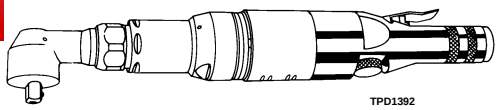


03539616
Form P7085
Edition 5
September, 1999

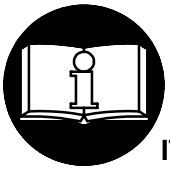
F
E
P

OPERATION AND MAINTENANCE MANUAL FOR SERIES 9RS, 9S AND 9T ANGLE WRENCHES

NOTICE

Series 9RS, 9S and 9T Angle Wrenches are designed for heavy–duty close–quarter threaded fastener applications which require precise torque repeatability.

Ingersoll–Rand is not responsible for customer modification of tools for applications on which Ingersoll–Rand was not consulted.



⚠ WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED.
READ THIS MANUAL BEFORE OPERATING TOOL.
IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION IN THIS MANUAL INTO THE HANDS OF THE OPERATOR.
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

PLACING TOOL IN SERVICE

- **Always operate, inspect and maintain this tool in accordance with American National Standards Institute Safety Code for Portable Air Tools (ANSI B186.1).**
- **For safety, top performance, and maximum durability of parts, operate this tool at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 1/2" (13 mm) inside diameter air supply hose.**
- **Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.**
- **Do not use damaged, frayed or deteriorated air hoses and fittings.**
- **Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905–1 for a typical piping arrangement.**
- **Always use clean, dry air at 90 psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool.**
- **Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.**
- **Do not remove any labels. Replace any damaged label.**

USING THE TOOL

- **Always wear eye protection when operating or performing maintenance on this tool.**
- **Always wear hearing protection when operating this tool.**
- **Keep hands, loose clothing and long hair away from rotating end of tool.**
- **Note the position of the reversing lever before operating the tool so as to be aware of the direction of rotation when operating the throttle.**
- **Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.**
- **Keep body stance balanced and firm. Do not overreach when operating this tool. High reaction torques can occur at or below the recommended air pressure.**
- **Tool accessories may continue to rotate briefly after throttle is released.**
- **Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.**
- **Use accessories recommended by Ingersoll–Rand.**
- **Use only impact sockets and accessories. Do not use hand (chrome) sockets or accessories.**
- **The Throttle Valve Cap is under pressure from the Throttle Valve Spring. Use care when removing the Throttle Valve Cap. (On tools where applicable.)**
- **Whenever the Angle Head is installed or repositioned, the Throttle Lever must be positioned so that reaction torque will not tend to retain the throttle in the "ON" position.**
- **This tool is not designed for working in explosive atmospheres.**
- **This tool is not insulated against electric shock.**

NOTICE

The use of other than genuine Ingersoll–Rand replacement parts may result in safety hazards, decreased tool performance, and increased maintenance, and may invalidate all warranties.

Repairs should be made only by authorized trained personnel. Consult your nearest Ingersoll–Rand Authorized Servicenter.

Refer All Communications to the Nearest Ingersoll–Rand Office or Distributor.

Printed in U.S.A.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

WARNING LABEL IDENTIFICATION

⚠ WARNING

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠WARNING

Always wear eye protection when operating or performing maintenance on this tool.

⚠WARNING

Always wear hearing protection when operating this tool.

⚠WARNING

Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.

⚠WARNING

Air powered tools can vibrate in use. Vibration, repetitive motions or uncomfortable positions may be harmful to your hands and arms. Stop using any tool if discomfort, tingling feeling or pain occurs. Seek medical advice before resuming use.

⚠WARNING

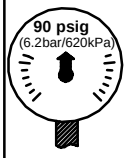
Do not carry the tool by the hose.

⚠WARNING

Do not use damaged, frayed or deteriorated air hoses and fittings.

⚠WARNING

Keep body stance balanced and firm. Do not overreach when operating this tool.



⚠WARNING

Operate at 90 psig (6.2 bar/ 620 kPa) Maximum air pressure.

PLACING TOOL IN SERVICE

LUBRICATION

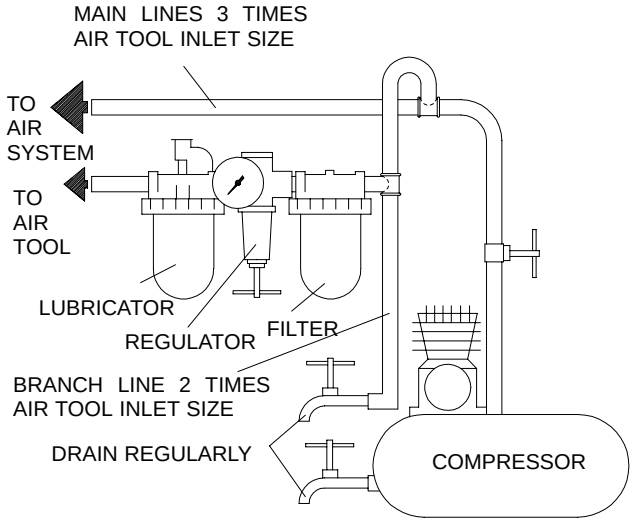
Ingersoll–Rand No. 10

Ingersoll–Rand No. 28
Ingersoll–Rand No. 66

Always use an air line lubricator with these tools.
We recommend the following Filter–Lubricator–Regulator Unit:

For USA – No. C28–04–FKG0–28

Before starting the tool and after each two or three hours of operation, unless the air line lubricator is used, detach the air hose and inject about 2.5 cc of Ingersoll–Rand No. 10 Oil into the air inlet.
After each forty–eight hours of operation, or as experience indicates, inject about 1 cc of Ingersoll–Rand No. 28 Grease into the gear case Grease Fitting.
After each forty–eight hours of operation, or as experience indicates, inject about 1 cc of Ingersoll–Rand No. 66 Grease into the angle head Grease Fitting.



(Dwg. TPD905–1)

HOW TO ORDER AN ANGLE WRENCH

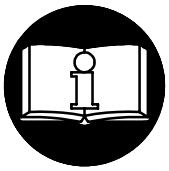
Model	Torque Range (Soft Draw) 50 psi pressure ft–lb	50 psi pressure Nm	90 psi pressure ft–lb	90 psi pressure Nm	Free Speed rpm	Square Drive in
INLINE HANDLE REVERSIBLE STALL						
9RSM53	25.0	33.9	40.0	54.2	665	1/2
9RSN53	32.0	43.4	50.0	67.8	535	1/2
9RSP53	39.0	52.9	58.0	78.6	425	1/2
9RSQ83	45.0	61.0	82.0	111.2	300	1/2
INLINE HANDLE NONREVERSIBLE STALL						
9SQ83	50.0	67.8	85.0	115.2	355	1/2
INLINE HANDLE NONREVERSIBLE SHUT–OFF						
9TM53	27.0	36.6	40.0	54.2	780	1/2
9TN53	35.0	47.5	50.0	67.8	630	1/2
9TP53	42.0	57.0	65.0	88.1	500	1/2
9TQ83	50.0	67.8	85.0	115.2	355	1/2

F

MANUEL D'EXPLOITATION ET D'ENTRETIEN DES CLÉS D'ANGLE DES SÉRIES 9RS, 9S ET 9T

NOTE

Les clés d'angle des séries 9RS, 9S et 9T sont destinées au serrage dans des espaces restreints des grosses fixations filetées nécessitant une répétabilité précise du couple. Ingersoll–Rand ne peut être tenu responsable de la modification des outils par le client pour les adapter à des applications qui n'ont pas été approuvées par Ingersoll–Rand.



