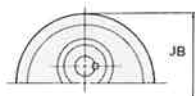
TAM4-010LG***

TAM4-015LG***

Deceleration ratio



TAM4-015 Deceleration ratio 100·120·160·200



DIMENSIONAL TABLE

Symbol		AB	BC	BD	CD	CE	DE	DG	EG	EL	FA	FB	GA	GB	GL	GT	HA
Model code	Deceleration ratio																
TAM4-010※G	005 010 015 020	272	194	199	154	134	φ145h7	55	35	64	3	40	10	68.5	20	98	80
	005 010 015 020	323	233	240	164	154	φ148h7	65	47	90	4	65	12	71	28	115	89
TAM4-015※G	030 040 050 060 080	340	247	252	186	175	φ170h7	70	50	125	4	90	15	86.5	28	128	105.5
	100 120 160 200	360	257	262	215	208	φ180h7	85	60	168	4	130	15	101.5	28	139	126.5

Symbol		HB	HL	JA	JB	KA	KB	L	MA	MB	NF	P	Axial end part					
Model code	Deceleration ratio												a	b	d	e	f	g
TAM4-010※G	005 010 015 020	85	157	77	135.5	φ11	φ9	16.5	φ170	45	10	φ112	30	φ18h6	6	6	3.5	27
	005 010 015 020	90	171.5	82.5	153	φ11	φ11	19	φ185	55	12	φ125	40	φ22h6	6	6	3.5	35
TAM4-015※G	030 040 050 060 080	110	199	94	169	φ11	φ11	23.5	φ215	65	15	φ152	45	φ28h6	7	8	4	40
	100 120 160 200	130	234	107.5	198	φ13	φ13	28.5	φ250	70	18	φ184	55	φ32h6	8	10	5	50

RADIAL PISTON TYPE AIR MOTOR **TAM4**

DIMENSIONAL DRAWINGS/WITH DECELERATOR/TAM4-030

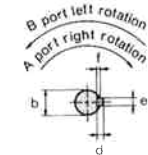
Unit : mm

FLANGE TYPE

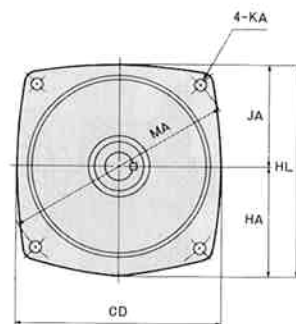
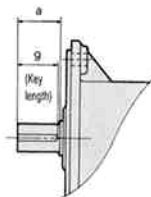
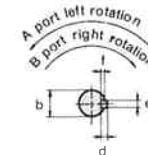
TAM4-030FG***

Deceleration ratio

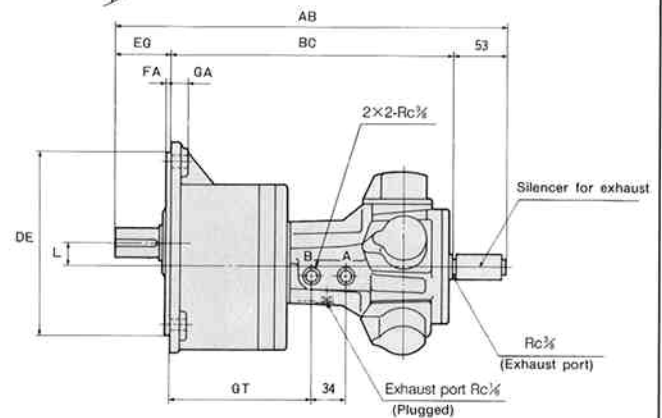
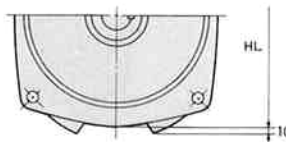
Deceleration ratio $\frac{1}{5} \sim \frac{1}{6}$



Deceleration ratio $\frac{1}{5} \sim \frac{1}{6}$



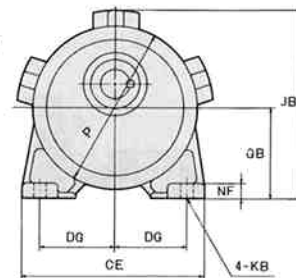
Deceleration ratio 005·010·015·020



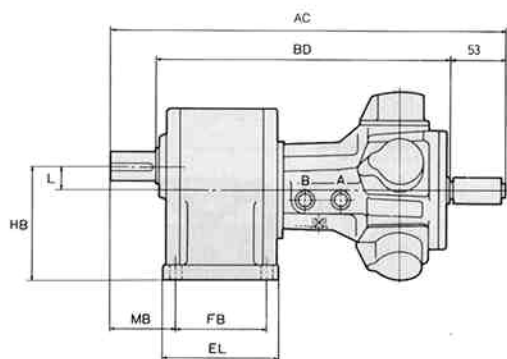
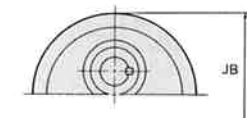
FOOT TYPE

TAM4-030LG***

Deceleration ratio



Deceleration ratio 100·120·160·200



DIMENSIONAL TABLE

Symbol		AB	AC	BC	BD	CD	CE	DE	DG	EG	EL	FA	FB	GA	GB	GT			
Model code	Deceleration ratio																		
TAM4-030※G	005 010 015 020	374	—	271	276	186	175	φ170h7	70	50	125	4	90	15	86.5	133			
	030 040 050 060 080	403	—	290	295	215	208	φ180h7	85	60	168	4	130	15	101.5	152			
	100 120 160 200	431	428	307	310	270	254	φ230h7	105	71	196	5	150	18	116	170			
Symbol		HA	HB	HL	JA	JB	KA	KB	L	MA	MB	NF	P	Axial end part					
Model code	Deceleration ratio													a	b	d	e	f	g
TAM4-030※G	005 010 015 020	105.5	110	198.5	93	180	φ11	φ11	23.5	φ215	65	15	φ152	45	φ28h6	7	8	4	40
	030 040 050 060 080	126.5	130	234	107.5	198	φ13	φ13	28.5	φ250	70	18	φ184	55	φ32h6	8	10	5	50
	100 120 160 200	149	150	284	135	230	φ18	φ15	34	φ310	90	20	φ218	65	φ40h6	8	12	5	60

TAM4 RADIAL PISTON TYPE AIR MOTOR

DIMENSIONAL DRAWINGS/WITH BRAKE·DECELERATOR/TAM4-015

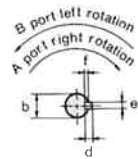
Unit : mm

FLANGE TYPE

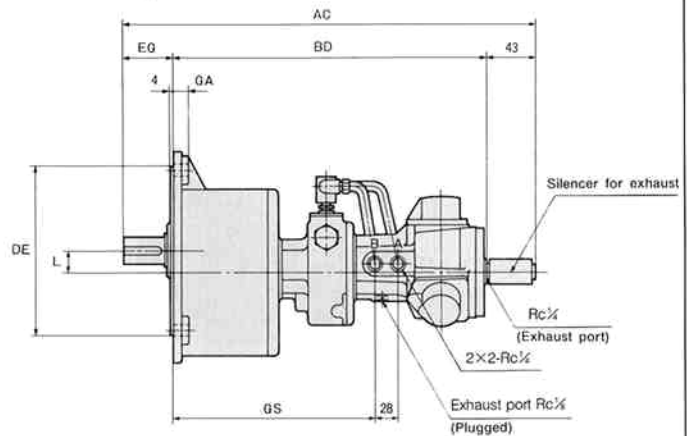
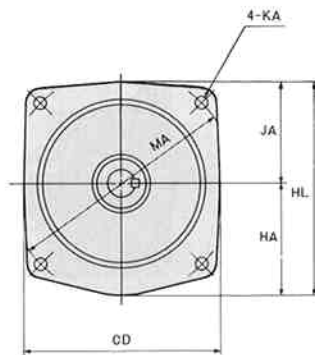
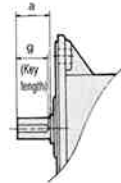
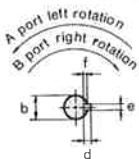
TAM4-015FBG***

Deceleration ratio

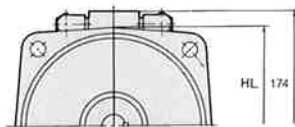
Deceleration ratio $\frac{1}{5} \sim \frac{1}{6}$



Deceleration ratio $\frac{1}{50} \sim \frac{1}{100}$



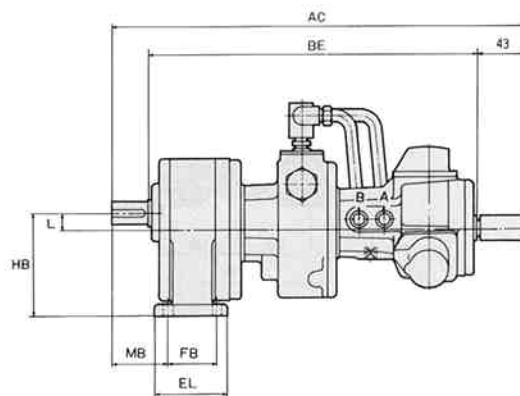
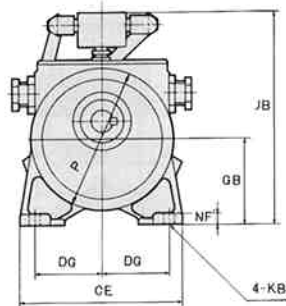
Deceleration ratio 005·010·015·020



FOOT TYPE

TAM4-015LBG***

Deceleration ratio



DIMENSIONAL TABLE

Symbol		AC	BD	BE	CD	CE	DE	DG	EG	EL	FB	GA	GB	GS	HA	HB
Model code	Deceleration ratio															
TAM4-015**BG	005 010 015	401	311	318	164	154	φ148h7	65	47	90	65	12	71	193	89	90
	020 040 050	417	324	329	186	175	φ170h7	70	50	125	90	15	86.5	206	105.5	110
	060 080															
	100 120 160 200	438	335	340	215	208	φ180h7	85	60	168	130	15	101.5	217	126.5	130

Symbol		HL	JA	JB	KA	KB	L	MA	MB	NF	P	Axial end part					
Model code	Deceleration ratio											a	b	d	e	f	g
TAM4-015**BG	005 010 015	174	82.5	175	φ11	φ11	19	φ185	55	12	φ125	40	φ22h6	6	6	3.5	35
	020 040 050	198.5	93	191	φ11	φ11	23.5	φ215	65	15	φ152	45	φ28h6	7	8	4	40
	060 080																
	100 120 160 200	234	107.5	206	φ13	φ13	28.5	φ250	70	18	φ184	55	φ32h6	8	10	5	50

RADIAL PISTON TYPE AIR MOTOR **TAM4**

DIMENSIONAL DRAWINGS/WITH BRAKE·DECELERATOR/TAM4-030

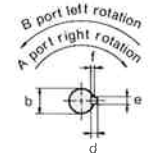
Unit : mm

FLANGE TYPE

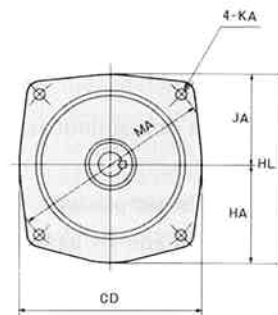
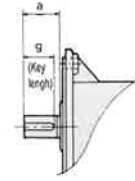
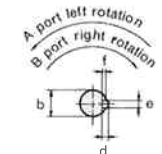
TAM4-030FBG※※※

Deceleration ratio

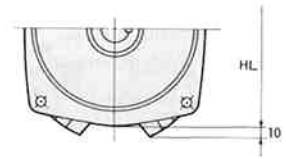
Deceleration ratio $\frac{1}{5} \sim \frac{1}{6}$



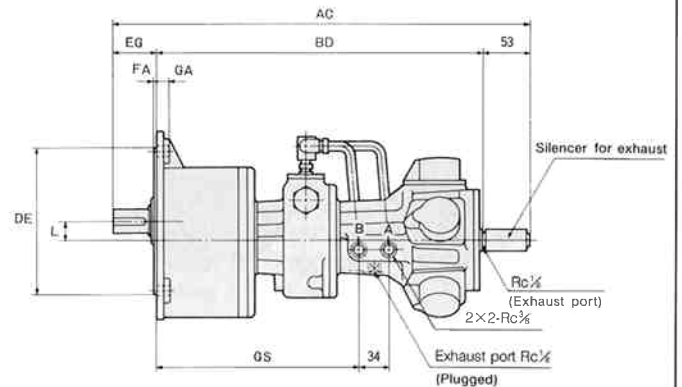
Deceleration ratio $\frac{1}{50} \sim \frac{1}{100}$



Deceleration ratio 005·010·015·020



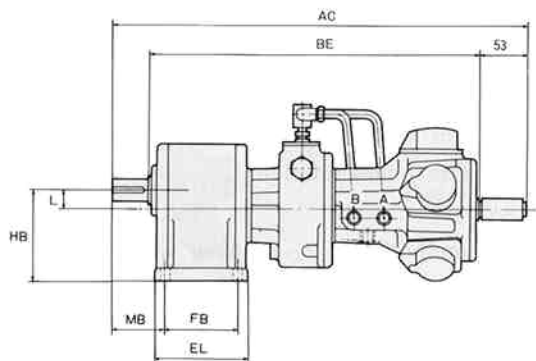
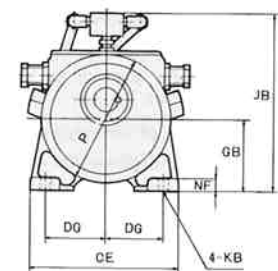
AXIAL END PART



FOOT TYPE

TAM4-030LBG※※※

Deceleration ratio



DIMENSIONAL TABLE

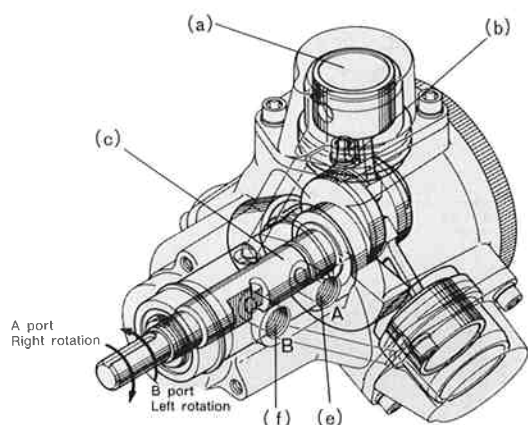
Symbol		AC	BD	BE	CD	CE	DE	DG	EG	EL	FA	FB	GA	GB	GS	HA	HB
Model code	Deceleration ratio																
TAM4-030※BG	005 010 015 020	466	363	368	186	175	φ170h7	70	50	125	4	90	15	86.5	225	105.5	110
	030 040 050 060 080	495	382	387	215	208	φ180h7	85	60	168	4	130	15	101.5	244	126.5	130
	100 120 160 200	520	396	402	270	254	φ230h7	105	71	196	5	150	18	116	259	149	150

Symbol		HL	JA	JB	KA	KB	L	MA	MB	NF	P	Axial end part					
Model code	Deceleration ratio											a	b	d	e	f	g
TAM4-030※BG	005 010 015 020	198.5	93	205	φ11	φ11	23.5	φ215	65	15	φ152	45	φ28h6	7	8	4	40
	030 040 050 060 080	234	107.5	220	φ13	φ13	28.5	φ250	70	18	φ184	55	φ32h6	8	10	5	50
	100 120 160 200	284	135	234	φ18	φ15	34	φ310	90	20	φ218	65	φ40h6	8	12	5	60

TAM4 RADIAL PISTON TYPE AIR MOTOR

STRUCTURE

ROTATION THEORY



For Radial Piston Type Air Motor, piston (a) and shaft (c) are connected by connecting rod (b), and compressed air sent from A port (e) is supplied successively to cylinder with rotary valve which is combined with shaft.

