

13 Displacements 13 Schluckvolumen 13 Cylindrée 13 Despazamientos	(8.6 to 58.5 in <sup>3</sup> /rev) 141 . . . 959 cm <sup>3</sup> /rev
<b>Maximum Pressure</b> Eingangsdruck Pression entrée Presion Maxima	<b>Cont.</b> (3000 psid) ... 207 bar <b>Int.</b> (4000 psid) ... 276 bar
<b>Maximum Oil Flow</b> Schluckstrom Débit d'huile Caudal Maximo de Aceite	(30 gpm) ... 114 lpm
<b>Maximum Speed</b> Drehzahl Vitesse de rotation Velocidad Maxima	(660 rpm) <b>660 rpm</b>
<b>Maximum Torque</b> MaxDrehmoment Couple Torque Maximo	<b>Cont.</b> (9,239 lb in) <b>1044 Nm</b> <b>Int.</b> (12,636 lb in) <b>1428 Nm</b>
<b>Maximum Side Load at Key</b> Seitenlast Charges latérales Carga Maxima Lateral	(4790 lb) ... 21306 N

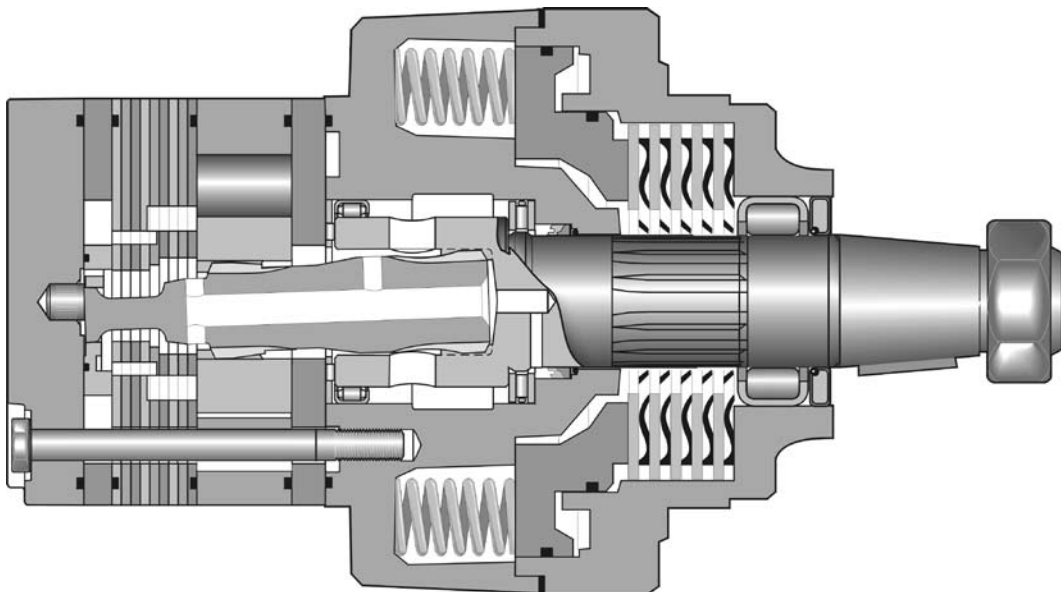
**! CAUTION!**  
 See installation/operating instructions for product cautions and proper use.

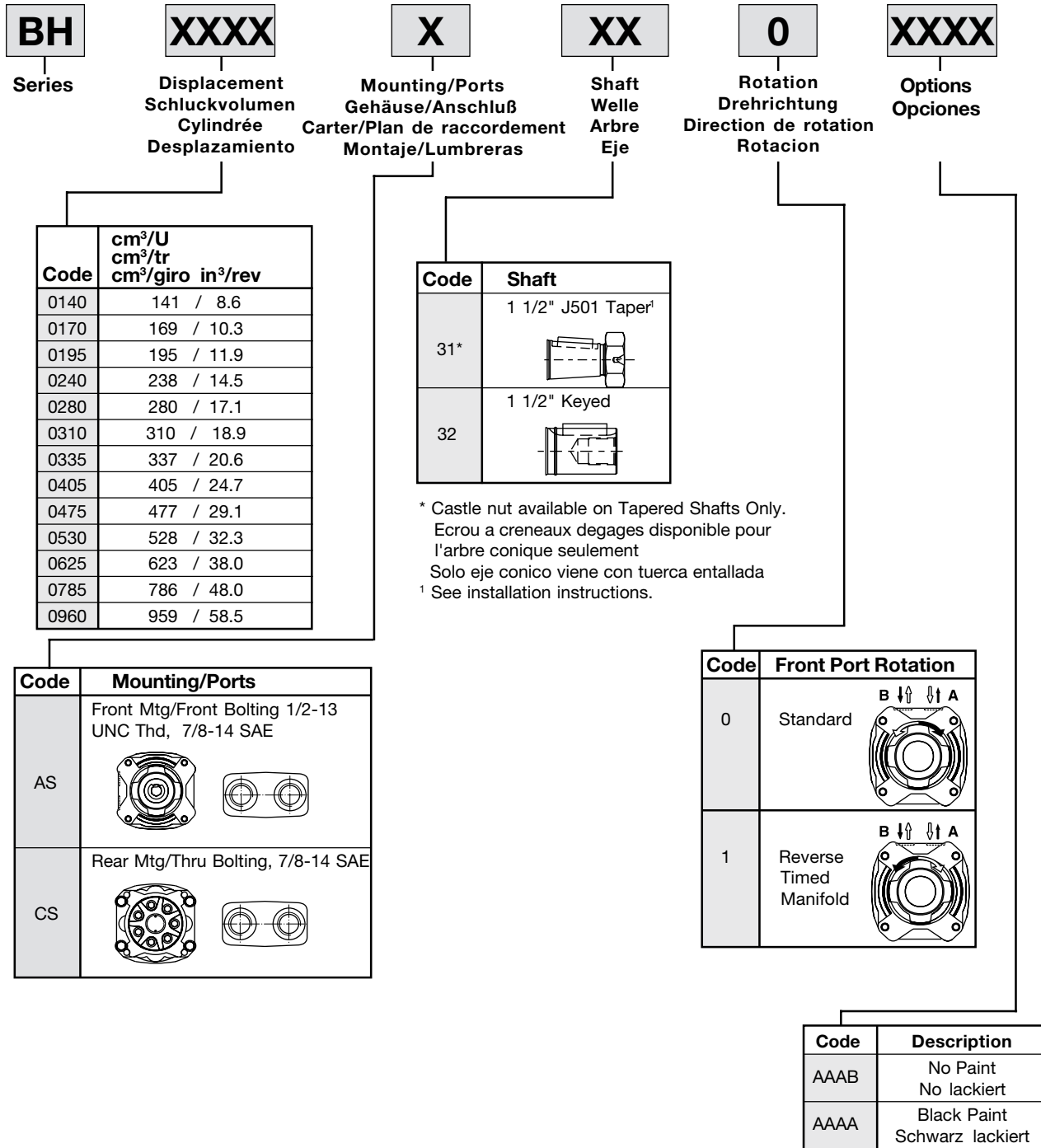
## Exceptional Strength and Durability in a High Performance Motor/Brake Package