⚠ ATTENTION

**D'IMPORTANTES INFORMATIONS DE SECURITÉ SONT JOINTES.
LIRE CE MANUEL AVANT D'UTILISER L'OUTIL.
L'EMPLOYEUR EST TENU À COMMUNIQUER LES INFORMATIONS DE CE MANUEL AUX EMPLOYÉS UTILISANT CET OUTIL.
LE NON RESPECT DES AVERTISSEMENTS SUIVANTS PEUT CAUSER DES BLESSURES**

MISE EN SERVICE DE L'OUTIL

- **Toujours exploiter, inspecter et entretenir cet outil conformément au Code de sécurité des outils pneumatiques portatifs de l'American National Standards Institute (ANSI B186.1).**
- **Pour la sécurité, les performances optimales et la durabilité maximale des pièces, cet outil doit être connecté à une alimentation d'air comprimé de 6,2 bar (620 kPa) maximum à l'entrée, avec un flexible de 13 mm de diamètre intérieur.**
- **Couper toujours l'alimentation d'air comprimé et débrancher le flexible d'alimentation avant d'installer, déposer ou ajuster tout accessoire sur cet outil, ou d'entreprendre une opération d'entretien quelconque sur l'outil.**
- **Ne pas utiliser des flexibles ou des raccords endommagés, effilochés ou détériorés.**
- **S'assurer que tous les flexibles et les raccords sont correctement dimensionnés et bien serrés. Voir Plan TPD905–1 pour un exemple type d'agencement des tuyauteries.**
- **Utiliser toujours de l'air sec et propre à une pression maximum de 6,2 bar. La poussière, les fumées corrosives et/ou une humidité excessive peuvent endommager le moteur d'un outil pneumatique.**
- **Ne jamais lubrifier les outils avec des liquides inflammables ou volatiles tels que le kérosène, le gasol ou le carburant d'aviation.**
- **Ne retirer aucune étiquette. Remplacer toute étiquette endommagée.**

UTILISATION DE L'OUTIL

- **Porter toujours des lunettes de protection pendant l'utilisation et l'entretien de cet outil.**
- **Porter toujours une protection acoustique pendant l'utilisation de cet outil.**
- **Tenir les mains, les vêtements flous et les cheveux longs, éloignés de l'extrémité rotative de l'outil.**
- **Noter la position du levier d'inversion avant de mettre l'outil en marche de manière à savoir dans quel sens il va tourner lorsque la commande est actionnée.**
- **Prévoir, et ne pas oublier, que tout outil motorisé est susceptible d'à–coups brusques lors de sa mise en marche et pendant son utilisation.**
- **Garder une position équilibrée et ferme. Ne pas se pencher trop en avant pendant l'utilisation de cet outil. Des couples de réaction élevés peuvent se produire à, ou en dessous, de la pression d'air recommandée.**
- **La rotation des accessoires de l'outil peut continuer pendant un certain temps après le relâchement de la gâchette.**
- **Les outils pneumatiques peuvent vibrer pendant l'exploitation. Les vibrations, les mouvements répétitifs et les positions inconfortables peuvent causer des douleurs dans les mains et les bras. N'utiliser plus d'outils en cas d'inconfort, de picotements ou de douleurs. Consulter un médecin avant de recommencer à utiliser l'outil.**
- **Utiliser les accessoires recommandés par Ingersoll-Rand.**
- **N'utiliser que les douilles et les accessoires pour clés à chocs. Ne pas utiliser les douilles et accessoires (chromés) de clés manuelles.**
- **Le chapeau de la soupape de commande est soumis à la pression du ressort de soupape. Prendre les soins nécessaires lors de la dépose du chapeau de soupape de commande. (Sur les outils concernés).**
- **A chaque fois que le renvoi d'angle est installé ou repositionné, le levier de commande doit être positionné de manière à ce que le couple de réaction n'ait pas tendance à maintenir le levier de commande en position "MARCHE".**
- **Cet outil n'est pas conçu pour fonctionner dans des atmosphères explosives.**
- **Cet outil n'est pas isolé contre les chocs électriques.**

NOTE

L'utilisation de rechanges autres que les pièces d'origine Ingersoll–Rand peut causer des risques d'insécurité, réduire les performances de l'outil et augmenter l'entretien, et peut annuler toutes les garanties.

Les réparations ne doivent être effectuées que par des réparateurs qualifiés autorisés. Consultez votre Centre de Service Ingersoll–Rand le plus proche.

Adressez toutes vos communications au Bureau Ingersoll–Rand ou distributeur le plus proche.

Imprimé aux É.U.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

SIGNIFICATION DES ETIQUETTES D'AVERTISSEMENT

⚠ ATTENTION

LE NON RESPECT DES AVERTISSEMENTS SUIVANTS PEUT CAUSER DES BLESSURES

⚠ ATTENTION

Porter toujours des lunettes de protection pendant l'utilisation et l'entretien de cet outil.

⚠ ATTENTION

Les outils pneumatiques peuvent vibrer pendant l'exploitation. Les vibrations, les mouvements répétitifs et les positions inconfortables peuvent causer des douleurs dans les mains et les bras. N'utiliser plus d'outils en cas d'inconfort, de picotements ou de douleurs. Consulter un médecin avant de recommencer à utiliser l'outil.

⚠ ATTENTION

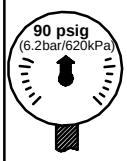
Garder une position équilibrée et ferme. Ne pas se pencher trop en avant pendant l'utilisation de cet outil.

⚠ ATTENTION

Porter toujours une protection acoustique pendant l'utilisation de cet outil.

⚠ ATTENTION

Ne pas transporter l'outil par son flexible.



⚠ ATTENTION

Utiliser de l'air comprimé à une pression maximum de 6,2 bar (620 kPa).

⚠ ATTENTION

Couper toujours l'alimentation d'air comprimé et débrancher le flexible d'alimentation avant d'installer, déposer ou ajuster tout accessoire sur cet outil, ou d'entreprendre une opération d'entretien quelconque sur l'outil.

⚠ ATTENTION

Ne pas utiliser des flexibles ou des raccords endommageés, effilochés ou détériorés.

MISE EN SERVICE DE L'OUTIL

LUBRIFICATION

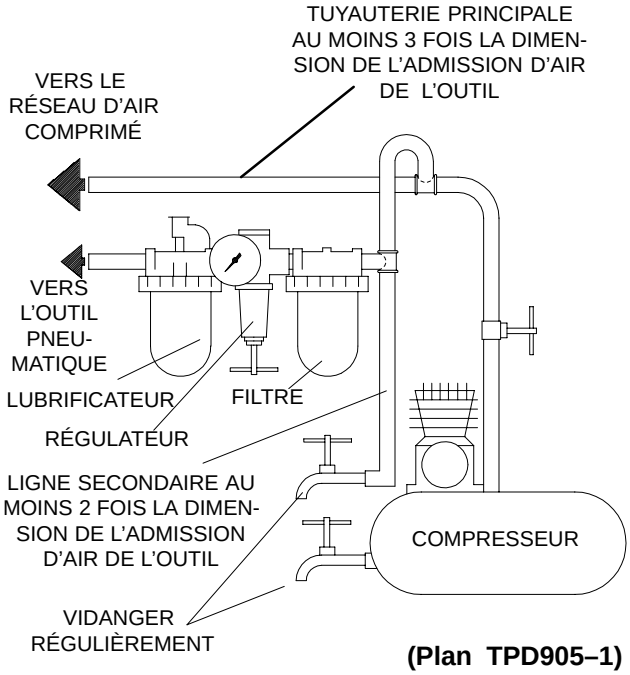
Ingersoll–Rand No. 10 **Ingersoll–Rand No. 28**
Ingersoll–Rand No. 66

Utiliser toujours un lubrificateur avec ces outils. Nous recommandons l'emploi du filtre–régulateur–lubrificateur suivant :

É.U. – No. C28–04–FKG0–28

Avant de mettre l'outil en marche et toutes les deux ou trois heures defonctionnement, si un lubrificateur de ligne n'est pas utilisé, débrancher le flexible d'alimentation et verser environ 2,5 cm^3 d'huile Ingersoll–Rand No 10. dans le raccord d'admission de l'outil.
Toutes les quarante–huit heures de fonctionnement, ou en fonction de l'expérience, injecter environ 1cm^3 de graisse Ingersoll–Rand No. 28 dans le raccord de graissage du boîtier d'engrenages.