When compressed air is supplied, piston part pushes crank and gains rotation force. B port (f) at the opposite side becomes exhaust port. As compressed air is supplied from B port (f), shaft (c) performs clockwise rotation, and A port (e) becomes exhaust port.

WITH DECELERATOR

Air motor with decelerator is combined with small-type decelerator to gain the stabilized rotation and high output at the extremely slow rotation.

● FEATURES

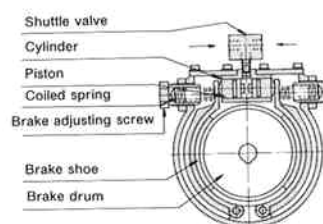
1. Deceleration method is a 2~3-phase variable speed according to the circumscribed gear system.
 2. All gears are heat treated.
 3. The air motor has the gear on the high speed side of integral construction with the air motor output shaft to facilitate internal inspection, disassembly and assembly of the motor and the gear case.
- The air motor with decelerator is not interchangeable with a standard motor because of different output shaft shape. (After-fitting of decelerator to a standard motor is unavailable.)

WITH BRAKE

Air motor can be stopped as engine brake is set by blocking the circuit with directional control valve, and brake torque corresponding to average start torque works in case that piping distance is short. But air motor with powerful external brake is necessitated in case that rotation of motor is inconvenient as torque is applied from load side at the time of suspension. For air motor with brake introduced here, double lock type brake is used.

● FEATURES

1. Non-phase adjustment is available for torque as needed.
2. Structure is simple with little trouble and long life.
3. Air motor made of aluminum is small and light.



It is load-working type double lock air brake with brake force turned out by pushing force of coiled spring and release conducted by air pressure as usual. Brake shoe is opened from brake drum as piston for release works after air pressure is applied to supply port of air motor and simultaneously to brake cylinder.

When the rotation of air motor is stopped and air pressure is exhausted, the air pressure of brake cylinder is also exhausted instantly, and brake shoe is pushed to drum with pushing force of coiled spring. The adjustment of brake torque is conducted with brake adjusting screw from the outside according to the necessary torque.

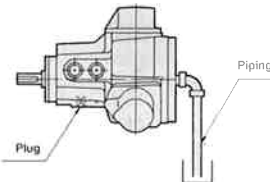
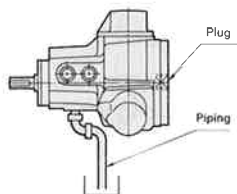
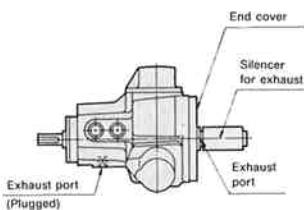
HANDLING INSTRUCTIONS

■ PRECAUTIONS FOR USE

MOUNTING

For all models of TAM4 series (fundamental, with brake, with decelerator, with brake/decelerator), the mounting direction and mounting angle are free. Core centering shall be performed so that axial core with shaft of matters to be driven will not be warped.

EXHAUST PORT



- Exhaust port is to remove pressure in air motor. It shall surely be kept open. When the breather port is plugged, the air motor internal pressures increases, resulting reduction of the output. Further, a trouble of come-off of the end cover will be caused.
- When shipped, silencer is not mounted at exhaust port of end cover part. In case of use, silencer shall be mounted.
- In use, air that leaks inside from exhaust port, and drains (water, oil) are exhausted to some extent. In case that dirt caused by drains is undesirable, piping shall be made to insert the end of pipe into supplementary container. (Note) Lay the piping as short and thick as possible with care not to cause back pressure.

PIPING

- Pneumatic equipment (air filter, air regulator, air lubricator, directional control valve, etc.) shall be mounted near air motor as much possible.
- Trouble of pneumatic equipment is mainly caused by foreign matters including dust. Before piping, the inside of pipe shall be cleaned with compressed air (over 0.2MPa) in order that chips, scrap of tape seal, dust rust, etc. will not enter absolutely in pipe.
- For piping bore and pneumatic equipment (air filter, air regulator, air lubricator, directional control valve, etc.) bore corresponding to the air consumption of air motor shall be used. When thin pipe or pneumatic equipment with smaller bore than that of air motor air used, the pressure loss is large, and the necessary output and rotation may be unavailable. Piping with larger bore than the port bore of air motor is appropriate.
- Clean air with dust and moisture removed shall be used by mounting air filter, air dryer, etc. at the inlet of air pressure.
- Effective silencer shall be mounted at the exhaust side.

- In case of use at the high-speed rotation, precautions shall be taken for the configuration of circuit so that back pressure will rise.
- Be sure to use the air motor with the recommended rotation range. Otherwise, stabilized rotation cannot be obtained. What is worse, the air motor life may be adversely affected. $(0.2 \sim 1) \times \text{Max. output rotation}$

LUBRICATING OIL

- Categories of oil

Air motor ...Daphne Eponex No. 1 (Idemitsu Kosan)
Grease for high load
Decelerator...TAM4-010 · 015
TAM4-030 1/5~1/10 } $\Rightarrow$ Listan EP-385 (Esso Oil)
TAM4-030 1/100~1/200

※For both air motor and decelerator, grease is mounted when delivered.

LUBRICATION

- With air lubricator mounted at the air pressure supply side, the spray lubrication shall be conducted.
- As lubricating oil for lubrication, JIS K2213-1 (Natural turbine oil ISO VG32) or equivalent shall be used.
- As to the quantity of lubrication, about 2 drops a minute are appropriate.

⚠ PRECAUTION

Insufficient lubrication will cause troubles such as shortening of life and seizure of rotary valve, piston and sleeve. Set an air lubricator near the air motor as much as possible.

■ ROTATING DIRECTION OF AIR MOTOR

FUNDAMENTAL · WITH BRAKE

- As seen from the output shaft side, there is left rotation for front side (B port) air supply, and right rotation for rear side (A port) air supply.



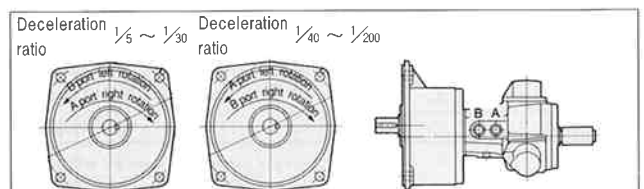
WITH DECELERATOR · WITH BRAKE/DECELERATOR

Deceleration ratio 1/5 ~ 1/30

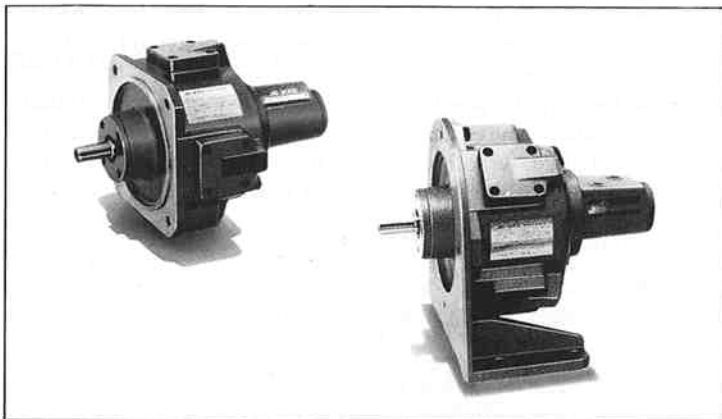
- As seen from output shaft side, there is left rotation for front side (B port) air supply, and right rotation for rear side (A port) air supply.

Deceleration ratio 1/40 ~ 1/200

- As seen from output shaft side, there is right rotation for front side (B port) air supply and left rotation for rear side (A port) air supply.



TAM2 RADIAL PISTON TYPE AIR MOTOR



Highly reliable general oil bath type air motor

- Smooth work with little vibration is available with balanced structure.
- With the adoption of oil bath type, reliability is excellent.
(Lubricating oil from air lubricator is necessary.)
- With a plenty of types, it is designed for easy use.

SPECIFICATIONS

Item		Deceleration ratio	at Maximum output(0.5MPa)				Stop torque N·m	Start torque N·m	Brake torque N·m	Weight	
			power kw	Torque N·m	Rotation R·P·M	Air con- sumption ℓ/min (ANR)				F type kg	L type kg
Model code											
TAM2-403	※	—	0.257	1.67	1500	450	3.04	2.65	—	7	11
	※B	—							3.33	13	17
	※※G005	1/5		6.86	300		13.7	11.8	14.7	24 (30)	23 (29)
	※※G010	1/10		13.7	150		27.5	23.5	29.4	24 (30)	23 (29)
	※※G015	1/15	0.228	20.6	100		41.2	35.3	44.1	24 (30)	23 (29)
	※※G020	1/20		27.5	75		54.9	47.1	58.8	32 (38)	32 (38)
	※※G030	1/30		41.2	50		82.4	70.6	88.3	32 (38)	32 (38)
TAM2-404	※	—	0.566	3.63	1500	950	6.77	5.88	—	11	16
	※B	—							7.45	20	25
	※※G005	1/5		15.7	300		30.4	26.5	33.3	37 (46)	37 (46)
	※※G010	1/10		31.4	150		60.8	53.0	66.7	37 (46)	37 (46)
	※※G015	1/15	0.507	47.1	100		91.2	79.4	100	37 (46)	37 (46)
	※※G020	1/20		62.8	75		122	106	133	49 (58)	49 (58)
	※※G030	1/30		94.1	50		182	159	200	49 (58)	49 (58)
TAM2-405	※	—	1.00	6.57	1450	1750	12.3	10.4	—	23	32
	※B	—							13.4	35	44
	※※G005	1/5		29.4	290		54.9	46.1	59.8	50 (62)	50 (62)
	※※G010	1/10		58.8	145		110	92.2	120	50 (62)	50 (62)
	※※G015	1/15	0.897	88.3	96		165	138	179	61 (73)	61 (73)
	※※G020	1/20		118	72		220	184	239	61 (73)	61 (73)
	※※G030	1/30		177	48		330	277	359	72 (84)	72 (84)
TAM2-406	※	—	2.47	17.5	1350	3700	32.9	28.2	—	51	68
	※B	—							36.1	77	94
	※※G005	1/5		78.5	270		147	127	157	103(129)	103(129)
	※※G010	1/10		157	135		294	255	314	103(129)	103(129)
	※※G015	1/15	2.21	235	90		441	382	471	129(155)	130(156)
	※※G020	1/20		314	67		588	510	628	129(155)	130(156)
	※※G030	1/30		471	45		883	765	941	155(181)	156(182)
TAM2-506	※	—	3.09	21.6	1350	4200	41.2	35.3	—	54	71
	※B	—							45.1	80	97
	※※G005	1/5		98.1	270		186	157	196	133(159)	134(160)
	※※G010	1/10		196	135		373	314	392	133(159)	134(160)
	※※G015	1/15	2.79	294	90		559	471	588	158(184)	160(186)
	※※G020	1/20		392	67		745	628	785	158(184)	160(186)
	※※G030	1/30		588	45		1120	941	1180	190(216)	194(220)

Figure in parenthesis is weight with brake/decelerator.

Note) The above specifications indicate performance at ambient temperature of 20°C.

Air motor performance values shown apply when pressure on the exhaust side is atmospheric pressure.

COMMON ITEMS

- Working fluid : Air
- Rated pressure : 0.5MPa
- Operating pressure : 0.2~0.7MPa
- Ambient temperature : -10~+70°C
(Use in unfrozen condition.)

- Painted color : Silver grey
- Lubricating oil : Inside mounting oil

Air motor : FBK turbine 32
(Nippon Oil)

Decelerator : BONNOK M150
(Nippon Oil)

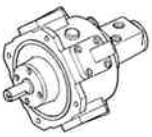
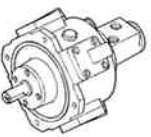
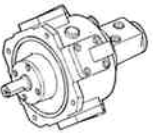
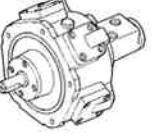
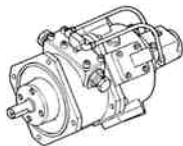
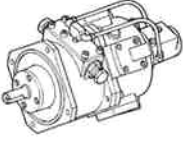
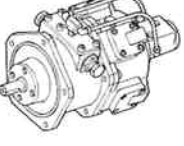
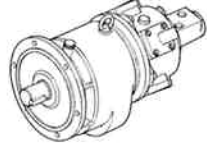
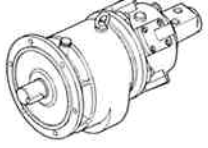
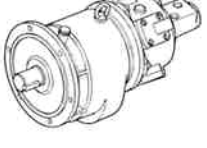
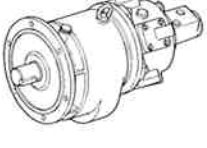
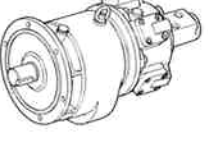
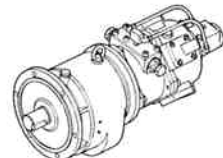
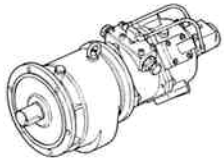
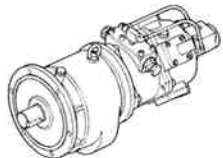
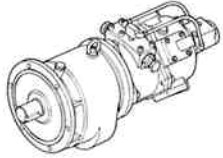
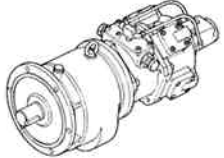
Airline lubrication
JIS K2213-1
(Natural turbine
oil ISO VG32)
or equivalent

- Range of Recommended rotation = (0.2~1) × Rotation at maximum output

RADIAL PISTON TYPE AIR MOTOR **TAM2**

TYPE OUTLINE • CODE

For order, specify the following code.