This brake motor consists of a BH Series motor integrated into a wet disc, spring applied, hydraulically released brake. Standard holding capacity is 16,000 lb in of holding torque. The brake is front mounted for reliable operation even in the event of a system failure. The brake release port is capable of pressures to 3000 PSI.



Rated Brake Holding Capacity @ Zero Release Pressure Nm (in-lbs)	Maximum Full Release Pressure bar (PSI)
1800 (16,000)	22 (315)
16,000 in-lbs is standard holding capacity. For other holding capacities, consult the factory for price and availability.	

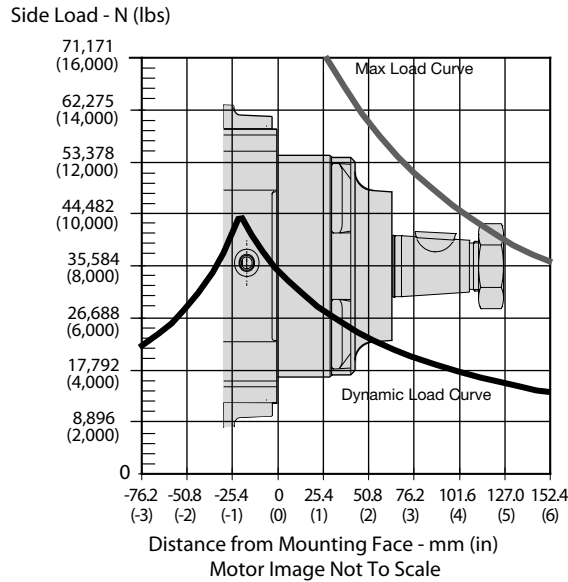




For performance data curves, see TH section.

For other available options, see pages 257–258.

Wheel Mount/Radnabengenhause  
Monture à roue/ Montaje de rueda



The maximum load curve is defined by bearing static load capacity. This curve should not be exceeded at any time including shock loads.  
Die maximale radiale Wellenbelastungskurve ist definiert als maximale statische Last ohne Drehzahl. Sie gilt als Grenze und sollte keinesfalls überschritten werden.  
La courbe de charge maximale est définie par la capacité de charge statique portante. Cette courbe ne devrait être dépassée en aucun moment y compris pour les charges par à-coups.  
La curva de carga máxima queda definida por la capacidad de carga estática del cojinete. No se deben superar los valores de esta curva, ni siquiera con cargas provisionarias de impacto.

The dynamic side load curve is based on uni-directional steady state loads for  $L_{10}$  bearing life at  $6 \times 10^6$  revolutions.  
Die zulässige auslegbare radiale Wellenbelastungskurve ist unter ruhenden, einseitig statisch gerichteten Lastverhältnissen auf eine  $L_{10}$  Lebensdauer mit  $6 \times 10^6$  Umdrehungen kalkuliert.  
La courbe de charge latérale permise se base sur des charges unidirectionnelles en régime permanent pour le roulement  $L_{10}$  à  $6 \times 10^6$  révolutions.  
La curva de valores admisibles de carga lateral está basada en cargas constantes para cojinetes  $L_{10}$  a  $6 \times 10^6$  revoluciones.

Equation to Calculate the Expected Radial Bearing Life  
Gleichung zur Ermittlung der Lagerlebensdauer

Equation to calculate the dynamic bearing life for a given load:  
Bestimmung der erlaubten radialen Wellenbelastung mit vorgegebener Last

Use  $F_a$ ,  $F_b$  and  $S$  in equation to determine hours of  $L_{10}$  bearing life.  
Die Lebensdauer in Stunden ergibt sich durch einsetzen von  $F_a$ ,  $F_b$ , und  $S$  in die nachstehende Formel.

$$L = \frac{6 \times 10^6}{60 \times S} \left\{ \frac{F_a}{F_b} \right\}^{3.33}$$

Where / Mit:

$S$  = Shaft Speed RPM / Abtriebswellendrehzahl in  $\text{min}^{-1}$

$L$  = Life In Hours / Lebensdauer in Stunden

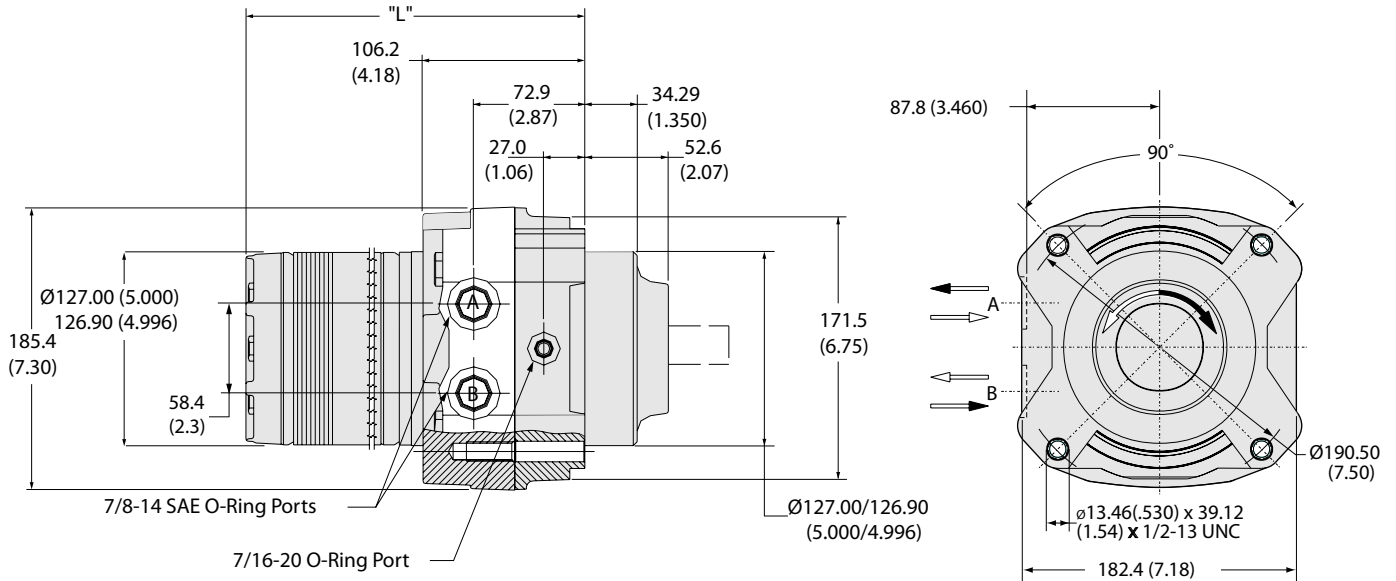
$F_a$  = Dynamic side load defined by above curve at a distance from mounting flange. / Erlaubte radiale Wellenbelastung als Function der Laenge

$F_b$  = Application side load. / Anwendungsseitige Wellenbelastung

Note: Calculations are based on  $L_{10}$  bearing life per ISO 281.  
Auslegung basiert auf einer  $L_{10}$  Lebensdauer nach ISO 281

**Code: AS**

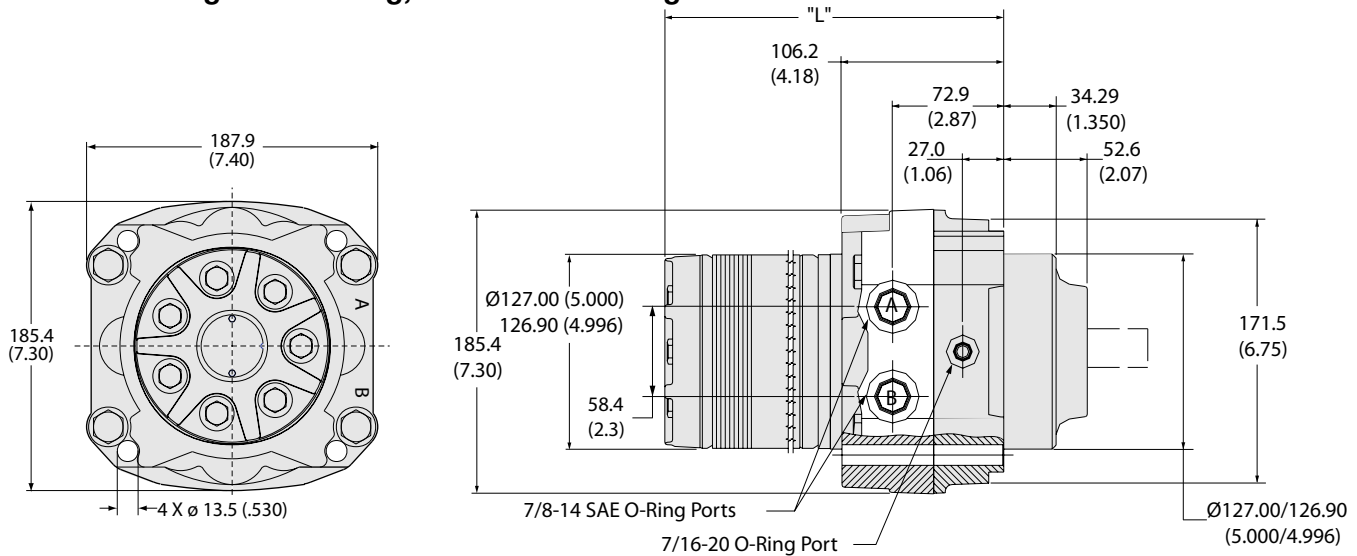
**Front Mounting / Front Bolting, 7/8-14 SAE O-Ring**



Code AS		0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	kg	27.3	27.5	27.8	28.1	28.5	28.7	28.9	29.5	30.2	30.9	31.7	33.2	34.9
Poids/Peso	(lb)	(60.2)	(60.8)	(61.3)	(62.1)	(63.0)	(63.5)	(63.9)	(65.2)	(66.7)	(68.3)	(69.9)	(73.3)	(77.1)
Length	"L" mm	198.6	201.7	205.0	209.6	214.4	217.9	220.7	228.1	236.7	243.1	252.5	271.5	290.6
	"L" (in)	(7.82)	(7.94)	(8.07)	(8.25)	(8.44)	(8.58)	(8.69)	(8.98)	(9.32)	(9.57)	(9.94)	(10.69)	(11.44)

**Code: CS**

**Rear Mounting/Thru Bolting, 7/8-14 SAE O-Ring**

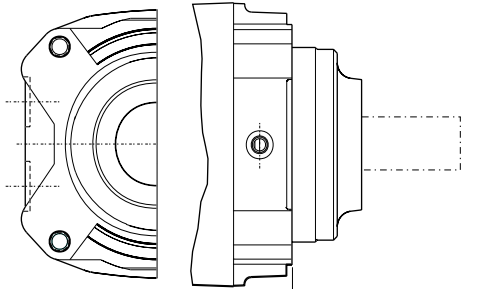


Code CS		0140	0170	0195	0240	0280	0310	0335	0405	0475	0530	0625	0785	0960
Weight/Gewicht	kg	27.3	27.5	27.8	28.1	28.5	28.7	28.9	29.5	30.2	30.9	31.7	33.2	34.9
Poids/Peso	(lb)	(60.2)	(60.8)	(61.3)	(62.1)	(63.0)	(63.5)	(63.9)	(65.2)	(66.7)	(68.3)	(69.9)	(73.3)	(77.1)
Length	"L" mm	198.6	201.7	205.0	209.6	214.4	217.9	220.7	228.1	236.7	243.1	252.5	271.5	290.6
	"L" (in)	(7.82)	(7.94)	(8.07)	(8.25)	(8.44)	(8.58)	(8.69)	(8.98)	(9.32)	(9.57)	(9.94)	(10.69)	(11.44)

English equivalents for metric specifications are shown in ( ).