Toutes les quarante–huit heures de fonctionnement, ou en fonction de l'expérience, injecter environ 1cm^3 de graisse Ingersoll–Rand No. 66 dans le raccord de graissage du renvoi d'angle.



(Plan TPD905–1)

SPÉCIFICATIONS

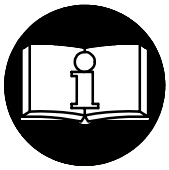
Modèle	Dispositif de couple	Plage de couple (Serrage élastique)		Vitesse libre	entr. carré
		50 psi ft–lbs (Nm)	90 psi ft–lbs (Nm)	tr/mn	in.
9RSM53	calage	25,0 (33,9)	40,0 (54,2)	665	1/2
9RSN53	calage	32,0 (43,4)	50,0 (67,8)	535	1/2
9RSP53	calage	39,0 (52,9)	58,0 (78,6)	425	1/2
9RSQ83	calage	45,0 (61,0)	82,0 (111,2)	300	1/2
9SQ83	calage	50,0 (67,8)	85,0 (115,2)	355	1/2
9TM53	arrêt	27,0 (36,6)	40,0 (54,2)	780	1/2
9TN53	arrêt	35,0 (47,5)	50,0 (67,8)	630	1/2
9TP53	arrêt	42,0 (57,0)	65,0 (88,1)	500	1/2
9TQ83	arrêt	50,0 (67,8)	85,0 (115,2)	355	1/2

E

MANUAL DE USO Y MANTENIMIENTO PARA LLAVES ANGULARES MODELOS 9RS, 9S Y 9T

NOTA

Las Llaves Angulares Modelos 9RS, 9S y 9T están diseñadas para trabajo pesado en aplicaciones de abrazadera roscada de distancia mínima que requieran repetibilidad de par precisa.
Ingersoll–Rand no aceptará responsabilidad alguna por la modificación de las herramientas efectuada por el cliente para las aplicaciones que no hayan sido consultadas con Ingersoll–Rand.



⚠ AVISO

SE ADJUNTA INFORMACIÓN IMPORTANTE DE SEGURIDAD.
LEA ESTE MANUAL ANTES DE USAR LA HERRAMIENTA.
ES RESPONSABILIDAD DE LA EMPRESA ASEGURARSE DE QUE EL OPERARIO ESTÉ AL TANTO DE LA INFORMACIÓN QUE CONTIENE ESTE MANUAL.
EL HACER CASO OMISO DE LOS AVISOS SIGUIENTES PODRÍA OCASIONAR LESIONES.

PARA PONER LA HERRAMIENTA EN SERVICIO

- **Utilice, examine y mantenga siempre esta herramienta conforme al código de seguridad para herramientas neumáticas portátiles de la American National Standards Institute (ANSI B186.1).**
- **Para seguridad, máximo rendimiento y vida de servicio de las piezas, use esta herramienta a una presión de aire máxima de 90 psig (6,2 bar/620 kPa) en la manguera de suministro de aire con diámetro interno de 13 mm.**
- **Corte siempre el suministro de aire y desconecte la manguera de suministro de aire antes de instalar, desmontar o ajustar cualquier accesorio de esta herramienta, o antes de realizar cualquier operación de mantenimiento de la misma.**
- **No utilice mangueras de aire y accesorios dañados, desgastados ni deteriorados.**
- **Asegúrese de que todas las mangueras y accesorios sean del tamaño correcto y estén bien apretados. Vea Esq. TPD905–1 para un típico arreglo de tuberías.**
- **Use siempre aire limpio y seco a una presión máxima de 90 psig. El polvo, los gases corrosivos y/o el exceso de humedad podrían estropear el motor de una herramienta neumática.**
- **No lubrique las herramientas con líquidos inflamables o volátiles tales como queroseno, gasoil o combustible para motores a reacción.**
- **No saque ninguna etiqueta. Sustituya toda etiqueta dañada.**

USO DE LA HERRAMIENTA

- **Use siempre protección ocular cuando utilice esta herramienta o realice operaciones de mantenimiento en la misma.**
- **Use siempre protección para los oídos cuando utilice esta herramienta.**
- **Mantenga las manos, la ropa suelta y el cabello largo alejados del extremo giratorio de la herramienta.**
- **Note la posición de la palanca de inversión antes de hacer funcionar la herramienta para ser consciente de su dirección giratoria cuando funcione el estrangulador.**
- **Anticipe y esté alerta sobre los cambios repentinos en el movimiento durante la puesta en marcha y el manejo de toda herramienta motorizada.**
- **Mantenga una postura de cuerpo equilibrada y firme. No estire demasiado los brazos al manejar la herramienta. Pueden ocurrir reacciones de alto par a, o a menos de, la recomendada presión de aire.**
- **Los accesorios de la herramienta podrían seguir girando brevemente después de haber soltado la palanca de estrangulación.**
- **Las herramientas neumáticas pueden vibrar durante el uso. La vibración, repetición o posiciones incómodas pueden dañarle los brazos y manos. En caso de incomodidad, sensación de hormigueo o dolor, deje de usar la herramienta. Consulte a un médico antes de volver a usarla otra vez.**
- **Utilice únicamente los accesorios Ingersoll–Rand recomendados.**
- **Utilice únicamente bocas y accesorios para llaves de impacto. No utilice bocas o accessorios manuales (cromados).**
- **La Tapa de Válvula de Estrangulación está presionada por el Muelle de Válvula de Estrangulación. Tenga cuidado al sacar la Tapa de Válvula de Estrangulación. (En las herramientas que la aplican).**
- **Cuando se instale o reposicione la Cabeza Angular, la Palanca de Estrangulación deberá posicionarse de forma que la reacción de par no tienda a retener el mando en la posición de "ON" (ACCIONAMIENTO).**
- **Esta herramienta no ha sido diseñada para trabajar en ambientes explosivos.**
- **Esta herramienta no está aislada contra descargas eléctricas.**

NOTA

El uso de piezas de recambio que no sean las auténticas piezas Ingersoll–Rand podría poner en peligro la seguridad, reducir el rendimiento de la herramienta y aumentar los cuidados de mantenimiento necesarios, así como invalidar toda garantía.

Las reparaciones sólo serán realizadas por personal cualificado y autorizado. Consulte con el centro de servicio Ingersoll–Rand autorizado más próximo.

Toda comunicación se deberá dirigir a la oficina o al distribuidor Ingersoll–Rand más próximo.

Impreso en EE. UU.

INGERSOLL-RAND®
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ETIQUETAS DE AVISO

⚠ AVISO

EL HACER CASO OMISO DE LOS AVISOS SIGUIENTES PODRÍA OCASIONAR LESIONES.

⚠ ADVERTENCIA

Use siempre protección ocular cuando utilice esta herramienta o realice operaciones de mantenimiento en la misma.

⚠ ADVERTENCIA

Las herramientas neumáticas pueden vibrar durante el uso. La vibración, los movimientos repetitivos o las posiciones incómodas podrían dañarle los brazos y las manos. En caso de incomodidad, sensación de hormigueo o dolor, dejar de usar la herramienta. Consultar al médico antes de volver a utilizarla.

⚠ ADVERTENCIA

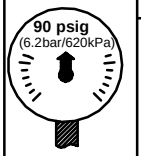
Mantener una postura del cuerpo equilibrada y firme. No estirar demasiado los brazos al manejar la herramienta.

⚠ ADVERTENCIA

Use siempre protección para los oídos cuando utilice esta herramienta.

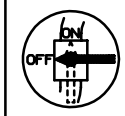
⚠ ADVERTENCIA

No coger la herramienta por la manguera para levantarla.