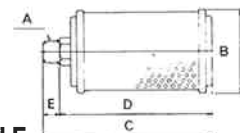
Series Type	TAM2-403	TAM2-404	TAM2-405	TAM2-406	TAM2-506
Fundamental	 TAM2-403 F ①	 TAM2-404 F ①	 TAM2-405 F ①	 TAM2-406 F ①	 TAM2-506 F ①
With brake	 TAM2-403 F B ① With brake	 TAM2-404 F B ①	 TAM2-405 F B ①	 TAM2-406 F B ①	 TAM2-506 F B ①
With decelerator	 TAM2-403 F G 020 ① With decelerator ②	 TAM2-404 F G 020 ① ②	 TAM2-405 F G 020 ① ②	 TAM2-406 F G 020 ① ②	 TAM2-506 F G 020 ① ②
With brake/decelerator	 TAM2-403 F BG 020 ① With brake/decelerator ②	 TAM2-404 F BG 020 ① ②	 TAM2-405 F BG 020 ① ②	 TAM2-406 F BG 020 ① ②	 TAM2-506 F BG 020 ① ②

SYMBOL EXPLANATION

Mounting type		
①	F	Flange type
	L	Foot type
Deceleration ratio		
②	005	1/6
	010	1/10
	015	1/15
	020	1/20
	030	1/30

ACCESSORIES

- Auto muffler
The muffler is to weaken exhaust noise and does not harm the performance of air motor.



DIMENSIONAL TABLE

Unit : mm

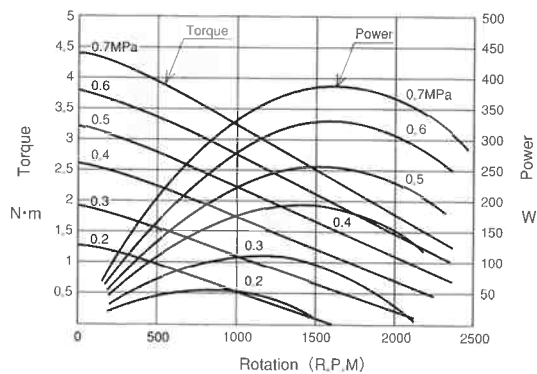
Model code	A	B	C	D	E	Weight(kg)	Exhaust area(mm ²)
M02	R 1/4	48	102	89	13	0.14	4580
M00	R 3/8	67	121	108	13	0.23	7870
M05	R 1/2	83	140	127	13	0.28	10900
M07	R 3/4	86	172	156	16	0.34	15500
M10	R 1	99	203	184	19	0.45	20500

TAM2 RADIAL PISTON TYPE AIR MOTOR

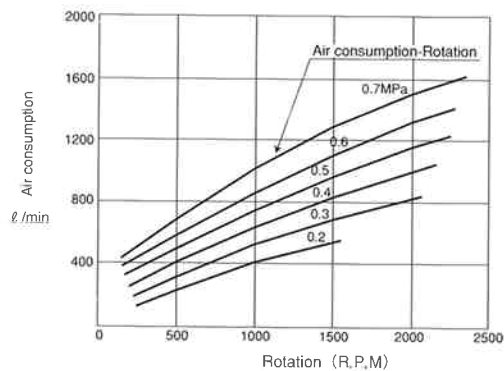
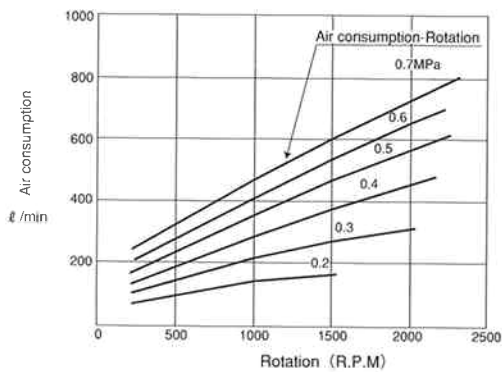
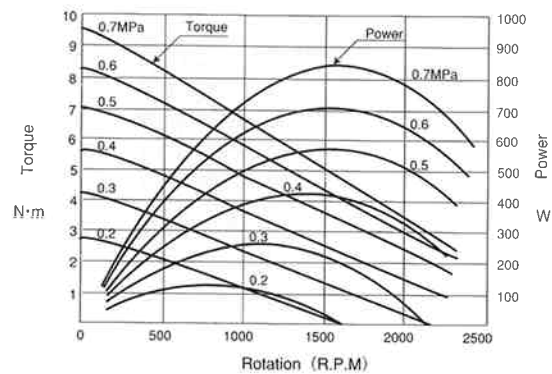
PERFORMANCE CURVE (DECELERATION RATIO 1 : 1)

□ Range of recommended rotation

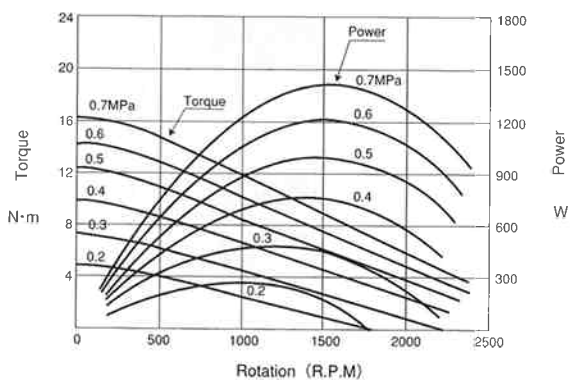
TAM2-403



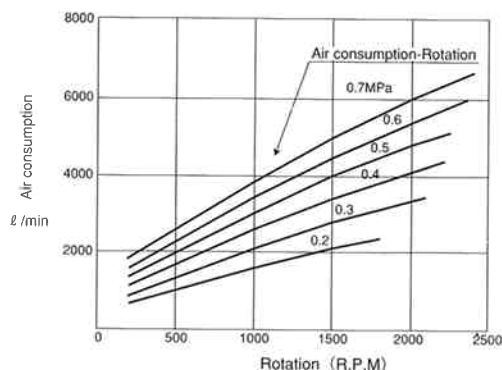
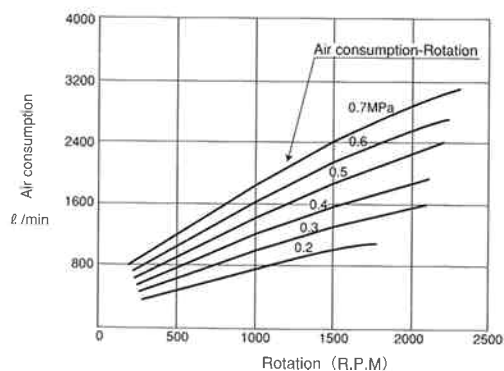
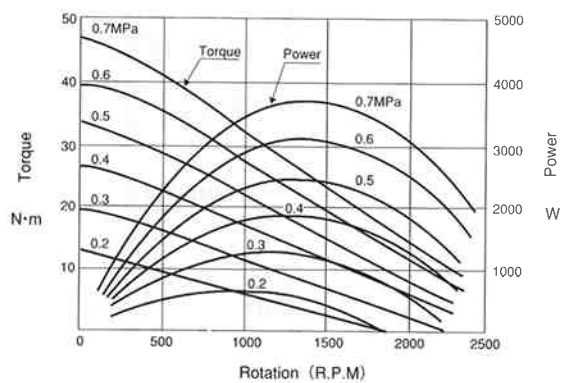
TAM2-404



TAM2-405

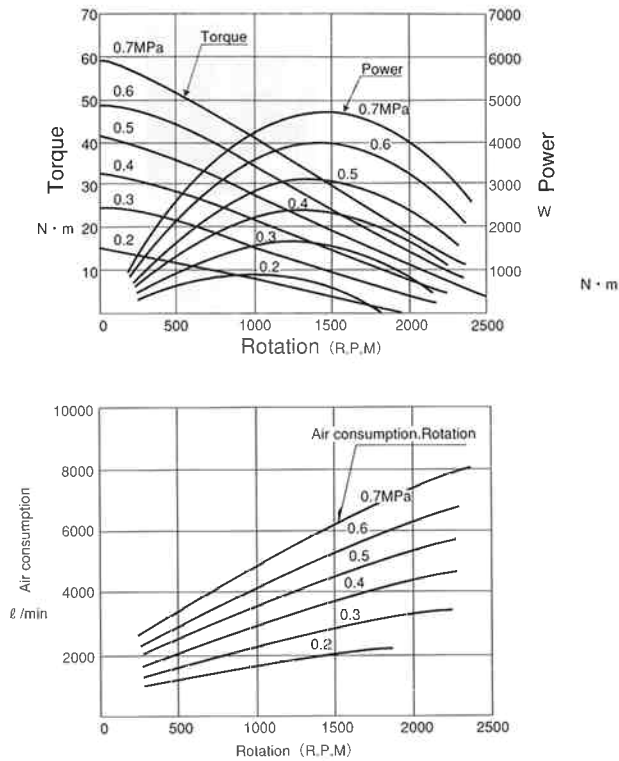


TAM2-406

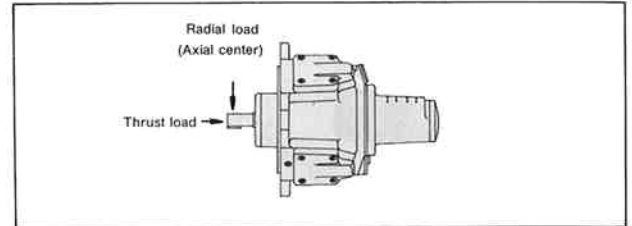


RADIAL PISTON TYPE AIR MOTOR **TAM2**

TAM2-506



ALLOWABLE AXIAL LOAD



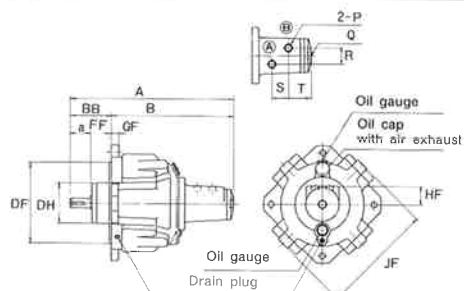
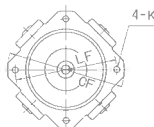
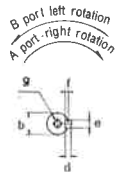
Model code		Radial load KN	Thrust load KN
TAM2-403F	B —	0.294	0.098
	G 0 0 5	0.490	0.196
	G 0 1 0	0.735	0.294
	G 0 1 5	0.981	0.392
	G 0 2 0	1.13	0.490
	G 0 3 0	1.57	0.588
TAM2-403L	B —	0.294	0.098
	G 0 0 5	0.932	0.196
	G 0 1 0	1.47	0.294
	G 0 1 5	1.91	0.392
	G 0 2 0	2.26	0.490
	G 0 3 0	3.04	0.588
TAM2-404F	B —	0.392	0.147
	G 0 0 5	0.735	0.343
	G 0 1 0	1.18	0.490
	G 0 1 5	1.57	0.588
	G 0 2 0	1.77	0.686
	G 0 3 0	2.45	0.883
TAM2-404L	B —	0.392	0.147
	G 0 0 5	1.46	0.343
	G 0 1 0	2.33	0.490
	G 0 1 5	3.04	0.588
	G 0 2 0	3.53	0.686
	G 0 3 0	4.85	0.883
TAM2-405F	B —	0.686	0.245
	G 0 0 5	0.981	0.392
	G 0 1 0	1.57	0.588
	G 0 1 5	2.01	0.785
	G 0 2 0	2.35	0.883
	G 0 3 0	3.19	1.18
TAM2-405L	B —	0.686	0.245
	G 0 0 5	1.93	0.392
	G 0 1 0	3.06	0.588
	G 0 1 5	4.02	0.785
	G 0 2 0	4.66	0.883
	G 0 3 0	6.37	1.18
TAM2-406F	B —	0.981	0.392
	G 0 0 5	1.77	0.785
	G 0 1 0	2.84	1.08
	G 0 1 5	3.73	1.37
	G 0 2 0	4.31	1.67
	G 0 3 0	5.88	2.16
TAM2-406L	B —	0.981	0.392
	G 0 0 5	3.55	0.785
	G 0 1 0	5.64	1.08
	G 0 1 5	7.40	1.37
	G 0 2 0	8.58	1.67
	G 0 3 0	11.8	2.16
TAM2-506F	B —	0.981	0.392
	G 0 0 5	2.16	0.981
	G 0 1 0	3.43	1.27
	G 0 1 5	4.51	1.67
	G 0 2 0	5.20	1.96
	G 0 3 0	7.16	2.54
TAM2-506L	B —	0.981	0.392
	G 0 0 5	4.30	0.981
	G 0 1 0	6.82	1.27
	G 0 1 5	8.97	1.67
	G 0 2 0	10.4	1.96
	G 0 3 0	14.2	2.55

TAM2 RADIAL PISTON TYPE AIR MOTOR

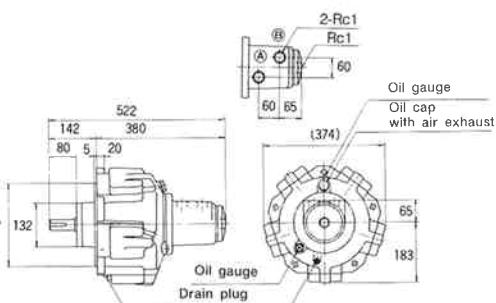
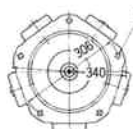
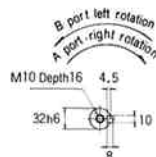
DIMENSIONAL DRAWINGS/FUNDAMENTAL/FLANGE TYPE

Unit : mm

• TAM2-403•404•405•406F



• TAM2-506F

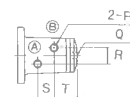
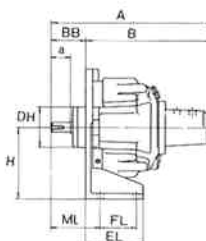
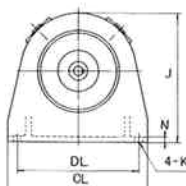
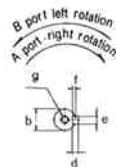