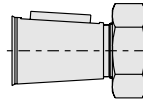
016 BH Brake.indd, js





Code: 31

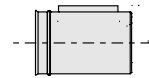
1 1/2" J501 Taper



130.0  
(5.12)

Code: 32

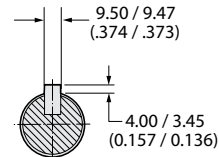
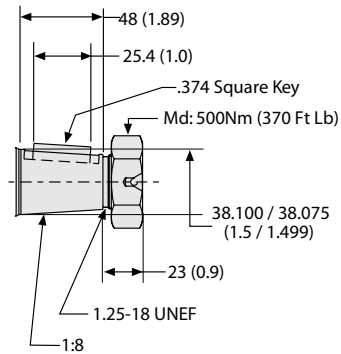
1 1/2" Keyed



116.4  
(4.58)

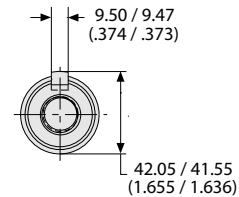
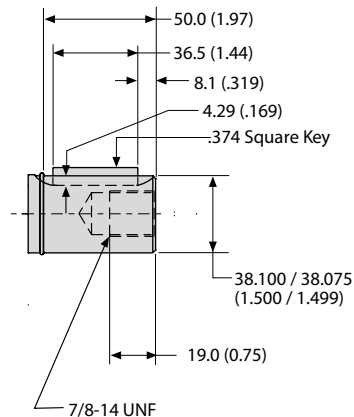
Code: 31

1 1/2" J501 Taper



Code: 32

1 1/2" Keyed



English equivalents for metric specifications are shown in ( ).

016 BH Brake.indd, js



Code: FSAA\* or FSAB 

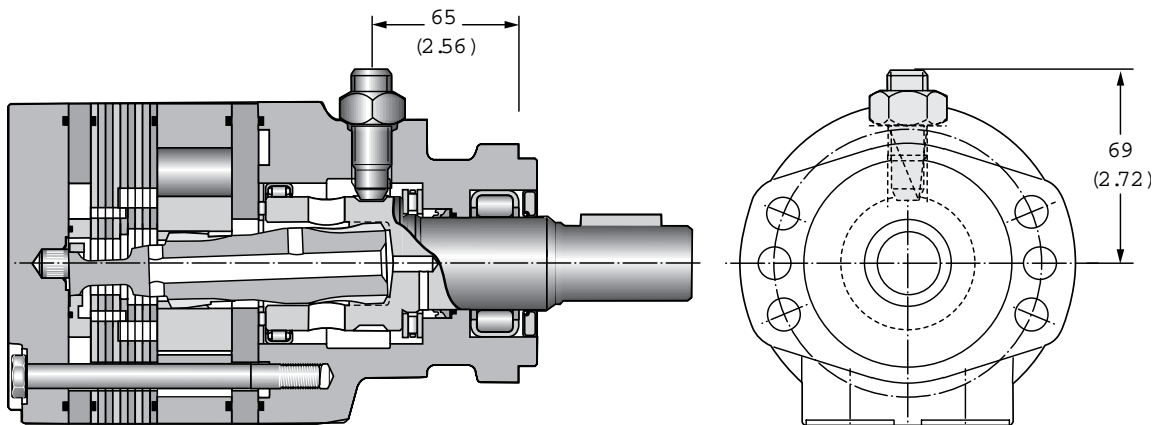
## An Economical Sensor for Speed Readout

This rugged, weather resistant design is ideal for industrial and mobile applications. Applications include salt/sand/fertilizer spreader drives, conveyer drives and injection molder compression drives. The sensor is a hall-effect type, which when externally powered outputs 30 square wave digital pulses per coupling shaft revolution. The connector is a user friendly universally available 4 pin polarized M12 connector allowing for simplified field service. The integrated design does not effect the side load capacity or performance of the torque motor.

Dieser robuste, wetterfeste Drehzahlaufnehmer arbeitet nach dem Halleffekt. Es werden 30 Rechteckimpulse pro Abtriebswellenumdrehung erzeugt. Durch Erfassung der positiven und negativen Wellenflanken sind 60 Impulse pro Umdrehung möglich. Der Sensor führt zu keiner Leistungsbeschränkung des Motors. Die volle Radiallastkapazität bleibt erhalten.

Un capteur economique pour mesure de la vitesse. Ce capteur robuste et resistant aux intemperies est a effet Hall. Alimente par une source externe, il fournit 30 ondes digitales carrees par tour. Par multiplication lelectronique on obtient 60 pulsations par tour. Son montage ne modifie pas le couple ni la charge radiale du moteur qui le recoit.

Este es un diseño de construcción reforzada, apto para uso a la intemperie e ideal para uso industrial y en equipos móviles. Entre sus aplicaciones, se puede mencionar esparcidores de sal, arena o fertilizantes, unidades motoras de transportadores y unidades motoras de compresión para moldeo a inyección. El sensor es del tipo de medio efecto, que al ser excitado externamente, genera 30 pulsos digitales de onda cuadrada por cada revolución del eje del acoplamiento. Utiliza un simple conector M12 polarizado tetrapolar, que es de uso común y facilita el mantenimiento en el lugar de instalación. El diseño integrado no afecta la capacidad de carga lateral ni la potencia del motor de torque.

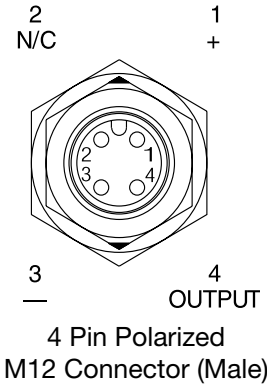


**Maximum operating pressure 172 bar (2500 psi).**

English equivalents for metric specifications are shown in ( ).