⚠ ADVERTENCIA

Manejar la herramienta a una presión de aire máxima de 90 psig (6,2 bar/620 kPa).



⚠ ADVERTENCIA

Cortar siempre el suministro de aire y desconectar la manguera de suministro de aire antes de instalar, retirar o ajustar cualquier accesorio de esta herramienta, o antes de realizar cualquier operación de mantenimiento de la misma.

⚠ ADVERTENCIA

No utilizar mangueras de aire y accesorios dañados, desgastados ni deteriorados.

PARA PONER LA HERRAMIENTA EN SERVICIO

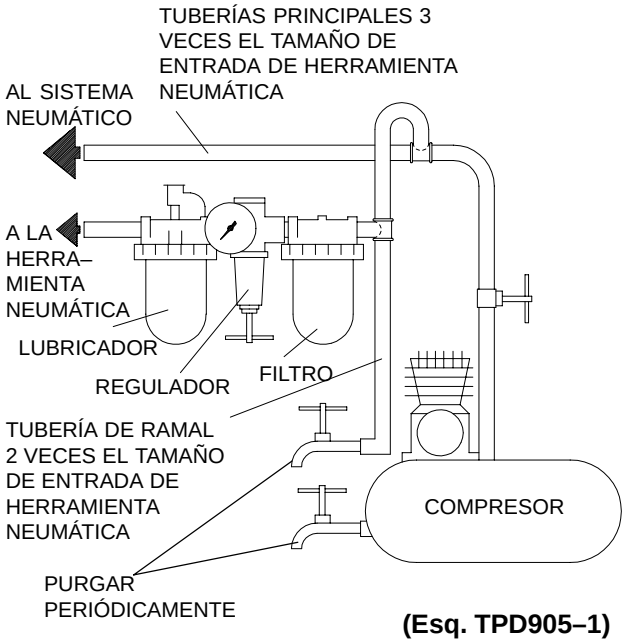
LUBRICACIÓN

Ingersoll–Rand Nº 10 **Ingersoll–Rand Nº 28**
Ingersoll–Rand Nº 66

Utilice siempre un lubricador de aire comprimido con estas herramientas. Recomendamos la siguiente unidad de Filtro–Lubricador–Regulador:

EE.UU. – Nº C28–04–FKG0–28

Antes de poner la herramienta en marcha y después de cada dos o tres horas de uso, a menos que se haya puesto lubricante de línea de aire comprimido, desconecte la manguera de aire e inyecte unos 2,5 cc de Aceite Ingersoll–Rand Nº 10 en la admisión de aire.
Después de cada cuarenta y ocho horas de uso, o como indique la experiencia, inyecte alrededor de 1 cc de Grasa Ingersoll–Rand Nº 28 en el Engrasador de caja de engranajes.
Después de cada cuarenta y ocho horas de uso, o como indique la experiencia, inyecte alrededor de 1 cc de Grasa Ingersoll–Rand Nº 66 en el Engrasador de la cabeza angular.



(Esq. TPD905–1)

PARA PONER LA HERRAMIENTA EN SERVICIO

ESPECIFICACIONES

Modelo	Dispositivo de Par	Gama de Par (Retirada Suave)		Velocidad Libre	Cuadradillo
		50 psi ft–lbs (Nm)	90 psi ft–lbs (Nm)	rpm	pulg.
9RSM53	calado	25,0 (33,9)	40,0 (54,2)	665	1/2
9RSN53	calado	32,0 (43,4)	50,0 (67,8)	535	1/2
9RSP53	calado	39,0 (52,9)	58,0 (78,6)	425	1/2
9RSQ83	calado	45,0 (61,0)	82,0 (111,2)	300	1/2
9SQ83	calado	50,0 (67,8)	85,0 (115,2)	355	1/2
9TM53	cierre	27,0 (36,6)	40,0 (54,2)	780	1/2
9TN53	cierre	35,0 (47,5)	50,0 (67,8)	630	1/2
9TP53	cierre	42,0 (57,0)	65,0 (88,1)	500	1/2
9TQ83	cierre	50,0 (67,8)	85,0 (115,2)	355	1/2

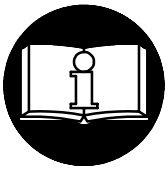
P

MANUAL DE FUNCIONAMENTO E MANUTENÇÃO PARA FERRAMENTAS PNEUMÁTICAS ANGULARES SÉRIES 9RS, 9S E 9T

AVISO

As Ferramentas Pneumáticas Angulares Modelos 9RS, 9S e 9T são concebidas para aplicações de aperto com rosca regulável para trabalhos pesados onde se requer a repetitividade de torque.

A Ingersoll–Rand não é responsável por modificações feitas pelo cliente em ferramentas nas quais a Ingersoll–Rand não tenha sido consultada.



⚠ ADVERTÊNCIA

INFORMAÇÃO DE SEGURANÇA IMPORTANTE EM ANEXO
LEIA ESTE MANUAL ANTES DE OPERAR A FERRAMENTA.
É DA RESPONSABILIDADE DO EMPREGADOR COLOCAR A INFORMAÇÃO DESTE MANUAL NAS MÃOS DO OPERADOR.
O NÃO CUMPRIMENTO DAS SEGUINTES ADVERTÊNCIAS PODE RESULTAR EM FERIMENTOS.

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

- **Sempre opere, inspeccione e mantenha esta ferramenta de acordo com o Código de Segurança do Instituto Americano de Padrões Nacionais para Ferramentas Pneumáticas Portáteis (ANSI B186.1).**
- **Para segurança, máximo desempenho e máxima durabilidade das peças, opere esta ferramenta com uma pressão de ar máxima de 6,2 bar/620 kPa (90 psig) na entrada da mangueira de alimentação de ar com diâmetro interno de 13 mm (1/2").**
- **Desligue sempre a alimentação de ar e desconecte a mangueira de alimentação de ar antes de instalar, remover ou ajustar qualquer acessório nesta ferramenta, ou antes de executar qualquer serviço de manutenção nesta ferramenta.**
- **Não use mangueiras de ar ou adaptadores danificados, gastos ou deteriorados.**
- **Certifique–se de que todas as mangueiras e adaptadores sejam do tamanho correcto e estejam apertados com firmeza. Veja o Desenho TPD905–1 para um arranjo típico de tubagem.**
- **Use sempre ar seco e limpo com pressão máxima de 90 psig. Pó, fumos corrosivos e/ou humidade excessiva podem arruinar o motor de uma ferramenta pneumática.**
- **Não lubrifique as ferramentas com líquidos inflamáveis ou voláteis tais como querosene, diesel ou combustível de jactos.**
- **Não remova nenhum rótulo. Reponha qualquer rótulo danificado.**

USANDO A FERRAMENTA

- **Use sempre óculos de protecção quando estiver operando ou executando serviço de manutenção nesta ferramenta.**
- **Use sempre protecção contra ruído ao operar esta ferramenta.**
- **Mantenha as mãos, partes do vestuário soltas e cabelos compridos afastados da extremidade em rotação.**
- **Observe qual é a posição da alavanca que reverte o sentido de rotação antes de operar esta ferramenta de modo a estar atento ao sentido de rotação quando operar o regulador de pressão.**
- **Antecipe e esteja alerta a mudanças repentinas no movimento quando ligar e operar qualquer ferramenta motorizada.**
- **Mantenha a posição do corpo equilibrada e firme. Não exagere quando operar esta ferramenta. Torques de reacção elevados podem ocorrer na ou abaixo da pressão de ar recomendada.**
- **Os acessórios da ferramenta podem continuar a girar brevemente após a pressão ter sido aliviada.**
- **Ferramentas accionadas pneumáticamente podem vibrar em uso. Vibração, movimentos repetitivos ou posições desconfortáveis podem ser prejudiciais às mãos e aos braços. Pare de usar a ferramenta caso ocorra algum desconforto, sensação de formigueiro ou dor. Procure assistência médica antes de retornar ao trabalho.**
- **Use acessórios recomendados pela Ingersoll–Rand.**
- **Use somente soquetes e acessórios de impacto. Não use soquetes ou acessórios de mão (cromo).**
- **O Tampo da Válvula Reguladora de Pressão está sob pressão da Mola da Válvula. Tenha cuidado ao removê–lo. (*Aplicável a algumas ferramentas.)***
- **Sempre que a Cabeça Angular seja instalada ou substituída, a Alavanca Reguladora de Pressão deve ser posicionada de tal modo que o torque de reacção não tenha tendência de reter a posição "LIGADO" na alavanca reguladora de pressão.**
- **Esta Ferramenta não foi concebida para trabalhos em atmosferas explosivas.**
- **Esta Ferramenta não está isolada contra choques eléctricos.**

AVISO

O uso de peças de substituição que não sejam genuinamente da Ingersoll–Rand podem resultar em riscos de segurança, diminuição do desempenho da ferramenta, aumento da necessidade de manutenção e pode invalidar todas as garantias.