DIMENSIONAL TABLE

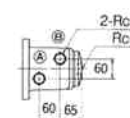
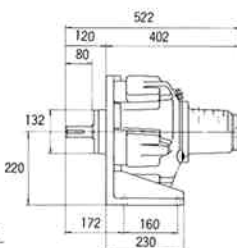
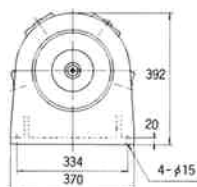
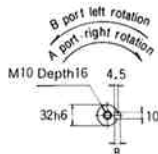
Symbol Model code	A	B	BB	CF	DF	DH	FF	GF	HF	JF	K	LF	P	Q	R	S	T	Axial end					
	a	b	d	e	f	g																	
TAM2-403F	285	216	69	190	130h7	74	4	10	28	192	φ 10	164	Rc 1/4	Rc 1/4	30	30	40	30	14h6	5	5	3	—
TAM2-404F	320	240	80	230	160h7	80	4	12	34	226	φ 12	200	Rc 3/8	Rc 3/8	30	30	41	40	19h6	5	5	3	M 6 Depth10
TAM2-405F	395	295	100	280	190h7	106	4	16	43	274	φ 15	244	Rc 1/2	Rc 1/2	40	40	49	50	24h6	7	7	4	M 8 Depth15
TAM2-406F	522	380	142	340	250h7	132	5	20	65	366	φ 15	306	Rc1	Rc1	60	60	65	80	32h6	8	10	4.5	M10 Depth16

DIMENSIONAL DRAWINGS/FUNDAMENTAL/FOOT TYPE

• TAM2-403•404•405•406L



• TAM2-506L



DIMENSIONAL TABLE

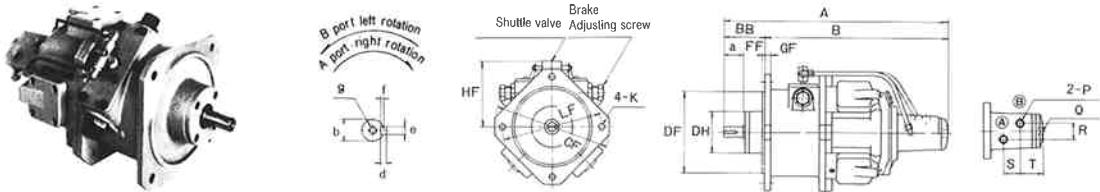
Symbol Model code	A	B	BB	CL	DH	DL	EL	FL	H	J	K	ML	N	P	Q	R	S	T	Axial end					
	a	b	d	e	f	g																		
TAM2-403L	285	228	57	204	74	178	122	70	120	217	φ 10	96	12	Rc 1/4	Rc 1/4	30	30	40	30	14h6	5	5	3	—
TAM2-404L	320	252	68	250	80	220	142	85	140	257	φ 12	110	12	Rc 3/8	Rc 3/8	30	30	41	40	19h6	5	5	3	M 6 Depth10
TAM2-405L	395	311	84	304	106	268	177	110	170	312	φ 15	133	15	Rc 1/2	Rc 1/2	40	40	49	50	24h6	7	7	4	M 8 Depth15
TAM2-406L	522	402	120	370	132	334	230	160	220	392	φ 15	172	20	Rc1	Rc1	60	60	65	80	32h6	8	10	4.5	M10 Depth16

RADIAL PISTON TYPE AIR MOTOR **TAM2**

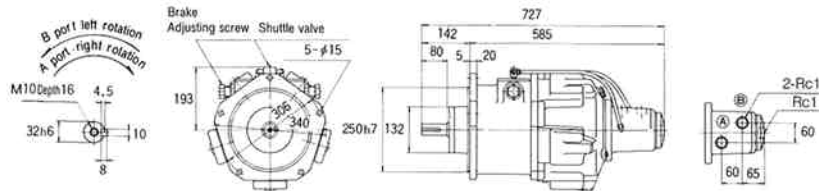
DIMENSIONAL DRAWINGS/WITH BRAKE/FLANGE TYPE

Unit : mm

● TAM2-403·404·405·406FB



● TAM2-506FB

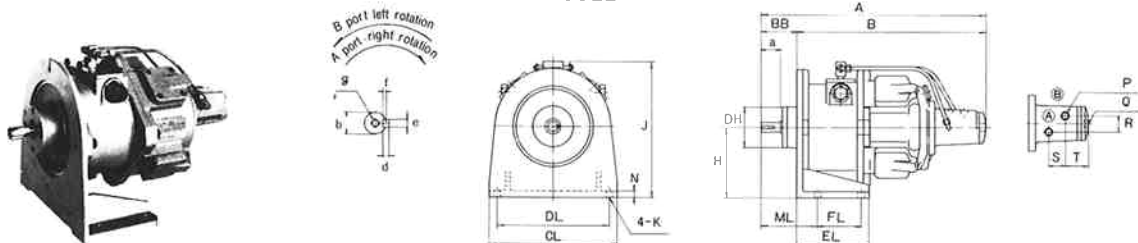


DIMENSIONAL TABLE

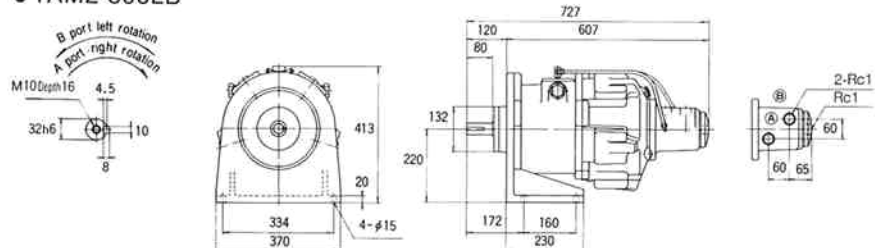
Model code	Symbol	A	B	BB	CF	DF	DH	FF	GF	HF	K	LF	P	Q	R	S	T	Axial end					
																		a	b	d	e	f	g
TAM2-403FB		400	331	69	190	130h7	74	4	10	123	φ 10	164	Rc¼	Rc¼	30	30	40	30	14h6	5	5	3	—
TAM2-404FB		440	360	80	230	160h7	80	4	12	138	φ 12	200	Rc⅝	Rc⅝	30	30	41	40	19h6	5	5	3	M 6 Depth10
TAM2-405FB		545	445	100	280	190h7	106	4	16	153	φ 15	244	Rc½	Rc½	40	40	49	50	24h6	7	7	4	M 8 Depth15
TAM2-406FB		727	585	142	340	250h7	132	5	20	193	φ 15	306	Rc1	Rc1	60	60	65	80	32h6	8	10	4.5	M10 Depth16

DIMENSIONAL DRAWINGS/WITH BRAKE/FOOT TYPE

● TAM2-403·404·405·406LB



● TAM2-506LB



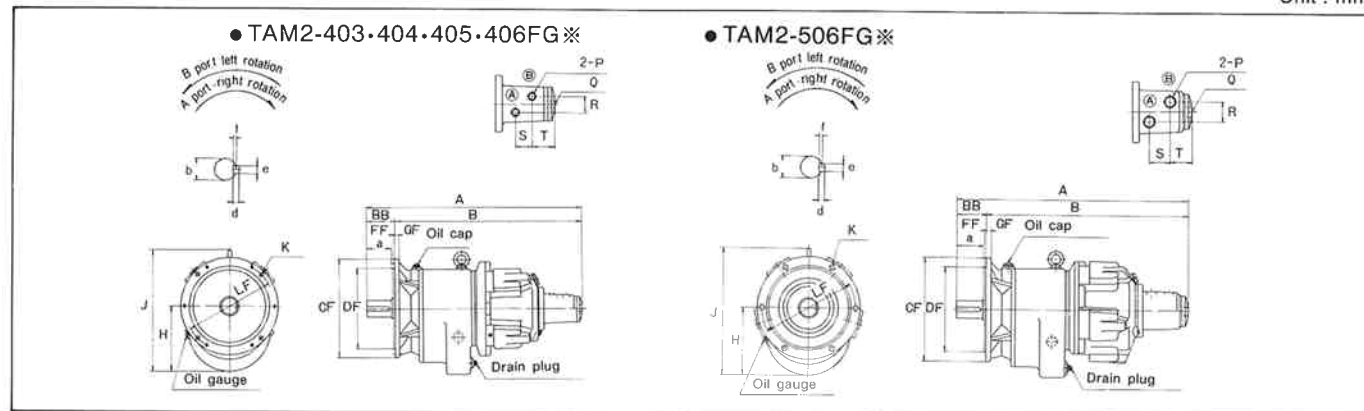
DIMENSIONAL TABLE

Model code	Symbol	A	B	BB	CL	DH	DL	EL	FL	H	J	K	ML	N	P	Q	R	S	T	Axial end					
																				a	b	d	e	f	g
TAM2-403LB		400	343	57	204	74	178	122	70	120	243	φ 10	96	12	Rc ¼	Rc ¼	30	30	40	30	14h6	5	5	3	—
TAM2-404LB		440	372	68	250	80	220	142	85	140	278	φ 12	110	12	Rc ⅜	Rc ⅜	30	30	41	40	19h6	5	5	3	M 6 Depth10
TAM2-405LB		545	461	84	304	106	268	177	110	170	323	φ 15	133	15	Rc ½	Rc ½	40	40	49	50	24h6	7	7	4	M 8 Depth15
TAM2-406LB		727	607	120	370	132	334	230	160	220	413	φ 15	172	20	Rc 1	Rc 1	60	60	65	80	32h6	8	10	4.5	M10 Depth16

TAM2 RADIAL PISTON TYPE AIR MOTOR

DIMENSIONAL DRAWINGS/WITH DECELERATOR/FLANGE TYPE

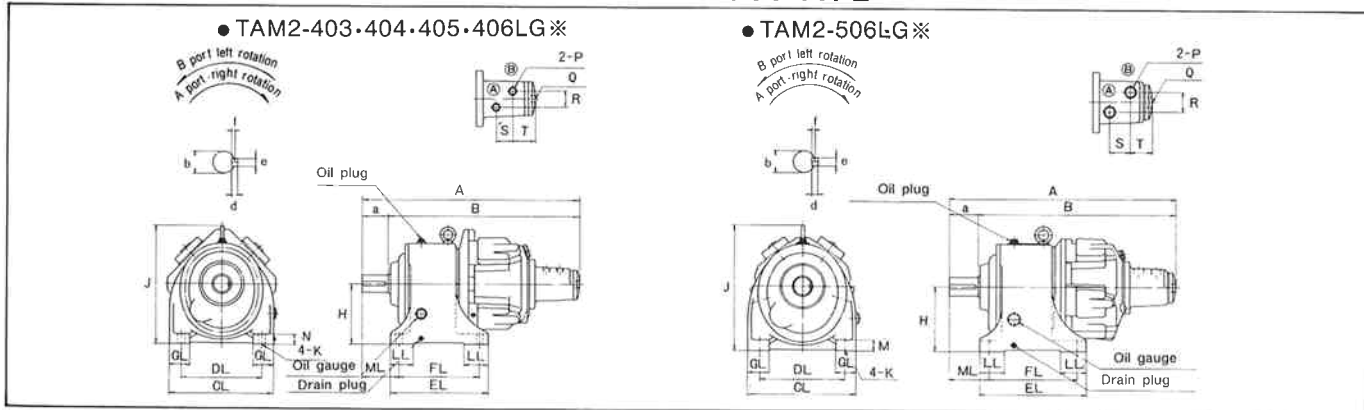
Unit : mm



DIMENSIONAL TABLE

Symbol		A	B	BB	CF	DF	FF	GF	H	J	K	LF	P	Q	R	S	T	Axial end				
Model code	Deceleration ratio																	a	b	d	e	f
TAM2-403FG	005 010 015	445	385	60	220	180f8	3	11	130	250	4-φ10	200	Rc¼	Rc¼	30	30	40	56	30h6	7	7	4
	020 030	485	415	70	250	200f8	3	12	155	297	4-φ13	225	Rc¼	Rc¼	30	30	40	63	35h6	8	10	4.5
TAM2-404FG	005 010 015	509	439	70	250	200f8	3	12	155	297	4-φ13	225	Rc⅝	Rc⅝	30	30	41	63	35h6	8	10	4.5
	020 030	544	469	75	270	220f8	3	12	175	329	6-φ13	245	Rc⅝	Rc⅝	30	30	41	71	45h6	8	12	4.5
TAM2-405FG	005 010	581	511	70	250	200f8	3	12	155	297	4-φ13	225	Rc½	Rc½	40	40	49	63	35h6	8	10	4.5
	015 020	608	533	75	270	220f8	3	12	175	329	6-φ13	245	Rc½	Rc½	40	40	49	71	45h6	8	12	4.5
TAM2-406FG	030	643	558	85	300	240f8	5	16	205	381	6-φ15	270	Rc½	Rc½	40	40	49	80	50h6	8	12	4.5
	005 010	747	662	85	300	240f8	5	16	205	381	6-φ15	270	Rc1	Rc1	60	60	65	80	50h6	8	12	4.5
TAM2-506FG	015 020	774	684	90	330	270f8	5	16	230	421	6-φ15	300	Rc1	Rc1	60	60	65	80	55h6	10	15	5
	030	819	719	100	390	310f8	5	20	260	466	6-φ20	350	Rc1	Rc1	60	60	65	90	65h6	12	18	6
TAM2-506FG	005 010	783	693	90	330	270f8	5	16	230	421	6-φ15	300	Rc1	Rc1	60	60	65	80	55h6	10	15	5
	015 020	818	718	100	390	310f8	5	20	260	466	6-φ20	350	Rc1	Rc1	60	60	65	90	65h6	12	18	6
	030	873	753	120	420	340f8	5	20	295	525	6-φ20	380	Rc1	Rc1	60	60	65	112	75h6	13	20	7