018 Large Frame Options.indd, js

<b>Operating voltage range</b> Versorgungsspannung Gamme de tension de service Gama de voltaje de alimentacion	4.5...24 VDC
<b>Operating temperature</b> Arbeitstemperatur Temperature de service Temperatura de servicio	-20° to 220° F -29°...104° C
<b>Operating frequency range</b> Arbeitsfrequenz Gamme de frequences de service Gama de frecuencia de servicio	0...10 KHZ
<b>Max sink current</b> Erforderlicher Laststrom Courant d'affaissement maxi Corriente maxima de alimentacion	0 ... 20 mA (max.)
<b>Connection</b> Anschluß Branchement Conexion	4 Pin Polarized (12mm)
<b>Sensor output</b> Sonorausgang Sortie du détecteur Salida del sensor	30 Pulses per revolution which can be doubled electronically 30 impulsions par revolution pouvant etre doublees electroniquement 30 pulsos por revolucion, que pueden duplicarse electronicamente
<b>Output is NPN</b> Ausgang is NPN La sortie est NPN La salida es NPN	Open Collector Collecteur ouvert Colector abierto

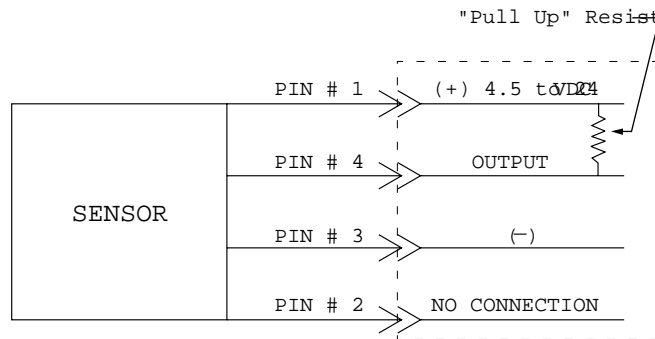


Cable and "Pull Up" Resistor are *not* supplied by factory.

Zubehör wie z.B. Kabel gehören nicht zum Lieferumfang.

Le câble et la résistance "Pull Up" ne sont pas fournis par l'usine.

El cable y la resistencia de arranque no se suministran originalmente de fábrica.



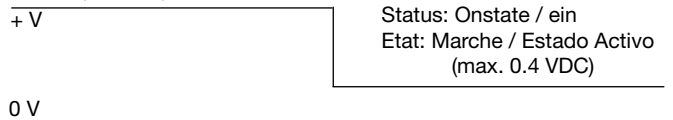
**Pull-up Resistor Value Formula**  
**Formel zur Ermittlung des Pull up-Widerstandes**  
**Formule de la valeur de resistance "Pull-up"**  
**Calculo de la resistencia de carga**

(0.25 Watt, 5% de tol.)  
 (0.25 Watt, Tol. 5%)  
 (0.25 Watt 5% Tol.)  
 (0.25 Watt, toll. 5%)

Voltage / Spannung  
 Curant d'affaissement / Voltaje 4.5...24 VDC  
 Sink Current / Laststrom 0...20 mA  
 Resistance /  
 Corriente de ali mentacion

Resistor  
 Widerstand (k Ohm)  
 Resistance  
 Resistancia

Status: Offstate / aus  
 Etat: Arret / Estado Inactivo  
 (95% +V)



Status: Onstate / ein  
 Etat: Marche / Estado Activo  
 (max. 0.4 VDC)



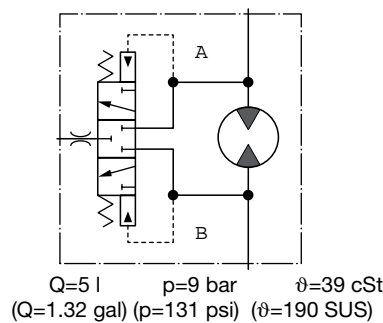
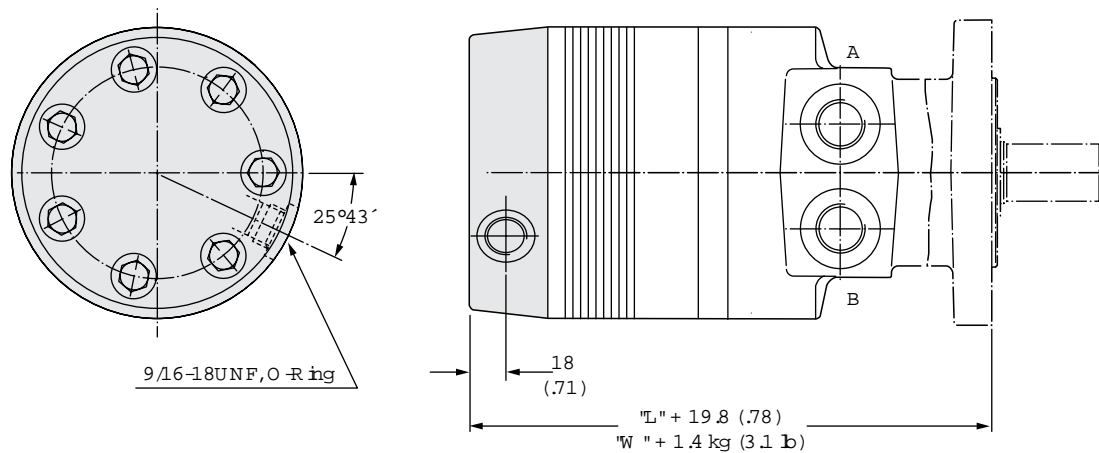
**Code: AAFX or AAAT\* EU US**

A Hot Oil Shuttle is used to continuously remove a portion of the fluid in a closed loop transmission or other closed loop system. At 125 PSI pressure differential between the motor return port and the shuttle outlet, 1.5 GPM\* will exit the circuit to cool, filter and return to the reservoir. The constant loop replenishment helps to keep heat and contamination from building up in the circuit. This option is not available with rear ports or integral cross over relief.

Spülventil für geschlossene Systeme zur Rückführung einer definierten Menge des Niederdrucköls in den Tank zur Abkühlung innerhalb desselben Kreislaufs.