As reparações devem ser feitas somente por pessoal treinado autorizado. Consulte o Centro de Serviços da Ingersoll–Rand mais próximo.

Envie Todos os Comunicados Para o Distribuidor ou Escritório da Ingersoll–Rand Mais Próximo.

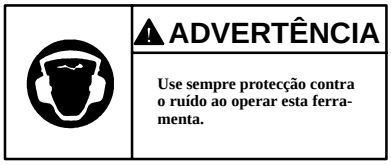
Impresso nos E.U.A.

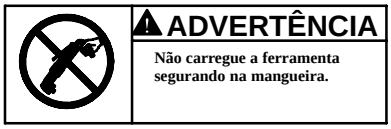
INGERSOLL-RAND®
PROFESSIONAL TOOLS

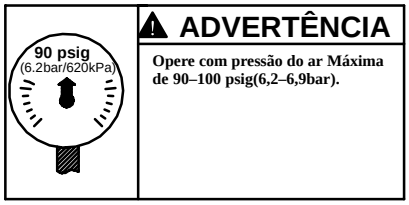
IDENTIFICAÇÃO DO RÓTULO DE ADVERTÊNCIA

⚠ ADVERTÊNCIA

O NÃO CUMPRIMENTO DAS SEGUINTES ADVERTÊNCIAS PODE RESULTAR EM FERIMENTO.







COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

LUBRIFICAÇÃO

Ingersoll–Rand No. 10 **Ingersoll–Rand No. 28**
Ingersoll–Rand No. 66

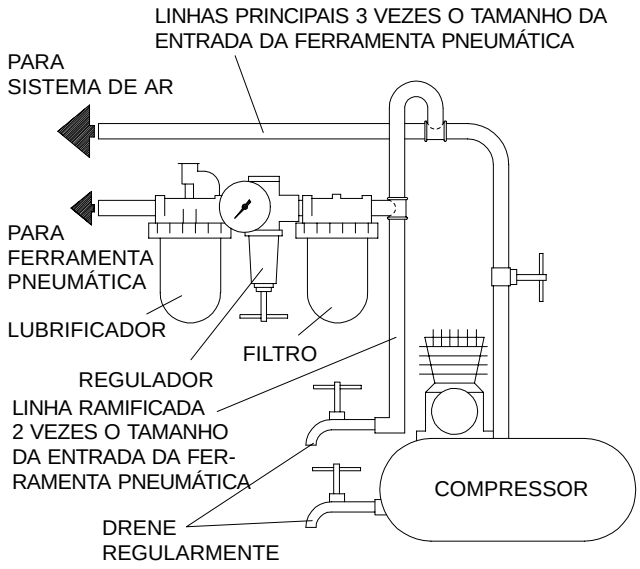
Use sempre um lubrificador de ar de linha com estas ferramentas. Nós recomendamos a seguinte Unidade Filtro–Lubrificador–Regulador :

Para E.U.A. – No. C28–04–FKG0–28

Antes de ligar a Ferramenta e em cada duas ou três horas de operação, ao menos que um lubrificador de ar de linha seja usado, disconecte a mangueira de ar e injecte aproximadamente 2.5 de Óleo Ingersoll–Rand No. 10 na entrada de ar.

Depois de cada quarenta e oito horas de operação, ou conforme a experiência indicar, injecte cerca de 1 cc de Massa Lubrificadora Ingersoll–Rand No. 28 na caixa de engrenagem do Adaptador de Massa Lubrificadora.

Depois de cada quarenta e oito horas de operação, ou conforme a experiência indicar injete cerca de 1 cc de Massa Lubrificadora Ingersoll–Rand No. 66 na cabeça angular do Adaptador de Massa Lubrificadora.



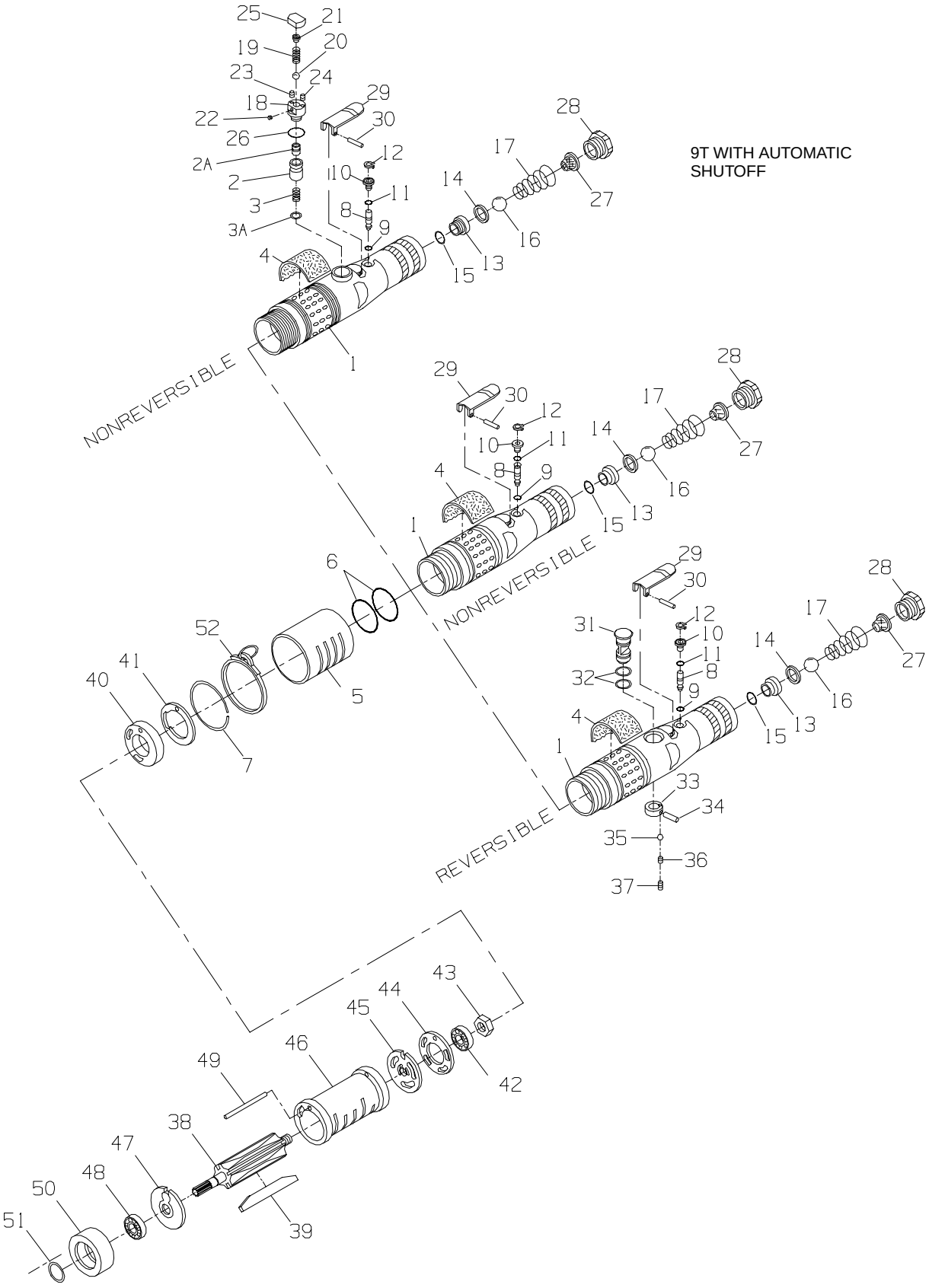
(Desenho TPD905–1)