DIMENSIONAL DRAWINGS/WITH DECELERATOR/FOOT TYPE



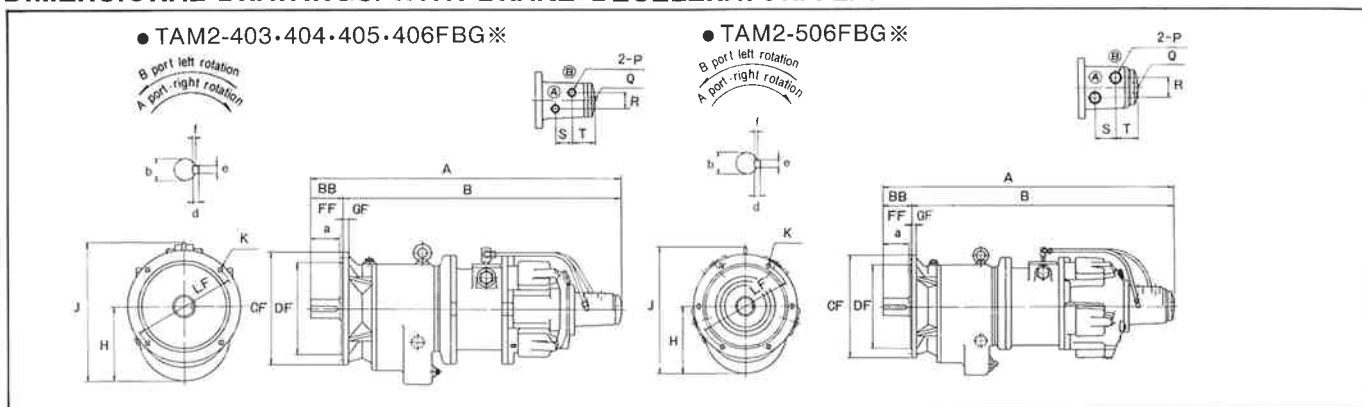
DIMENSIONAL TABLE

Symbol		A	B	CL	DL	EL	FL	GL	H	J	K	LL	ML	N	P	Q	R	S	T	Axial end				
Model code	Deceleration ratio																			a	b	d	e	f
TAM2-403LG	005 010 015	430	375	210	160	195	165	40	115	235	φ 12	50	75	16	Rc¼	Rc¼	30	30	40	55	30h6	7	7	4
	020 030	465	400	240	180	230	190	50	135	275	φ 15	60	90	22	Rc¼	Rc¼	30	30	40	65	35h6	8	10	4.5
TAM2-404LG	005 010 015	489	424	240	180	230	190	50	135	275	φ 15	60	90	22	Rc⅜	Rc⅜	30	30	41	65	35h6	8	10	4.5
	020 030	519	449	275	215	265	225	55	155	306	φ 15	65	95	25	Rc⅜	Rc⅜	30	30	41	70	45h6	8	12	4.5
TAM2-405LG	005 010	561	496	240	180	230	190	50	135	275	φ 15	60	90	22	Rc½	Rc½	40	40	49	65	35h6	8	10	4.5
	015 020	583	513	275	215	265	225	55	155	306	φ 15	65	95	25	Rc½	Rc½	40	40	49	70	45h6	8	12	4.5
TAM2-406LG	030	613	533	310	240	295	245	60	180	353	φ 19	70	110	30	Rc½	Rc½	40	40	49	80	50h6	8	12	4.5
	005 010	717	637	310	240	295	245	60	180	353	φ 19	70	110	30	Rc1	Rc1	60	60	65	80	50h6	8	12	4.5
	015 020	744	659	350	270	340	290	70	205	393	φ 19	75	115	30	Rc1	Rc1	60	60	65	85	55h6	10	15	5
	030	779	684	390	300	380	320	75	230	431	φ 24	80	130	35	Rc1	Rc1	60	60	65	95	65h6	12	18	6
TAM2-506LG	005 010	753	668	350	270	340	290	70	205	393	φ 19	75	115	30	Rc1	Rc1	60	60	65	85	55h6	10	15	5
	015 020	778	683	390	300	380	320	75	230	431	φ 24	80	130	35	Rc1	Rc1	60	60	65	95	65h6	12	18	6
	030	823	708	440	340	420	360	85	260	485	φ 24	90	150	40	Rc1	Rc1	60	60	65	115	75h6	13	20	7

RADIAL PISTON TYPE AIR MOTOR **TAM2**

DIMENSIONAL DRAWINGS/WITH BRAKE·DECELERATOR/FLANGE TYPE

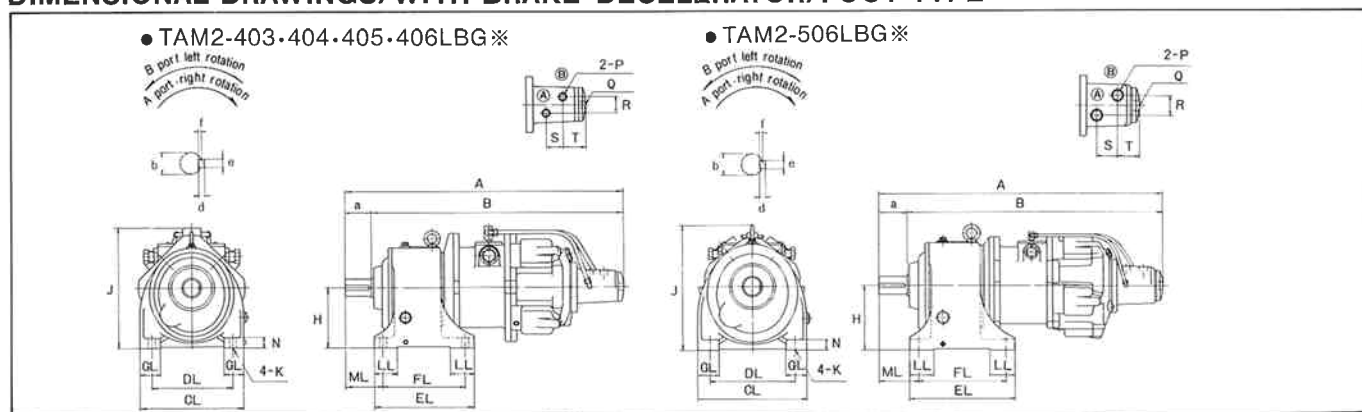
Unit : mm



DIMENSIONAL TABLE

Symbol		A	B	BB	CF	DF	FF	GF	H	J	K	LF	P	Q	R	S	T	Axial end				
Model code	Deceleration ratio																	a	b	d	e	f
TAM2-403FBG	005 010 015	560	500	60	220	180f8	3	11	130	253	4-φ10	200	Rc1/4	Rc1/4	30	30	40	56	30h6	7	7	4
	020 030	600	530	70	250	200f8	3	12	155	297	4-φ13	225	Rc1/4	Rc1/4	30	30	40	63	35h6	8	10	4.5
TAM2-404FBG	005 010 015	629	559	70	250	200f8	3	12	155	297	4-φ13	225	Rc3/8	Rc3/8	30	30	41	63	35h6	8	10	4.5
	020 030	664	589	75	270	220f8	3	12	175	329	6-φ13	245	Rc3/8	Rc3/8	30	30	41	71	45h6	8	12	4.5
TAM2-405FBG	005 010	731	661	70	250	200f8	3	12	155	308	4-φ13	225	Rc1/2	Rc1/2	40	40	49	63	35h6	8	10	4.5
	015 020	758	683	75	270	220f8	3	12	175	329	6-φ13	245	Rc1/2	Rc1/2	40	40	49	71	45h6	8	12	4.5
	030	793	708	85	300	240f8	5	16	205	381	6-φ15	270	Rc1/2	Rc1/2	40	40	49	80	50h6	8	12	4.5
TAM2-406FBG	005 010	952	867	85	300	240f8	5	16	205	398	6-φ15	270	Rc1	Rc1	60	60	65	80	50h6	8	12	4.5
	015 020	979	889	90	330	270f8	5	16	230	423	6-φ15	300	Rc1	Rc1	60	60	65	80	55h6	10	15	5
	030	1024	924	100	390	310f8	5	20	260	466	6-φ20	350	Rc1	Rc1	60	60	65	90	65h6	12	18	6
TAM2-506FBG	005 010	988	898	90	330	270f8	5	16	230	423	6-φ15	300	Rc1	Rc1	60	60	65	80	55h6	10	15	5
	015 020	1023	923	100	390	310f8	5	20	260	466	6-φ20	350	Rc1	Rc1	60	60	65	90	65h6	12	18	6
	030	1078	958	120	420	340f8	5	20	295	525	6-φ20	380	Rc1	Rc1	60	60	65	112	75h6	13	20	7

DIMENSIONAL DRAWINGS/WITH BRAKE·DECELERATOR/FOOT TYPE



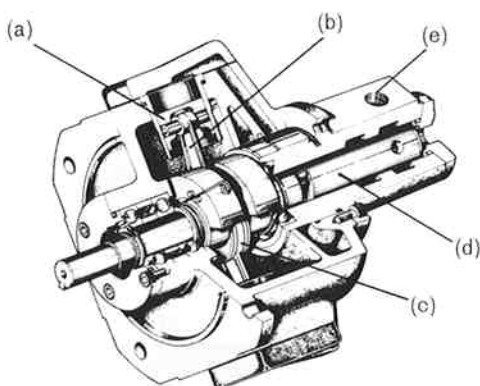
DIMENSIONAL TABLE

Symbol		A	B	CL	DL	EL	FL	GL	H	J	K	LL	ML	N	P	Q	R	S	T	Axial end				
Model code	Deceleration ratio																			a	b	d	e	f
TAM2-403LBG	005 010 015	545	490	210	160	195	165	40	115	238	φ12	50	75	16	Rc1/4	Rc1/4	30	30	40	55	30h6	7	7	4
	020 030	580	515	240	180	230	190	50	135	275	φ15	60	90	22	Rc1/4	Rc1/4	30	30	40	65	35h6	8	10	4.5
TAM2-404LBG	005 010 015	609	544	240	180	230	190	50	135	275	φ15	60	90	22	Rc3/8	Rc3/8	30	30	41	65	35h6	8	10	4.5
	020 030	639	569	275	215	265	225	55	155	306	φ15	65	95	25	Rc3/8	Rc3/8	30	30	41	70	45h6	8	12	4.5
TAM2-405LBG	005 010	711	646	240	180	230	190	50	135	288	φ15	60	90	22	Rc1/2	Rc1/2	40	40	49	65	35h6	8	10	4.5
	015 020	733	663	275	215	265	225	55	155	308	φ15	65	95	25	Rc1/2	Rc1/2	40	40	49	70	45h6	8	12	4.5
	030	763	683	310	240	295	245	60	180	353	φ19	70	110	30	Rc1/2	Rc1/2	40	40	49	80	50h6	8	12	4.5
TAM2-406LBG	005 010	922	842	310	240	295	245	60	180	373	φ19	70	110	30	Rc1	Rc1	60	60	65	80	50h6	8	12	4.5
	015 020	949	864	350	270	340	290	70	205	398	φ19	75	115	30	Rc1	Rc1	60	60	65	85	55h6	10	15	5
	030	984	889	390	300	380	320	75	230	431	φ24	80	130	35	Rc1	Rc1	60	60	65	95	65h6	12	18	6
TAM2-506LBG	005 010	958	873	350	270	340	290	70	205	398	φ19	75	115	30	Rc1	Rc1	60	60	65	85	55h6	10	15	5
	015 020	983	888	390	300	380	320	75	230	431	φ24	80	130	35	Rc1	Rc1	60	60	65	95	65h6	12	18	6
	030	1028	913	440	340	420	360	85	260	485	φ24	90	150	40	Rc1	Rc1	60	60	65	115	75h6	13	20	7

TAM2 RADIAL PISTON TYPE AIR MOTOR

STRUCTURE

ROTATION THEORY



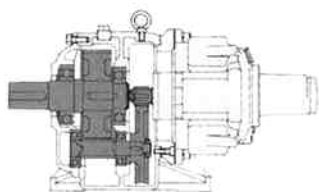
For Radial Piston Type Air Motor, piston (a) and crank shaft (c) are connected by connecting rod (b), and compressed air sent from A port (e) is successively supplied to cylinder by rotary valve (d) rotating with crank shaft. With the supply of compressed air, piston pushes crank and gains rotating force. B port at opposite side becomes exhaust port.

WITH DECELERATOR

Air motor with decelerator is combined with small-type decelerator gear to gain the stabilized rotation and high output at the slow rotation.

● FEATURES

1. Deceleration method is 2~3 phase variable speed according to the circumscribed gear system.
2. All gears are heat treated.
3. As air motor can be removed with high-speed pinion attached, it is very easy to conduct the inner inspection, disassembly and assembly of motor and gear case.



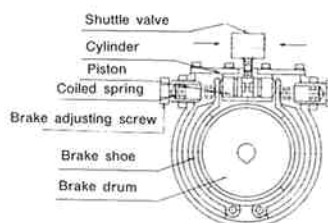
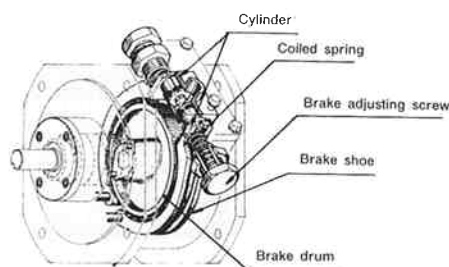
WITH BRAKE

Air motor can be stopped as engine brake is set by blocking the circuit with directional control valve, and brake torque corresponding to average start torque works in case that piping distance is short.

But air motor with powerful external brake is necessitated in case that rotation of motor is inconvenient as torque is applied from load side at the time of suspension. For air motor with brake introduced here, double lock type brake is used.

● FEATURES

1. Non-phase adjustment is available for torque as needed.
2. Structure is simple with little trouble and easy maintenance.
3. Air motor made of aluminum is small and light.



It is load-working type double lock air brake with brake force turned out by pushing force of coiled spring and release conducted by air pressure as usual. Brake shoe is opened from brake drum as piston for release works after air pressure is applied to supply port of air motor and simultaneously to brake cylinder.

When the rotation of air motor is stopped and air pressure is exhausted, the air pressure of brake cylinder is also exhausted instantly and brake shoe is pushed to drum with pushing force of coiled spring. The adjustment of brake torque is conducted with brake adjusting screw from the outside according to the necessary torque.

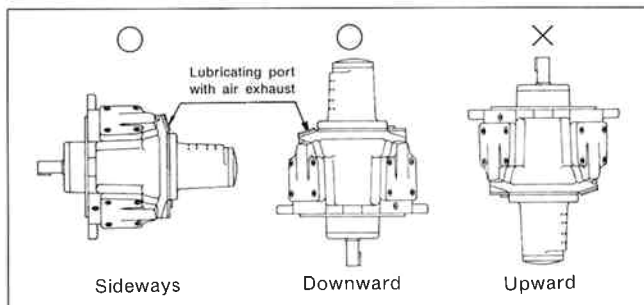
RADIAL PISTON TYPE AIR MOTOR **TAM2**

HANDLING INSTRUCTIONS

■ PRECAUTIONS FOR MOUNTING

FUNDAMENTAL TYPE·WITH BRAKE

- Horizontal mounting...It shall be mounted so that lubricating port is set at upper side.
- Vertical mounting...It shall be mounted so that output shaft is set downward.