Valve de rincage pour systèmes fermés pour le retour d'un volume déterminé de fluide basse pression vers le réservoir, un refroidisseur ou un filtre de réfrigération, dans le même circuit.

Un transferidor de aceite caliente actúa permanentemente para extraer una parte del fluido en una transmisión de circuito cerrado u otro sistema de circuito cerrado. Entre la entrada de retorno del motor y la salida del transferidor hay una diferencia de presión de 125 psi (libras/pulg.<sup>2</sup>), y a esta presión salen 1,5 galones por minuto del circuito para enfriarse, filtrarse y volver al depósito de fluido. El reacondicionamiento permanente de parte del fluido evita la contaminación del mismo y el incremento de temperatura en el circuito.



Standard Length & Weights for TF Series on Pages 84-85, TG Series on Pages 120-121 and TH Series on Pages 150-151.

Längen/Gewichte TF Serie Seiten 84-85, TG Serie Seiten 120-121, TH Serie Seiten 150-151.

Longueurs et poids courants pour la série TF, voir les pages 84-85, et la série TG, voir les pages 120-121, et la série TH, voir les pages 150-151. Los valores estándar de longitud y peso de la Serie TF se puede ver en las Páginas 84-85, y de la Serie TG en las Páginas 120-121, y de la Serie TH en las Páginas 150-151.

English equivalents for metric specifications are shown in ( ).

018 Large Frame Options.indd, js

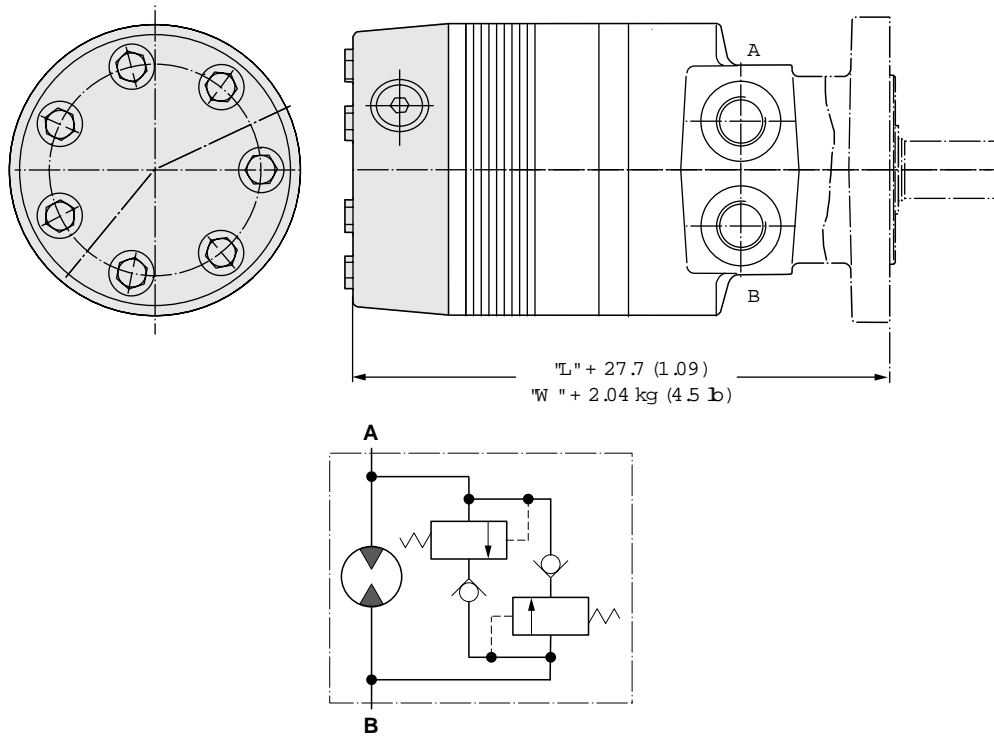
**Code: BBBA\*, BBBB\*, BBBC\*, BBBD\* or BBBG\* EU US**

This integrated internal relief valve is used for fixed pressure settings.

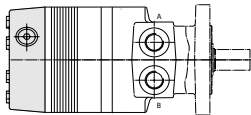
Internes Schockventil

La soupape de sécurité interne utilise pour des valeurs de pression fixes.

La valvula interna de alivio se utiliza para cablibraciones fijas de presion.



Bestellschlüssel / Système de Commande / Ordering system / Información para pedidos

Option		Pressure bar (psi)
*	 <p><b>Öffnungsdruck</b>  <b>Opening pressure</b>  <b>Tarage</b>  <b>Presion de apertura</b></p>	69 (1000)
*		138 (2000)
*		207 (3000)
*		276 (4000)
*		103 (1500)

Standard Length & Weights for TF Series on Pages 84-85, TG Series on Pages 109-111 and TH Series on Pages 139-140.

Längen/Gewichte TF Serie Seiten 84-85, TG Serie Seiten 109-111, TH Serie Seiten 139-140.

Longueurs et poids courants pour la série TF, voir les pages 84-85, et la série TG, voir les pages 109-111, et la série TH, voir les pages 139-140.

Los valores estándar de longitud y peso de la Serie TF se puede ver en las Páginas 84-85, y de la Serie TG en las Páginas 109-111, y de la Serie TH en las Páginas 139-140.

English equivalents for metric specifications are shown in ( ).

018 Large Frame Options.indd, js

**Code: AAAC** 

**Double Paint** — Base coat of red oxide primer and finish coat of black paint for increased corrosion resistance. Zweischichtlackierung schwarz

**Code: AAAF\* or AABP**  

**Castle Nut** — All motors ordered with Tapered shafts are equipped with patch locking nuts. If desired, a castle nut may be specified. Kronenmutter  
Selbstsichernde Mutter wird ersetzt durch Kronenmutter

**Code: AAAJ\* or AAFG**  

**Vespel™ Commutator Seal** — Under conditions of high temperature, it is suggested that a vespel commutator seal be used. Vespel™ / Kommutator Dichtung  
Für Anwendungen im höheren Temperaturbereich oder nicht ausreichender Schmierung.

**Code: AAAG\* or AAAH**  

**Fluorocarbon** — is available under various registered trademarks, including VITON™ (a registered trademark of DuPont), FLUOREL™ (a registered trademark of 3M) or FPM™ (a registered trademark of DuPont).