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

ESPECIFICAÇÕES

Modelo	Equipamento de Torque	Intervalo de Torque (Apertos Ligeiros)		Velocidade Livre	Encabadouro Quadrado
		50 psi Nm (pés–lb)	90 psi Nm (pés–lb)	rpm	pol.
9RSM53	paragem	33,9 (25,0)	54,2 (40,0)	665	1/2
9RSN53	paragem	43,4 (32,0)	67,8 (50,0)	535	1/2
9RSP53	paragem	52,9 (39,0)	78,6 (58,0)	425	1/2
9RSQ83	paragem	61,0 (45,0)	111,2 (82,0)	300	1/2
9SQ83	paragem	67,8 (50,0)	115,2 (85,0)	355	1/2
9TM53	corte automático	36,6 (27,0)	54,2 (40,0)	780	1/2
9TN53	corte automático	47,5 (35,0)	67,8 (50,0)	630	1/2
9TP53	corte automático	57,0 (42,0)	88,1 (65,0)	500	1/2
9TQ83	corte automático	67,8 (50,0)	115,2 (85,0)	355	1/2

MAINTENANCE SECTION



(Dwg. TPB963)

PART NUMBER FOR ORDERING

			9RS, 9S	9T
	1	Motor Housing Assembly		
		Nonreversible		
		for 9S and 9T models ending in 53 or 83	9SL–A40	9TL–A40
		for 9T models ending in –EU	—	9TL–EU–A40
		Reversible		
		for 9R models ending in 53 or 83	9RSL–A40	—
		for 9R models ending in –EU	9RSL–EU–A40	—
	*	Warning Label		
		for models ending in –EU	EU–99	EU–99
	*	for all other models	WARNING–9–99	WARNING–9–99
	2	Shutoff Valve	—	8TL–172
	2A	Shutoff Valve Body	—	8TL–170
	3	Shutoff Valve Spring	—	8TL–171
	3A	Shutoff Valve Stop	—	8TL–176
•	4	Exhaust Silencer	9SL–311	9SL–311
•	5	Exhaust Deflector		
		for models ending in –EU	9SL–EU–23	9SL–EU–23
		for all other models	9SL–23	9SL–23
•	6	Exhaust Deflector Seal (2)	WBT180N–103	WBT180N–103
	7	Deflector Retaining Ring	9SL–203	9SL–203
	8	Throttle Valve Plunger Assembly	8SL–A302	8SL–A302
•	9	Throttle Plunger Seal	8SL–259	8SL–259
	10	Throttle Plunger Bushing Assembly	8SL–A503	8SL–A503
•	11	Throttle Plunger Bushing Seal	405–159	405–159
	12	Throttle Valve Plunger Stop	8SL–305	8SL–305
	13	Throttle Valve Seat Assembly	8SL–A303	8SL–A303
•	14	Valve Seat Face	8SL–159	8SL–159
•	15	Valve Seat Seal	AF120–290	AF120–290
	16	Throttle Valve Ball	K6U–941	K6U–941
	17	Throttle Valve Spring	8SL–262	8SL–262
	18	Regulator Body Assembly	—	8TL–A173
	19	Regulator Spring	—	8TL–180
	20	Regulator Ball	—	2U–722
	21	Regulator Adjusting Screw	—	8TL–174
	22	Lock Screw	—	8TL–179
	23	Bleed Adjusting Screw	—	8TL–175
	24	Sensor Port Plug	—	5081T–266
	25	Regulator Body Cap	—	8TL–181
	26	Regulator Body Seal	—	C321–606
	27	Air Strainer	834–61	834–61
	28	Inlet Bushing	88V60–38	88V60–38
	29	Throttle Lever	8SL–273	8SL–273
•	30	Throttle Lever Retaining Pin	MR–100	MR–100

* Not illustrated.

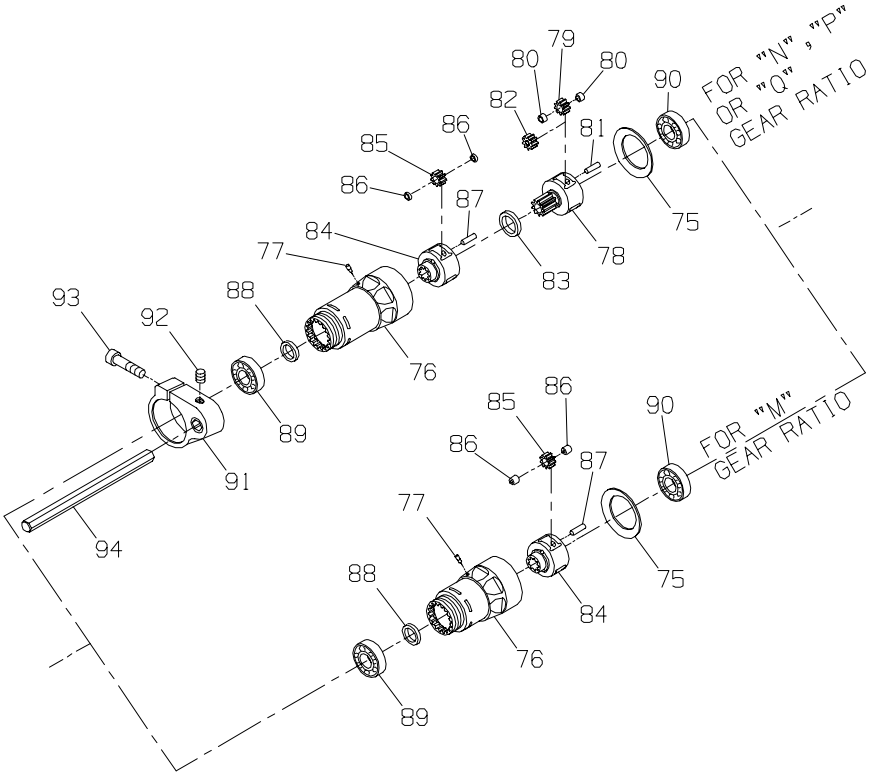
• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

PART NUMBER FOR ORDERING

			9RS, 9S	9T
	31	Reverse Valve Assembly	8RSL–A329	—
•	32	Reverse Valve Seal (2)	85H–167	—
	33	Reverse Valve Knob	8RSL–163	—
•	34	Reverse Valve Knob Pin	R100B–120	—
•	35	Detent Ball	8RSL–31	—
•	36	Detent Spring	5RA–664	—
	37	Detent Adjusting Screw	8RSL–662	—
	38	Rotor	9SM–53	9SM–53
•	39	Vane Packet (set of 5 Vanes)	9SL–42–5	9SL–42–5
	40	Rear Rotor Bearing Support		
		for Nonreversible Sizes	9SL–25	9SL–25
		for Reversible Sizes	9RSL–25	—
•	41	Rear Bearing Support Gasket		
		for Nonreversible Sizes	9SL–283	9SL–283
		for Reversible Sizes	9RSL–283	—
•	42	Rear Rotor Bearing	AG210–24Z	AG210–24Z
•	43	Rotor Bearing Retaining Nut	8SL–118	8SL–118
	44	Rear End Plate Gasket	9SL–739	9SL–739
•	45	Rear End Plate	9SL–12	9SL–12
	46	Cylinder		
		for Nonreversible Sizes	9SL–3	9SL–3
		for Reversible Sizes	9RSL–3	—
•	47	Front End Plate	9SL–11	9SL–11
•	48	Front Rotor Bearing	WFS182–24	WFS182–24
	49	Cylinder Dowel		
		for Nonreversible Sizes	9SL–98	9SL–98
		for Reversible Sizes	9RSL–98	—
	50	Front Rotor Bearing Support Assembly	9SL–A26	9SL–A26
	51	Front Rotor Bearing Retainer	AFH120A–362	AFH120A–362
	52	Horizontal Hanger	9SL–366	9SL–366