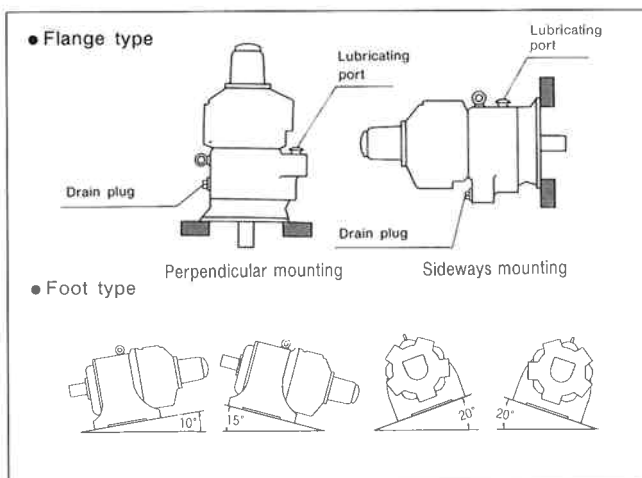
WITH DECELERATOR

- Flange type
For air motor with flange type decelerator, the perpendicular mounting (shaft is vertical) is standard, but the sideways mounting (shaft is horizontal) is available if the mounting position of lubricating port and drain plug of decelerator is changed.

- Foot type
Air motor with foot type decelerator shall be mounted horizontally as much as possible because the lubrication for gear become worse and oil leak is caused if mounting is inclined.

In case that the mounting is inclined inevitably, it shall be made at the allowable mounting angle as shown in the following figures.

In case that it exceeds the allowable mounting angle, contact us.



LUBRICATION

- With air lubricator mounted at the air pressure supply side, the spray lubrication shall be conducted.
- As lubricating oil for airline lubrication, the inside mounting oil for air motor or equivalent shall be used.

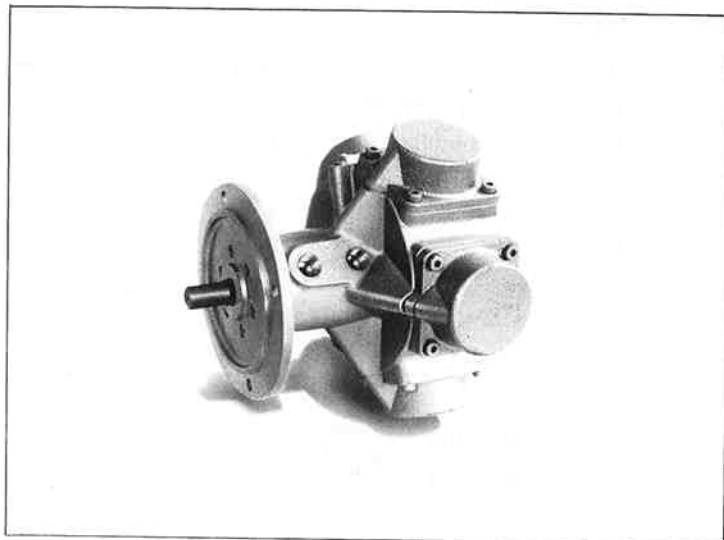
- Lubricating quantity is as follows :

Model code	Lubricating quantity
TAM2-403	2~3drops/min
TAM2-404	2~3drops/min
TAM2-405	3~4drops/min
TAM2-406	4~5drops/min
TAM2-506	4~5drops/min
TAM1-507	3~4drops/min

⚠ PRECAUTION

Insufficient lubrication will cause troubles such as shortening of life and seizure of rotary valve, piston and sleeve. Set an air lubricator near the air motor as much as possible.

TAM1 RADIAL PISTON TYPE AIR MOTOR



Low-speed high torque type air motor with the most outstanding outcome attained.

- Oil lubrication with air lubricator is necessary. (2~3drops/min)
- With the adoption of oil bath type, reliability is excellent.

SPECIFICATIONS

Item		TAM1-507※
at Max. output (0.5MPa)	Power W	735
	Torque N·m	23.5
	Rotation R.P.M.	300
	Air consumption ℓ/min (ANR)	1,000
Stop Torque	N·m	45.1
Start Torque	N·m	37.3
Weight kg	F type	15
	L type	16

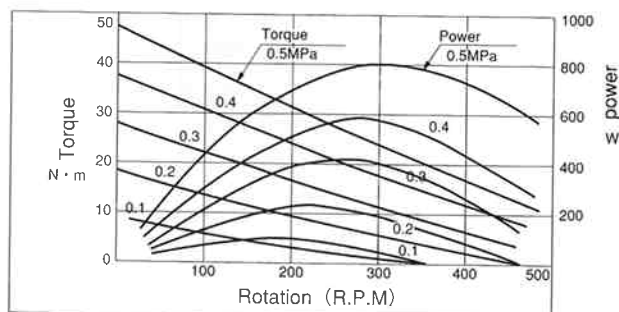
Note) The above specifications indicate the performance at ambient temperature of 20°C.
Air motor performance values shown apply when the pressure on the exhaust side is atmospheric pressure.

- Working fluid : Air
- Rated pressure : 0.5MPa
- Operating pressure : 0.2~0.6MPa
- Ambient temperature : -10~+70°C (Use in unfrozen condition)
- Lubricating oil : Inside mounting oil...
FBK turbine 32 (Nippon Oil)
Airline lubrication...
JIS K2213-1 (Natural turbine oil ISO VG32)
or equivalent
- Range of recommended rotation : 60~300rpm

⚠ PRECAUTION

Insufficient lubrication will cause troubles such as shortening of life and seizure of rotary valve, piston and sleeve. Set an air lubricator near the air motor as much as possible

PERFORMANCE CURVE



MODEL CODE

For order, specify the following code.

TAM1-507 ※

Series

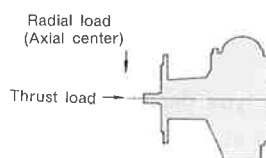
Code

Mounting type

F : Flange type

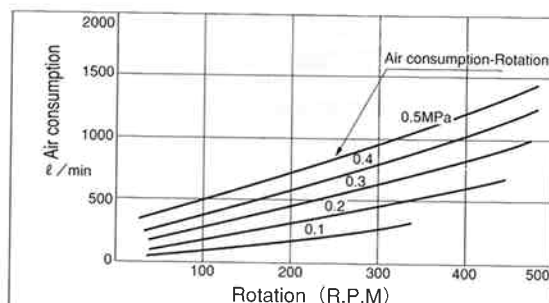
L : Foot type

ALLOWABLE AXIAL LOAD



Unit : N

Item	TAM1-507※
Radial load	490
Thrust load	686



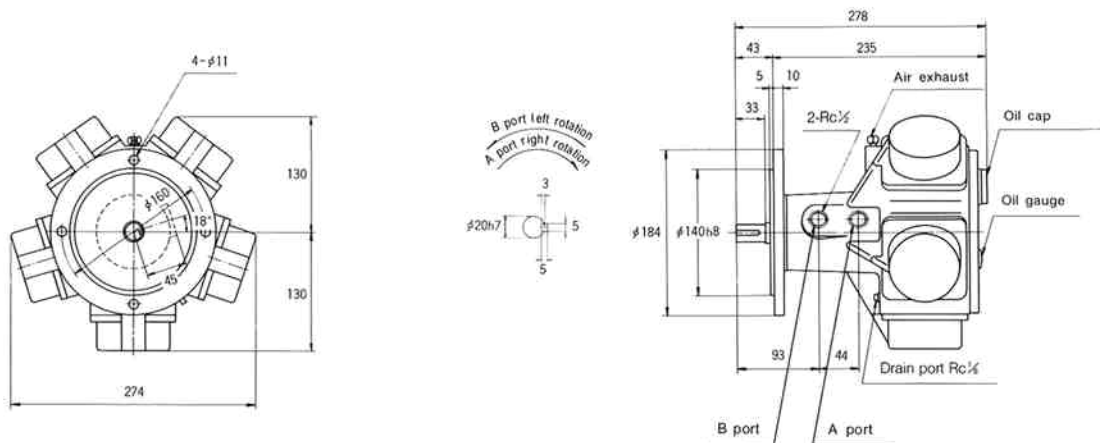
□ Range of Recommended rotation

RADIAL PISTON TYPE AIR MOTOR **TAM1**

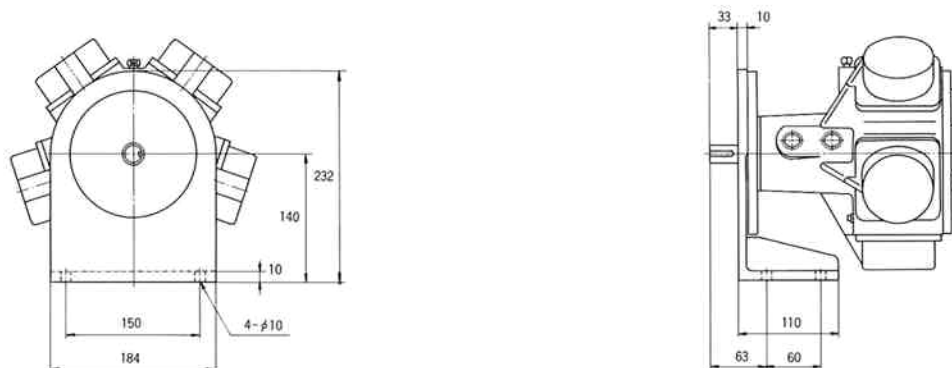
DIMENSIONAL DRAWINGS

Unit : mm

FLANGE TYPE TAM1-507F

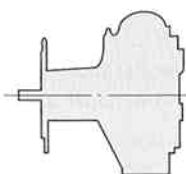


FOOT TYPE TAM1-507L

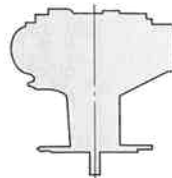


PRECAUTIONS FOR AIR MOTOR MOUNTING

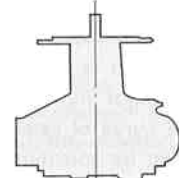
Mount the air motor with the output shaft directing sideways (with oil port with air breather atop) or downward as shown. Note carefully that the air motor cannot be mounted with the output shaft directing upward.



Side ways



Down ward

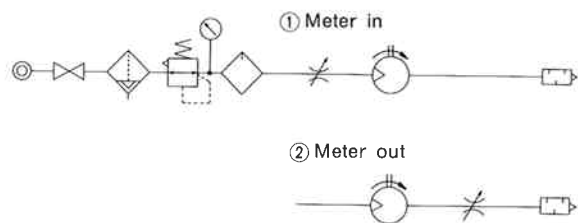


Up ward

SELECTION MATERIALS

BASIC CIRCUIT

SINGLE DIRECTION ROTATION CIRCUIT

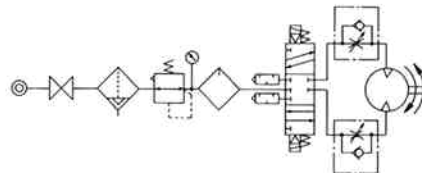


In the circuit of continuous rotation only for single direction (stop with stop valve), those almost near the value of catalog can be gained with exhaust side affected only by back pressure of silencer.

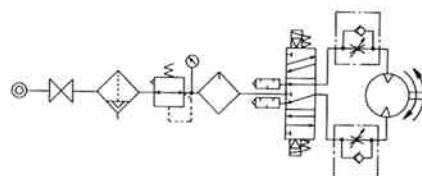
In case that it is used with low-speed rotation and that rotation with variation of load is made a little, throttle valve shall be put in exhaust side.
(Pump, agitating, driving, etc.)

COUNTER-CLOCKWISE, CLOCKWISE ROTATION CIRCUIT

① 3 position closed center type valve

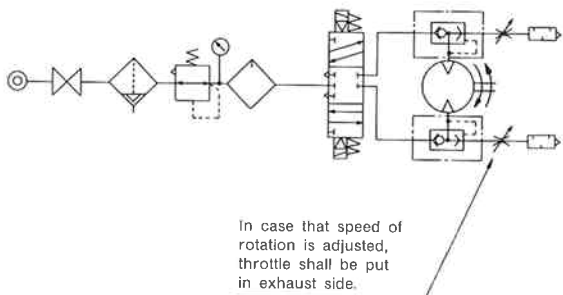


② 3 position exhaust center type valve



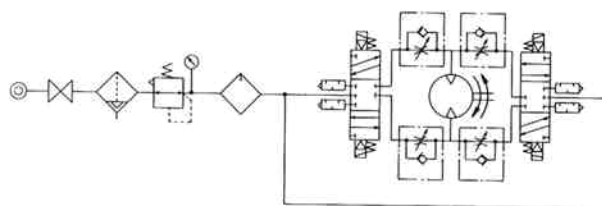
It is a circuit for counter-clockwise, clockwise rotation and stop of motor with solenoid valve. Although the circuit is most widely utilized, cautions shall be taken for valve and piping capacity because the valve capacity and piping resistance may be easily affected, and at the same time, piping distance of motor and valve shall be shortened as much as possible.
(Conveyor, truck driving, etc.)

COUNTER-CLOCKWISE, CLOCKWISE ROTATION, HIGH OUTPUT CIRCUIT



In circuit designed not to raise back pressure with quick exhaust valve put in counter-clockwise, clockwise rotation circuit, the output and rotation that are almost near the performance curve of catalog, can be gained. But cautions shall be taken for too much increase of rotation.

COUNTER-CLOCKWISE, CLOCKWISE ROTATION, DECELERATION CIRCUIT

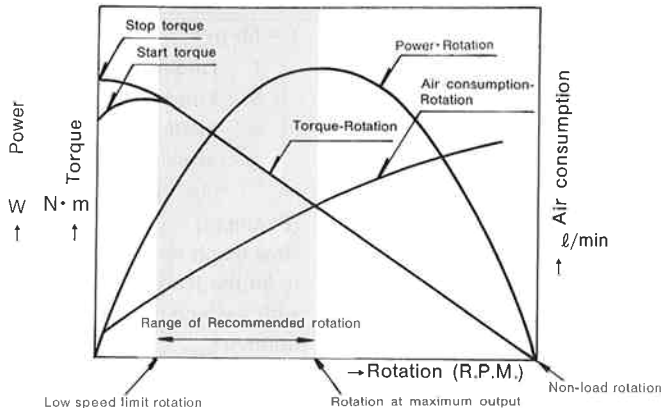


It is 2-phase speed circuit that is capable of counter-clockwise, clockwise rotation, deceleration, stop. There is little pressure loss as supply and exhaust are made by 2 valves at high speed.