**Code: AAAJ\* or AAFG**

Vespel™ / Kommutator Dichtung  
Für Anwendungen im höheren Temperaturbereich oder nicht ausreichender Schmierung.

**Code: AAAG\* or AAAH**

Fluorocarbon Dichtungen  
Für Anwendungen im höheren/niedrigeren Temperaturbereich oder speziellen Flüssigkeiten wird der Einsatz von Fluorocarbon Dichtungen empfohlen. Fluorocarbon ist bekannt unter verschiedenen eingetragenen Warenzeichen

**Code: AABJ\* or AABK**  

**Free Running Rotorset** — The “free running rotorset” is a specially dimensioned rotorset that allows for smoother operation at low flows and low pressure. Volumetric efficiency can be affected.

VITON™ - DuPont, Fluorel™ - 3M, FPM™ - DuPont

**Code: AABJ\* or AABK**

Leichtläufer Rotorsatz  
Anlaufdruck < 5 bar

**Code: AANM\***  

**Seal Saver** — Seal saver is a metal disc that presses onto the motor shaft, covering the dirt and water (D&W) seal. Its purpose is to aid in preventing external contamination from damaging the D&W seal.

**Code: AANM\***

**Versiegelungsschutz** — Der Versiegelungsschutz besteht aus einer Metallscheibe, die gegen die Antriebswelle drückt und damit Schmutz- und Wasserdichtung (D&W-Dichtung) abdeckt. Hierdurch soll einer Beschädigung der D&W-Dichtung auf Grund externer Verunreinigungen vorgebeugt werden.

\* Option code shown is with a single black coat of paint.

\* Motor schwarz grundiert

Availability							Code		Description
TF/DF	Clutch	TG/DG	TH	BG/BH	TK	TL	Painted	Unpainted	
US	US	US	US	US	US	US	AAAA	AAAB	Black Paint
US		US	US	US	US		AAAC	-	Double Paint
US		US	US	US	US		AAAF	AABP	Castle Nut
US	US	US	US	US	US		AAAG	AAAH	Fluorocarbon Seals
US		US	US	US	US		AAAJ	AAFG	Vespel™ Commutator Seal
US		US	US	US			AABJ*	AABK*	Free Running Rotorset
US		US	US	US			AAAT**	AAFX**	Hot Oil Shuttle (11:00)
US		US					AANM	-	Seal saver for 1.25 taper shaft only
US		US		US			AANB	-	678 Nm (6000 in-lb) Holding Capacity
				US			AAMN	AANH	1808 Nm (16000 in-lb) Holding Capacity
						US	AAWM	AAWL	Fluorocarbon shaft seal.
US		US	US	US		US	AAAU**	-	Bi-directional Shuttle (11:00*), Castle Nut
US		US	US	US		US	AAAW**	-	Bi-directional Shuttle (11:00*), Vespel™ Commutator Seal
US	US	US	US	US			AABL*	AABM*	Free Running Rotor Set & No Commutator Seal
US	US	US	US	US	US		AABT	-	No Nut
US		US	US	US	US	US	AACP*	-	Free Running Rotor Set, Castle Nut
US	US	US	US	US	US	US	-	AADJ	Vespel™ Commutator Seal, Castle Nut
US	US	US		US	US	US	AAFW	-	Fluorocarbon (Viton) Seals, Vespel™ Commutator Seal
US	US	US	US	US		US	-	AAFX**	Bidirectional shuttle (11:00*)
US	US	US	US	US	US	US	AAHU	-	Vespel™ Commutator Seal, No Nut
US	US	US	US	US	US	US	-	AAJL	No Nut
US	US	US	US	US		US	AALD**	-	Bidirectional shuttle (1:00*), Castle Nut
US	US	US	US	US		US	AALE**	-	Bidirectional shuttle (1:00*)
US	US	US	US	US	US		AALF	-	No Commutator Seal
US	US	US	US	US			-	AALP*	Free Running Rotor Set, Fluorocarbon (Viton) Seals, Vespel™ Commutator Seal
				US			AAML**	-	(IBM) Bidirectional shuttle (11:00*), Castle Nut, 6 Brake Springs Installed
				US			AAMM	-	(IBM) Castle Nut, 6 brake springs installed, (9000 in-lbs hold cap)
				US			AAMN	-	(IBM) 'Yellow' brake springs (8), (16,000 in-lbs hold cap)
				US			AAMP	-	(IBM) 'Yellow' brake springs (8), (16,000 in-lbs hold cap), Castle Nut
US		US	US	US			BBBA**	BBBM**	69 Bar (1000 PSI) Internal Bidirectional Relief
US		US	US	US			BBBG**	BBBJ**	103 Bar (1500 PSI) Internal Bidirectional Relief
US	US	US	US				BBBB**	BBBN**	138 Bar (2000 PSI) Internal Bidirectional Relief
US	US	US	US	US			BBBC**	BBBF**	207 Bar (3000 PSI) Internal Bidirectional Relief
US		US	US	US			BBBD**	BBBW**	276 Bar (4000 PSI) Internal Bidirectional Relief
US		US	US				-	BBCG**	2500 PSI Int Bidirectional Relief
US		US	US				-	BBCW**	3000 PSI Int Bidirectional Relief, No Nut
US		US	US				BBCX**	-	2500 PSI Int Bidirectional Relief, No Nut
US		US	US				-	BBDA**	3000 PSI Int Bidirectional Relief, Castle Nut
US		US	US				-	BBDH**	2500 PSI Int Bidirectional Relief, Castle Nut
US		US	US				BBDN**	-	1750 PSI Int Bidirectional Relief
US		US	US				-	BBDP**	725 PSI Int Bidirectional Relief
US		US	US				BBDW**	-	725 PSI CCW Int Bidirectional Relief (045134)
US		US	US				FSAA	FSAB	Speed Sensor
US		US					FSAJ	FSAH	Int Short Speed Sensor, Castle Nut
US		US	US				-	AAUY	Complete Motor Nickel Plated, 40 um, Except Shaft

Consult factory for other positions and combinations.

\* Not applicable to TF, TG or TH 0625, 0785 or 0960 displacement codes.