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

GEAR CASE ASSEMBLY



(Dwg. TPC594)

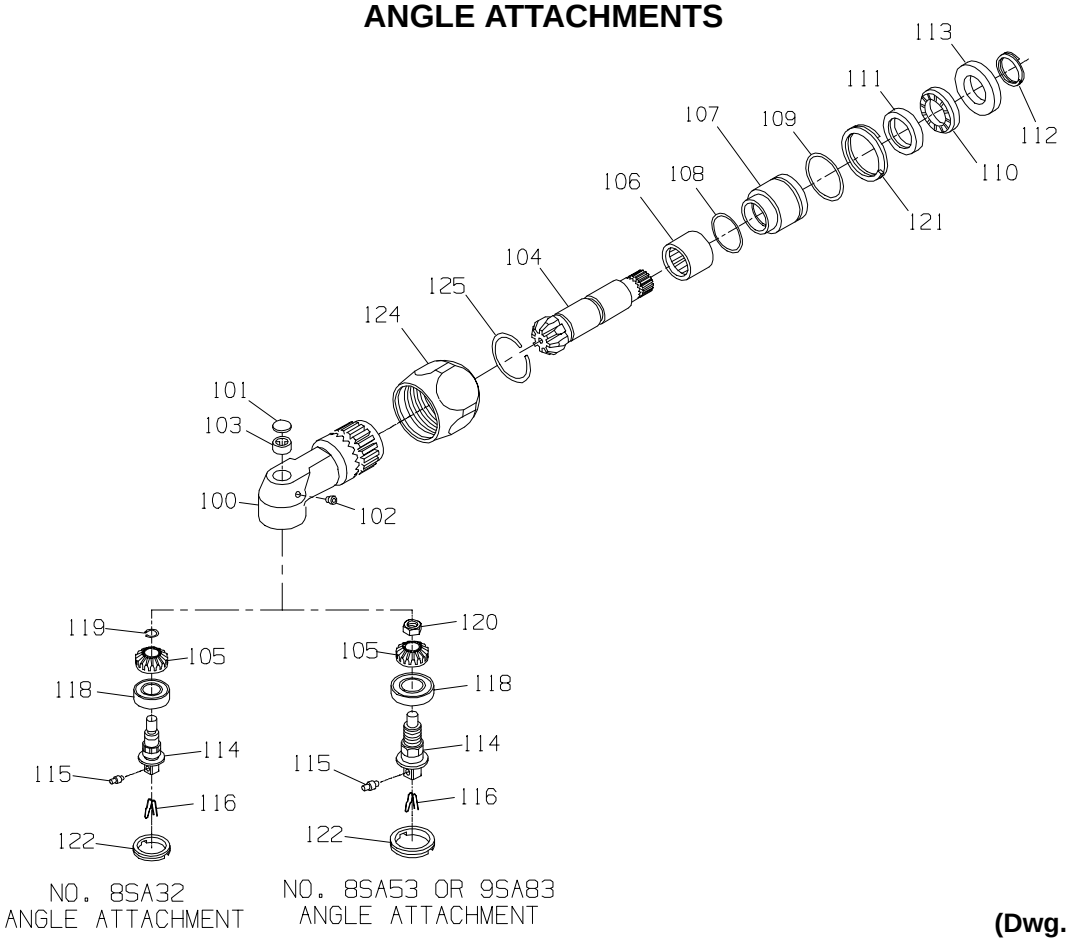
PART NUMBER FOR ORDERING

		M Ratio	N Ratio	P Ratio	Q Ratio
75	Motor Clamp Washer	9SL–207	9SL–207	9SL–207	9SL–207
76	Gear Case Assembly	9SL–A37	9SN–A37	9SN–A37	9SN–A37
77	Grease Fitting	D0F9–879	D0F9–879	D0F9–879	D0F9–879
	Gear Head Assembly	—	9SN–A216	9SP–A216	9SQ–A216
78	Gear Head	—	9SN–216	9SP–216	9SQ–216
79	Planet Gear Assembly (3) for N ratio gearing (15 teeth, color–coded green)	—	9SN–A9	—	—
	Planet Gear Assembly (3) for P and Q ratio gearing (17 teeth, color–coded red)	—	—	9SP–A9	9SP–A9
80	Planet Gear Bearing (2 for N ratio 1, for P and Q ratios)	—	8SL–500	WFS182–654	WFS182–654
81	Planet Gear Shaft (3)	—	8SN–190	8SL–191	8SL–191
82	Rotor Pinion for N ratio (color–coded red)	—	9SN–17	—	—
	Rotor Pinion for P and Q ratio (color–coded yellow)	—	—	9SP–17	9SP–17
83	Gear Head Spacer	—	9SN–80	9SN–80	9SN–80
	Spindle Assembly	9SM–A108	9SN–A108	9SP–A108	9SQ–A108
84	Spindle	9SM–108	9SN–108	9SP–108	9SQ–108

PART NUMBER FOR ORDERING

		M Ratio	N Ratio	P Ratio	Q Ratio
85	Spindle Planet Gear Assembly (3) for M ratio gearing (22 teeth, color–coded yellow)	9SM–A10	—	—	—
	for N ratio gearing (15 teeth, color–coded steel)	—	9SN–A10	—	—
	for P ratio gearing (16 teeth, color–coded green)	—	—	9SP–A10	—
	for Q ratio gearing (19 teeth, color–coded red)	—	—	—	9SQ–A10
86	Planet Gear Bearing	W22–654	9SN–500	W22–654	W22–654
87	Planet Gear Shaft (3)	9SL–191	9SN–190	9SL–191	9SL–191
88	Spindle Spacer	WFS182–111	WFS182–111	WFS182–111	WFS182–111
89	Spindle Bearing (2 for M ratio; 1 for N, P and Q ratios)	R1602–510	R1602–510	R1602–510	R1602–510
90	Gear Head Bearing	—	R1602–510	R1602–510	R1602–510
91	Reaction Bar Adapter Assembly	9SL–A60	9SL–A60	9SL–A60	9SL–A60
92	Bar Lock Screw	9SL–50	9SL–50	9SL–50	9SL–50
93	Adapter Bolt	9SL–49	9SL–49	9SL–49	9SL–49
94	Torque Reaction Bar	9SL–48	9SL–48	9SL–48	9SL–48

ANGLE ATTACHMENTS



(Dwg. TPC595)

PART NUMBER FOR ORDERING

		For Models ending in 32	For Models ending in 53	For Models ending in 83
100	Angle Attachment	8SA32	8SA53	9SA83
100	Angle Housing Assembly	8SA32–A550	8SA53–A600	182A83–A600
101	Angle Housing Cap	8SA32–110	182A53–110	R00B–110
102	Grease Fitting	D0F9–879	D0F9–879	D0F9–879
• 103	Upper Spindle Bearing	8SA32–603	182A53–603	34U–367
•	Matched Gear Set	8SA32–A552	182A53–A602	182A83–A602
104	Bevel Pinion (not sold separately)	—	—	—
105	Bevel Gear (not sold separately)	—	—	—
• 106	Bevel Pinion Bearing	182A53–606	182A53–606	182A83–606
107	Bevel Pinion Bearing Spacer	182A53–A165	182A53–A165	182A83–A165
108	Front Seal	R18LF–21	R18LF–21	AFH120A–358
109	Rear Seal	C321–606	C321–606	C321–606

- To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set of each part indicated by a bullet (•) for every four tools in service.