CHARACTERISTICS

■ PERFORMANCE CURVE

It is called the air motor performance curve that the relation of torque, horse power and air consumption against the change of rotation is indicated in case that air supply pressure was uniformed. The relation is shown in the following chart.



● ROTATION

Rotation shall be applied in the range from rotation at the maximum output to rotation in the low-speed limit. When lower speed is needed, the deceleration system shall be adopted.

If it is used with rotation larger than that at the maximum output, the life is shortened. For rotation less than the low-speed limit, it is also hard to be stabilized.

● TORQUE-ROTATION

Rotation lowers following the increase of load torque as torque is in inverse proportion to rotation. When load continues to increase, air motor stops. It is called stop torque. Affected by lubrication and friction, the start torque is generally 80~85% of stop torque.

● HORSE POWER-ROTATION

Horse power becomes the maximum value at the position that is about half of non-load rotation. Accordingly, there are two places to apply the similar horse power at low-speed side and high-speed side centering on the rotation with the maximum horse power. But it shall be used at low-speed side. Air consumption can be economized.

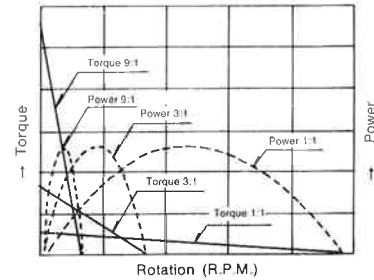
● AIR CONSUMPTION-ROTATION

Air consumption is approximately in proportion to rotation and rectilinearly increases following the raise of rotation. Accordingly, it becomes the maximum consumption under the uniformed pressure in the non-load rotation (maximum rotation). The air consumption rate (air consumption/output) becomes the minimum value at about 80% of rotation at the maximum output. It is most economical to use at the minimum value.

■ WITH DECELERATOR

In case that air supply pressure is uniformed and that the deceleration system is adopted for output shaft of air motor, the performance curve becomes as shown in the following chart.

- The max. horse power reduces a little as much as the transmission efficiency of the decelerator. The horse power-rotation curve becomes as shown in the following chart.
- As torque increases at the rate of deceleration, (consideration of the transmission efficiency of the decelerator is required.) the torque-rotation curve is inclined largely.



The above chart indicates 3 examples of deceleration ratio 1:1 in direct connection, 3:1 and 9:1 for curves of torque and horse power of air motor.

■ VARIOUS FACTORS

Besides the above performance curve, there is a variety of characteristics due to various factors such as air supply pressure, back pressure and deceleration.

● AIR SUPPLY PRESSURE

When air supply pressure is changed, torque, horse power, rotation and air consumption all of air motor are also changed in proportion to pressure, and there is a wide range of practical use.

With the adjustment of air supply pressure, the output is generally adjusted. To uniform the set pressure, it is necessary to adjust the secondary pressure with reducing valve so that it becomes lower than the variable range of primary pressure.

● FLOW

In proportion to flow, the rotation is adjusted generally following the adjustment of flow.

● BACK PRESSURE

When back pressure becomes large even if supply pressure is uniformed, torque, horse power and rotation become small.

● EXHAUST NOISE

Although exhaust noise of piston type air motor is comparatively small, silencer shall be used further to avoid exhaust noise. Unless effective silencer is used, back pressure rises and the output of motor lowers. The use of auto-muffler is recommended.

● OPERATION SPEED

1. Piston type air motor is low-speed high torque type. But, pulsation is seen when it becomes less than the low-speed limit rotation. Even if torque is large, horse power becomes small. When the air motor is used in parallel with the deceleration structure in such case, it becomes high torque at low speed and is able to use nearly at the maximum horse power. The recommended rotation range is $(0.2 \sim 1) \times \text{rotation at maximum output}$.
2. In test run, increase the rotation gradually up to the required level by adjusting the orifice. If the rotation should exceed max. output rotation, break of the air motor will be caused. Be sure to check the rotation on the tachometer.
3. Vane type air motor is high-speed type, but the life of air motor is extremely shortened if it is used with rotation far exceeding the rotation at maximum output. The efficiency becomes worse with the use at low-speed rotation. Be sure to adjust the speed after checking rotation on the tachometer.

SELECTION MATERIALS

CALCULATION METHOD

In case of the selection of air motor, it is necessary to choose with power or torque.

• Selection with power H (W)

Drive for rotating while output is continuously transmitted.

PUMP DRIVE • AGITATOR • BLOWER

• Selection with torque T (N·m)

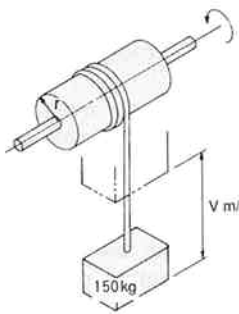
In case that torque·time at start and stop causes problem, GD^2 (flywheel effect) of load shall be calculated to select from torque necessary for start and stop.

DRIVE SOURCE OF GENERAL INDUSTRIAL MACHINE • TRUCK DRIVE

$$H = \text{Power (W)} \quad M = \text{weight (kg)} \quad V = \text{Speed (m/s)}$$

(Example)

For lifting the weight of 150kg at 0.1m/s, how much power is necessary?



(Answer)

$$\begin{aligned} \text{Power } H &= M \cdot g \cdot V \\ &= 150 \times 9.8 \times 0.1 \\ &= 147 \text{ W} \end{aligned}$$

■ TERMINOLOGY

Air motor performance values apply when the pressure on the exhaust side is atmospheric pressure.

Stop torque : When load increases during rotation of an air motor, rotation of the motor decreases linearly, and the air motor stops when the rotation is balanced with the load torque.

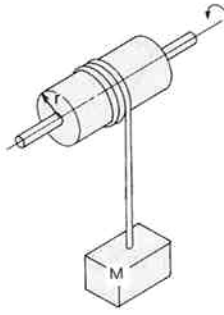
This torque is called the stop torque.

Brake torque : This means a torque which can be held by an air motor with brake.

Start torque : This means a torque generated when the motor is started.

■ TORQUE

It is the force for rotating movement (rotation force) or backward force. It is indicated by the product of rotating force F and distance from center of rotation (radius) r.



$$T = M \cdot g \cdot r$$

T : Torque (N·m)
 M : Load (kg)
 r : Radius (m)
 g : gravity accelerating speed 9.8 m/s²

(Example)
How much torque is necessary to lift the load of 100kg with a winch drum bore of 300mm?

(Answer)
 $T = M \cdot g \cdot r = 100 \times 9.8 \times \frac{0.3}{2} = 147 \text{ N} \cdot \text{m}$
 147N·m is necessary for torque.

■ RELATION OF POWER AND TORQUE

If substance performs N rotation by gaining a torque of T (N·m)

$$\text{Power } H \text{ (W)} = \frac{2\pi \cdot N \cdot T}{60} = \frac{N \cdot T}{9.549}$$

$$\text{Torque } T \text{ (kgf} \cdot \text{m)} = \frac{60}{2\pi} \cdot \frac{H}{N} = 9.549 \cdot \frac{H}{N}$$

N : Rotation per minute (R.P.M.)

$$N = \frac{V}{\pi \cdot D} \times 60 \text{ (R.P.M.)}$$

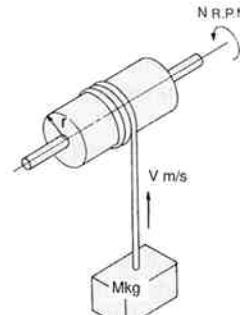
V : Speed (m/s)

D : Diameter of rotating substance (m)

T : Torque (N·m)

(Example)

How much power is necessary to lift the weight of 100kg with a drum bore of 300mm at the speed of 0.5m/s?



(Answer)

$$\begin{aligned} \text{Torque } T &= M \cdot g \cdot r \\ &= 100 \times 9.8 \times \frac{0.3}{2} \\ &= 147 \text{ N} \cdot \text{m} \end{aligned}$$

$$\begin{aligned} \text{Rotation } N &= \frac{V}{\pi \cdot D} \times 60 \\ &= \frac{0.5 \times 60}{0.3 \pi} \\ &= 32 \text{ (R.P.M.)} \end{aligned}$$

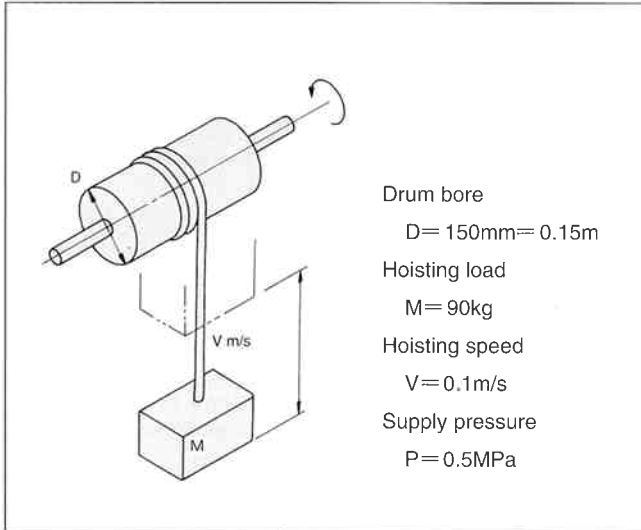
$$\begin{aligned} \text{Power } H &= \frac{2\pi}{60} \cdot N \cdot T \\ &= \frac{2 \times 3.14}{60} \times 32 \times 147 \\ &= 492 \text{ (W)} \end{aligned}$$

SELECTION MATERIALS

EXAMPLE 1 WINCH DRIVE

Which type of air motor is used to lift the weight of 90kg with the drum bore of 150mm at 0.1m/s?

Supply pressure $P = 0.5\text{MPa}$



① Calculate the necessary power H of air motor.

Load power H_1 is,

$$H_1 = M \cdot g \cdot V = 90 \times 9.8 \times 0.1 = 88.2\text{W}$$

② Criterion of air motor type

With surplus rate of 2 on assumption of output decrease caused by load leaving out of account and back pressure, the necessary power is,

$$H = H_1 \times \text{Surplus rate} = 88.2 \times 2 = 176.4\text{W}$$

TAM4-030 is set as criterion.

③ Calculate the deceleration ratio i .

Set rotation of air motor N_M is set at about 70% of rotation at maximum output N_H .

Rotation at maximum output of TAM4-030 is

$N_H = 750 \text{ R.P.M.}$ (As seen in specifications).

$$N_M = N_H \times 0.7 = 750 \times 0.7 = 525$$

Accordingly, it is set at about 525 R.P.M.

Calculate the drum rotation N_L .

$$N_L = \frac{V}{\pi \cdot D} = \frac{0.1 \times 60}{\pi \times 0.15} = 12.7 \text{ R.P.M.}$$

Deceleration ratio i is,

$$\text{Deceleration ratio } i = \frac{N_M}{N_L} = \frac{525}{12.7} = 41.3$$

$$\text{Deceleration ratio } \frac{1}{i} = \frac{1}{40}$$

(In case that there is no appropriate deceleration ratio, it shall be studied with drum bore.)

④ Confirmation of air motor power in working rotation

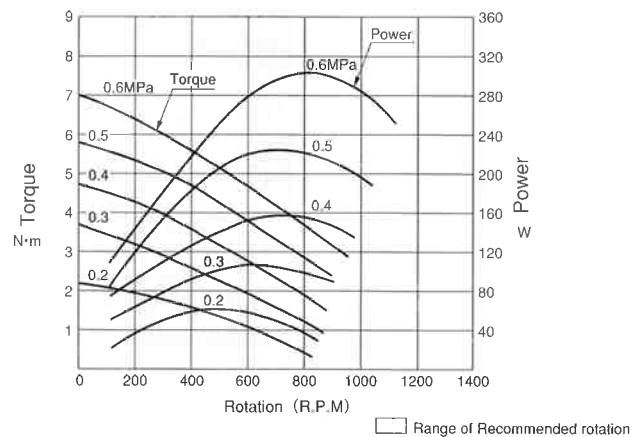
Working rotation of air motor N_U is,

$$N_U = N_L \cdot i = 12.7 \times 40 = 508 \text{ R.P.M.}$$

With torque T_U at N_L as $4.2 \text{ N} \cdot \text{m}$, decelerator conductive efficiency as $\eta = 0.9$ according to performance curve, Output, power H_U at N_U is,

$$H = \frac{2 \pi N_U \cdot T_U \cdot \eta}{60} = \frac{2 \times 3.14 \times 508 \times 4.2 \times 0.9}{60} = 201\text{W}$$

• TAM 4-030



Confirm it is more surplus than the necessary power H or air motor calculated in Item ②.

$$H = 176.4\text{W} < 201\text{W} = H_U$$

Hereby TAM4-030 is selected as motor.

Brake is mounted to prevent the decrease due to inverse load in suspension.

Accordingly, code is TAM4-030 □ BG040.

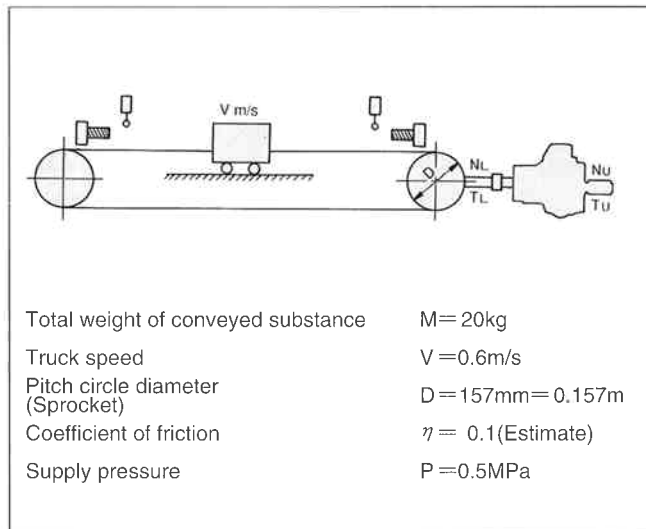
SYMBOL EXPLANATION

H	Necessary power
H_1	Load power
H_U	Output power
i	Deceleration ratio
η	Decelerator conductive efficiency
N_H	Rotation at maximum output
N_L	Drum rotation
N_M	Set rotation
N_U	Working rotation
T_U	Torque in working rotation

SELECTION MATERIALS

EXAMPLE 2 TRUCK DRIVE

Which type of air motor is selected to meet with the following specifications?