\*\* Not available with A, B, E, Y, X or L porting. If specifying internal bidirectional reliefs, relief settings cannot exceed intermittent pressure rating of motor.

## Fluid

To insure maximum motor performance and life, use a premium grade hydraulic or engine oil. Fluids with a minimum of .125% zinc (or equivalent) anti-wear package should be used. A mineral or synthetic based 10W40 engine oil or hydraulic (200 SUS) is recommended. Torqmotor™ seals come standard in nitrile rubber. If a fluid that is not compatible with nitrile is to be used, a fluoroelastomer seal material can be specified.

- Minimum fluid viscosity is 50 SUS
- Recommended fluid operating temperature is -28° C to 93° C (-20°F to 200° F)
- Filtration level is 20-50 micron nominal

## Pressure

Operating the motor in its intermittent pressure range will shorten the life of the motor and should generally be restricted to 10% or less per minute. The reduced life resulting from continuous operation in the intermittent range may be acceptable in some applications. Consult the factory for details.

## Shaft Loading

The use of 1 inch and 25mm diameter shafts are not recommended when torque loads exceed 3500 lb-in. 316 stainless shafts should be limited to 2000 lb-in. For 7/8 inch diameter shafts, torque should be limited to 2500 lb-in. Corrosion resistant Nitrotec shafts have reduced torque-carrying capability. Consult factory for values for specific shafts. The maximum thrust load on all shafts should not exceed 1000 lbs inward or outward.

## Performance Data

Performance data shown in this catalog is the result of testing performed using 10W40 oil at 54°C (130°F), 200 SUS. Actual performance will vary with fluid conditions. Lower viscosity will produce lower performance.

## Inlet Conditions

Positive pressure *must* be available at the motor inlet while it is rotating. If an overrunning load causes the motor to rotate faster than the pump can fill it, cavitation will occur. Consult the factory for inlet pressure requirements and speed limitations.

## Other Operating Conditions

Consult factory before operating at conditions exceeding any ratings or recommendations in this catalog.

## Installation Recommendations

- To avoid contamination do not remove plastic port plugs until fittings are to be installed.
- Motor mounting flange must make full contact with equipment mount; do not use the mounting bolts to force the motor pilot into the pilot hole to align the motor.
- Pulleys, sprockets, wheels, or couplings should be properly aligned on the shaft to avoid excessive radial or thrust loads.
- To avoid damaging the thrust system, do not hammer on the motor or shaft to install or remove couplings, pulleys, sprockets, etc.

## Tapered Shaft

The tightening torque listed for a taper shaft nut is based on strength of the shaft and nut. Hub design and hub material determine the application tightening torque. Refer to hub manufacturers specifications to determine actual assembly torque. Factory suggested assembly torques are: 250-400 lb-ft (1.25, 1.5 & 1.75 Dia. Shafts), 175-225 lb-ft (1.0 dia. shafts).

To insure a sound hub to shaft coupling, the hub must conform to the full length of the shaft taper. This will prevent bending stresses at the keyway that could cause a fatigue failure.

## Castle Nut

All motors ordered with Tapered shafts are equipped with patch locking nuts. If desired, a castle nut may be specified.

## Paint

Unless specified otherwise, motors are shipped unpainted and coated with a rust inhibitor. Paint options are:

- \* Single coat of black paint.
- \* Single coat of black paint plus a coat of red oxide primer. (Double paint).

### Reverse Timed Manifold

All motors in this catalog are bi-rotational. The efficiency of the motors is essentially unaffected by direction of rotation.

The direction of output shaft rotation depicted below is that which will result from pressurizing the “A” port of the motor. Pressurizing the “B” port will cause shaft rotation in the opposite direction. Direction of rotation is as seen by looking directly at the shaft.

“Front ported” motors have the ports at the shaft end of the motor. “Rear ported” motors have the ports in the end cap of the motor. Standard motors are Rotation Code “0”. Reverse timed motors are Rotation Code “1”.

Series	Standard Code “0”		Reverse Timed Code “1”	
	Front Ported	Rear Ported	Front Ported	Rear Ported
TC, TB, TE, TJ	CW	CCW	CCW	CW
TF, DF, TG, BG, DG, TH, BH	CCW	CW	CW	CCW
TK	N/A	CW	N/A	CCW
110A	CW	N/A	N/A	N/A
700, 716	CCW	N/A	N/A	N/A

**CAUTION!****Static Brake Only:**

The brakes on these motors are designed for static use only, i.e., the brake should not be used to stop the motor and the motor should not be started while the brake is applied. These brakes are "parking" brakes only. Using the brake in a dynamic condition (while the motor is turning) will damage and reduce the holding capacity of the brake. If the brake does not hold because it has been damaged, personal injury or property damage could result.

**Brake holding capacity and periodic test:**

The brake holding capacity rating is based on actual holding capacity when new. If properly used as a static brake only, the holding capacity will slowly decrease with time. Since holding capacity will slowly decrease over time, a proper maintenance procedure should include periodically testing the holding capacity of the brake. This can be achieved by running a vehicle ramp test per OEM instructions.

**Brake orientation:**

This wet sump, multi-disk brake is designed to be mounted with the shaft in a horizontal position. If your application will have the motor in any other orientation, the motor should be thoroughly tested for longevity of brake holding capacity. This can be achieved by running a vehicle ramp test per OEM instructions after a predetermined number of brake actuations. Under no circumstances, however, should the motor be mounted with the shaft pointing vertically upward because the disks will not be operating within the oil sump and damage to the brake disks will occur.

**Brake release pressure:**

The brake release port is designed for 3000 psi maximum. Limiting the pressure in that port to below 1500 psi is recommended to enhance seal life.

**Initial use, bleeding not required:**

Bleeding the brake is not required. It is recommended that the brake release port be filled with approximately 1.2 oz. (36cc) system oil prior to installation or first use.

**Torque for mounting bolts:**

Customer installed mounting bolts should be grade 8 and torqued to a minimum of 90 ft-lbs.

**Brake service intervals:**

The seals, springs and brake disc package should be periodically (how often depends on your application) inspected and replaced if damaged or worn. All should be replaced at least every 250,000 brake cycles or 3 years, whichever occurs first.