① Calculate the necessary power H of air motor.

Load power H_1 is,

$$H_1 = 0.1 \times 20 \times 9.8 \times 0.6 = 11.76\text{W}$$

② Criterion of air motor type

With the surplus rate of 2 on assumption of output decrease caused by load factor leaving out of count, brake force in deceleration suspension, and back pressure, the necessary power H is,

$$H = H_1 \times \text{Surplus rate} = 11.76 \times 2 = 23.52$$

TAM4-010 is set as criterion.

③ Calculate the deceleration ratio i .

Set rotation N_M of air motor is set at about 70% of rotation N_H at maximum output.

TAM4-010 rotation at maximum output $N_H = 1100$ R.P.M.

(as seen in specifications)

$$N_M = N_H \times 0.7 = 1100 \times 0.7 = 770\text{R.P.M.}$$

Accordingly, it is set at about 770 R.P.M.

Calculate the sprocket rotation N_L .

$$N_L = \frac{V}{\pi \cdot D} = \frac{0.6 \times 60}{\pi \times 0.157} = 73\text{R.P.M.}$$

Deceleration ratio i is,

$$i = \frac{N_M}{N_L} = \frac{770}{73} = 10.5$$

Deceleration ratio is set at $\frac{1}{i} = \frac{1}{10}$

(In case that there is no appropriate deceleration ratio, it shall be studied with pitch circle diameter.)

④ Confirmation of air motor power in working rotation.

Working rotation N_U of air motor is,

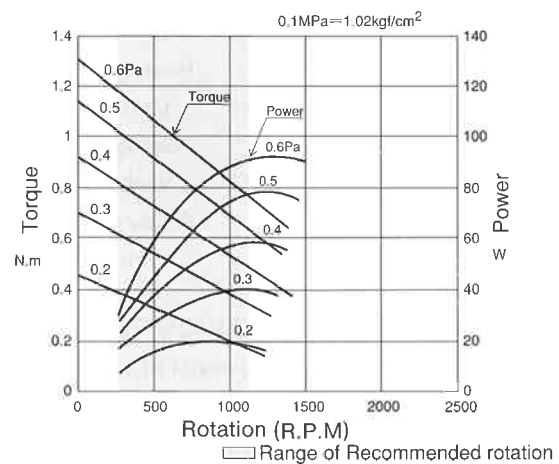
$$N_U = N_L \cdot i = 73 \times 10 = 730\text{R.P.M.}$$

According to characteristics curve, torque T_U at N_U is $0.81\text{N}\cdot\text{m}$.

With decelerator conductive efficiency as $\eta = 0.9$, output power H_U at N_U is,

$$H_U = \frac{2\pi \cdot N_U \cdot T_U \cdot \eta}{60} = \frac{2 \times 3.14 \times 703 \times 0.81 \times 0.9}{60} = 53.6\text{W}$$

● TAM4-010



Confirm it is more surplus than the necessary power H of air motor calculated in Item ②.

$$H = 23.52\text{W} < 53.6\text{W} = H_U$$

Hereby, TAM4-010 is selected as motor.

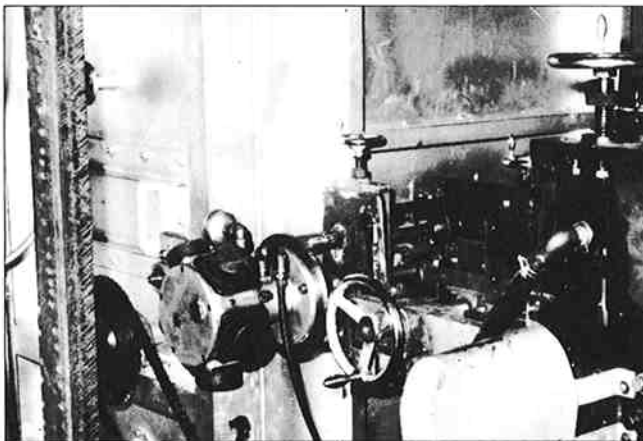
Accordingly, code is TAM4-010 L G010.

PRACTICAL EXAMPLES



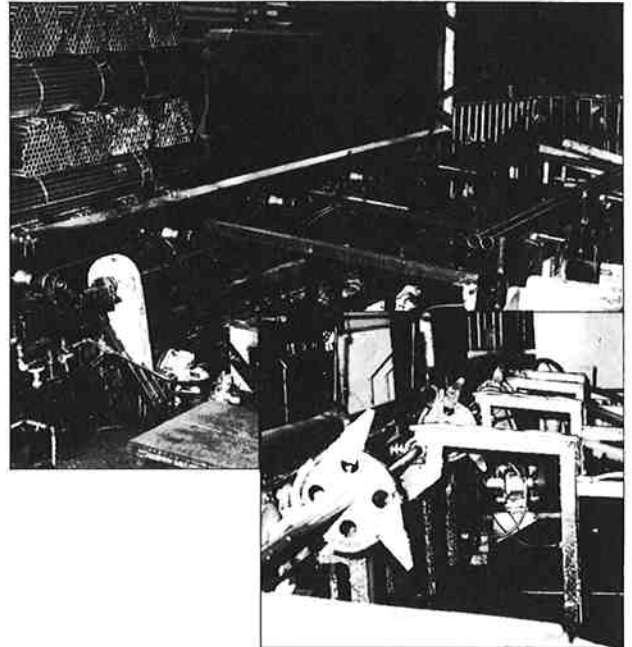
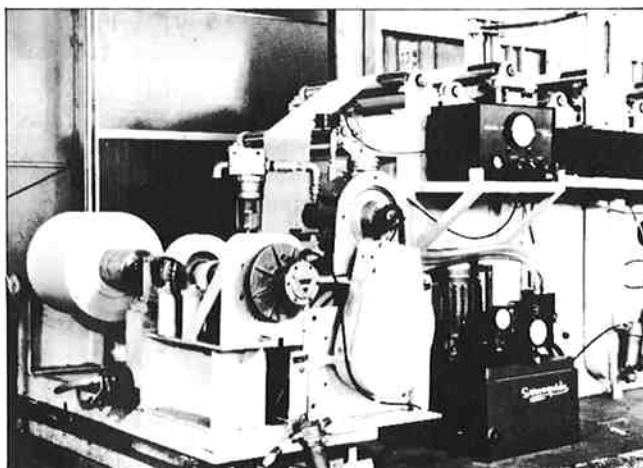
Drive of mono pump

It is a forcing pump of high viscous fluid such as paint, ink, cream, adhesive and mortar. It is most suitable to chemical plant, for which explosion-proof is especially demanded.



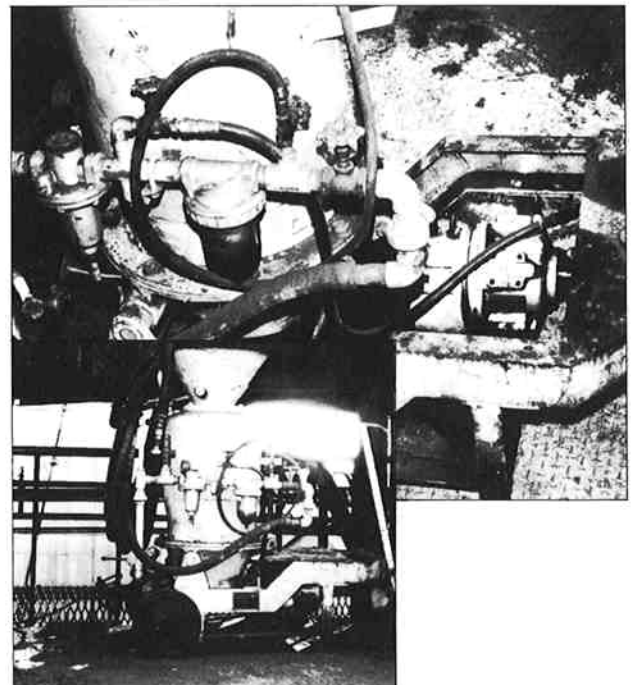
Damper opening, closing of furnace

Opening, closing can be adjusted freely by converting the rotation of air motor into screw conveyance and raising the stop accuracy. It is also reliable against the pyrogenetic atmosphere.



Pipe delivery device

Pipe delivered on conveyor is exhausted separately to outlet shoot with rotary lever driven by air motor, and rotary lever can be suspended at the fixed position of 120° each without using clutch and brake.



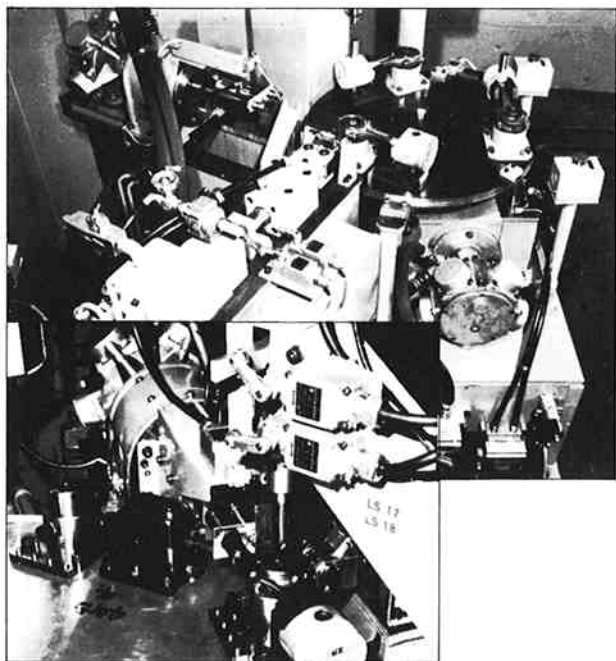
Cement gun

Air motor to be used for delivering the fixed quantity of concrete while it is agitated, can freely adjust the delivery to meet the application.

◀ Wave tension control device

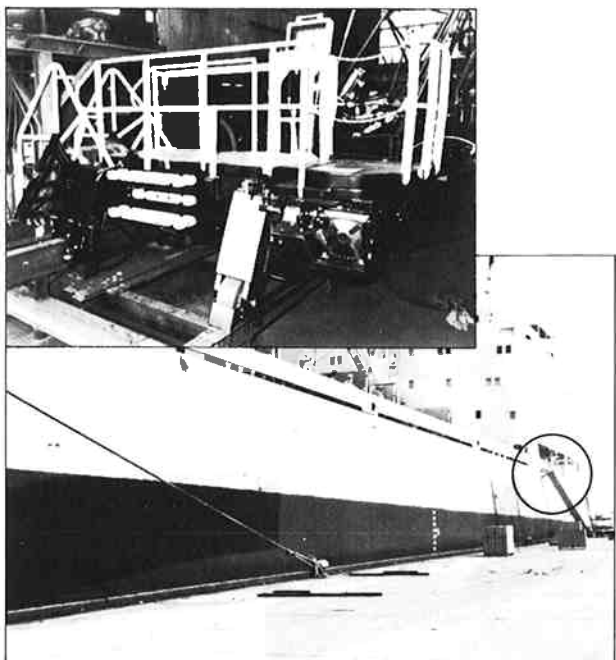
Tension control and take-up devices are pneumatically pressurized. Air motor is used for take-up, and a take-up torque can be placed under automatic control with pneumatic control signal.

PRACTICAL EXAMPLES



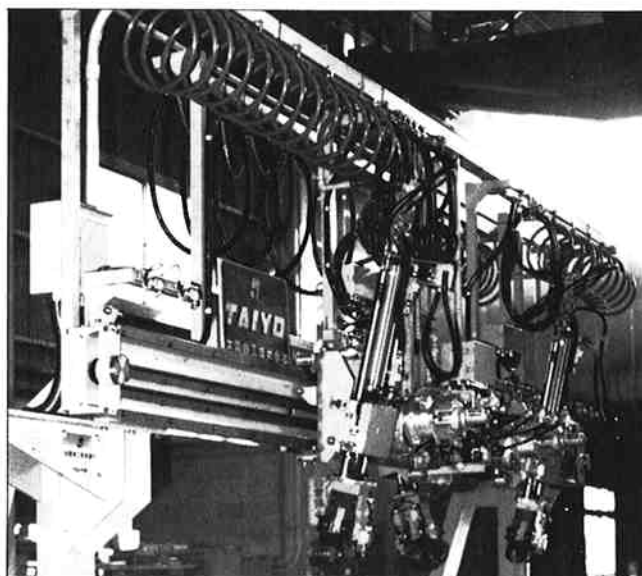
Index table and nut runner

Index table can set the position with pushing suspension at dividing plate. With air pressure adjusted at regulated stop torque, nut runner automatically stops when load torque moves up to stop torque. Clamp torque can be maintained uniformly.



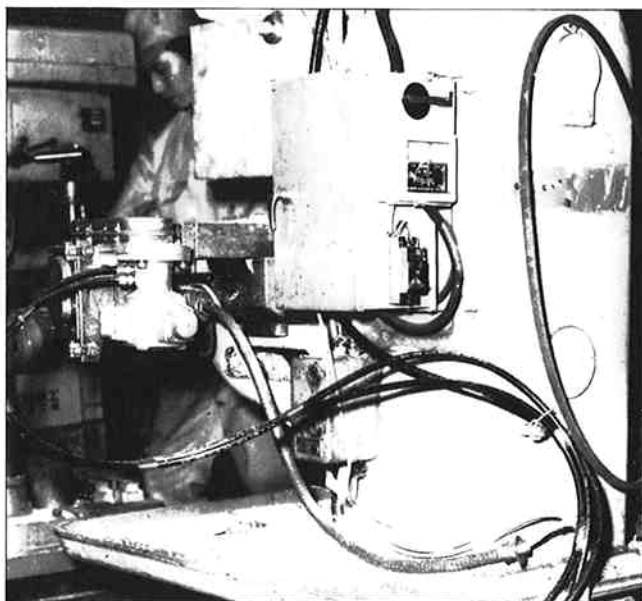
Gangway ladder equipment

It is a ladder elevating device for berthing ships. It is especially suitable for tanker and LPG ship with explosion-proof demanded.



Running drive of auto loader

The air motor can be used to run auto loader which repeats high-speed operation, low-speed operation, stop and counterclockwise rotation. The auto loader operation can be automated.



Delivery of milling machine on table

Although the change-over of one cycle (counter-clockwise, clockwise rotation) had hitherto been conducted manually, one cycle and continuous cycle can be simply automated with the use of air motor.

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