PART NUMBER FOR ORDERING

			For Models ending in 32	For Models ending in 53	For Models ending in 83
	110	Bevel Pinion Thrust Bearing	R1610–105	R1610–105	R1610–105
	111	Bevel Pinion Thrust Washer	182A53–554	182A53–554	182A53–554
	112	Bevel Pinion Snap Ring	182A53–689	182A53–689	182A53–689
	113	Bevel Pinion Retainer	182A53–589	182A53–589	182A53–589
◊	114	Socket Adapter Spindle Assembly			
		3/8” Square Drive (flush spindle)	8SA32–P507–3/8	—	—
+		1/2” Square Drive (flush spindle)	—	182A53–P507–1/2	182A83–P507–1/2
+		3/8” Square Drive (recessed spindle)	8SA32–P607–3/8	—	—
+		1/2” Square Drive (recessed spindle)	—	182A53–A607–1/2	182A83–A607–1/2
	115	Socket Retainer	5020–716	804–716	804–716
	116	Socket Retainer Spring	401–718	5UHD–718	5UHD–718
◊	*	Flush Socket Adapter Spindle			
		1/2” Hexagon	8SA34–807	182A54–807	—
		13mm Hexagon	8SA34–807M	182A13MF–807	—
		9/16” Hexagon	—	182A55–807	—
		15 mm Hexagon	—	182A15MF–807	—
		5/8” Hexagon	—	182A56–807	—
		17 mm Hexagon	—	8SA56–807M	—
		11/16” Hexagon	—	—	182A87–807
		18 mm Hexagon	—	—	9SA87–807M
		3/4” Hexagon (19 mm)	—	—	182A88–807
•	118	Lower Spindle Bearing	8SA32–593	182A53–593	182A83–593
◊	119	Bevel Gear Retainer	8SA32–578	—	—
◊	120	Bevel Gear Lock Nut	—	182A53–578	182A83–578
	121	Bevel Spacer Retainer	182A53–685	182A53–685	182A53–685
	122	Spindle Bearing Cap	8SA32–531	182A53–531	182A83–531
	*	Spindle Bearing Cap Wrench	8SA32–26	WFS182–26	WFS182–26
	124	Attachment Coupling Nut	8SA32–27	8SA32–27	8SA32–27
	125	Coupling Nut Retainer	182A53–29	182A53–29	182A53–29

* Not illustrated.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set of each part indicated by a bullet (•) for every four tools in service.

◊ When ordering a Socket Adapter Spindle (114) or Flush Socket Spindle, also order a Bevel Gear Retainer (119) or Bevel Gear Lock Nut (120).

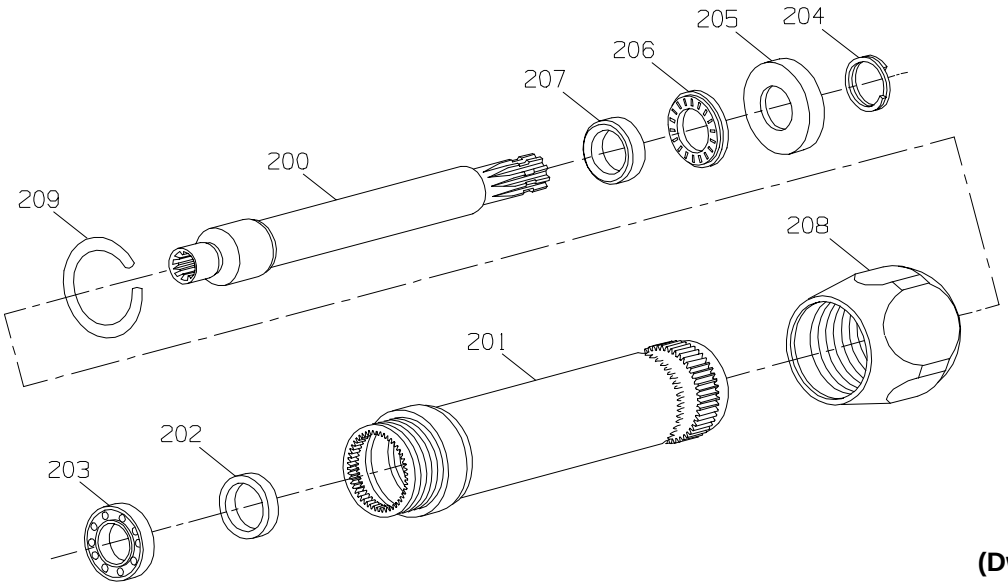
\+ **When using Spindle No. 8SA32–P507–3/8, 182A53–P507–1/2, or 182A83–P507–1/2**, the rear face of the socket will be flush with the face of the Angle Housing.

When using Spindle No. 8SA32–P607–3/8, any socket not exceeding 15/16” diameter will fit up into the Angle Housing, thus reducing the overall height by 1/4”.

When using Spindle No. 182A53–A607–1/2, any socket not exceeding 1–11/32” diameter will fit up into the Angle Housing, thus reducing the overall height by 1/4”.

When using Spindle No. 182A83–A607–1/2, any socket not exceeding 1–7/16” diameter will fit up into the Angle Housing, thus reducing the overall height by 1/4”.

ANGLE HOUSING EXTENSION ASSEMBLY



(Dwg. TPC420)

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
	6” Angle Housing Extension Assembly	8SL–A327–6	205	Extension Arbor Retainer	182A53–589
200	Extension Arbor	8SL–327–6	206	Extension Arbor Thrust Bearing	R1610–105
201	Arbor Housing	8SL–43–6	207	Extension Arbor Thrust Washer	182A53–554
202	Arbor Spacer	WFS182–111	208	Coupling Nut	8SA32–27
203	Arbor Bearing	R1602–510	209	Coupling Nut Retainer	182A53–29
204	Extension Arbor Snap Ring	182A53–689			

⚠ WARNING

Always wear eye protection when operating or performing maintenance on this tool.

Always turn off air supply and disconnect air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.

LUBRICATION

Each time the Series 9RS, 9S and 9T Angle Wrenches are disassembled for maintenance, repair or replacement of parts, lubricate the tool as follows:

1. Work 2 to 3 cc of Ingersoll–Rand No. 28 Grease into the Upper Spindle Bearing (103), Bevel Pinion Bearing (106), Bevel Pinion Thrust Bearing (110), Spindle Bearing (96), and the Planet Gear Bearings and Rollers.
2. Apply approximately 30 cc of Ingersoll–Rand No. 66 Grease to the Bevel Gear (105) and Bevel Pinion (104).
3. Inject approximately 2–1/2 cc of Ingersoll–Rand No. 10 Oil into the air inlet before attaching the air hose.

DISASSEMBLY

General Instructions

1. Do not disassemble the tool any further than necessary to replace or repair damaged parts.
2. Whenever grasping a tool or part in a vise, always use leather–covered or copper–covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
3. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
4. Do not disassemble the tool unless you have a complete set of new gaskets and O–rings for replacement.
5. Do not press any needle bearing from a part unless you have a new needle bearing on hand for installation. Needle bearings are always damaged during the removal process.

Disassembly of the Angle Attachment

1. With the Gear Case Assembly (76) clamped in leather–covered or copper–covered vise jaws with the Angle Housing Assembly (100) upward, unscrew the Attachment Coupling Nut (124).
2. Carefully separate the Angle Housing Assembly from the Gear Case Assembly.

NOTICE

The Spindle Bearing Cap (122) has left–hand threads. Because an adhesive is used on the threads, it may be necessary to apply moderate heat to release the bond.

CAUTION

If the application of heat is necessary, apply it only to the area of the Angle Housing Assembly directly over the threads. If this procedure is not followed, the Lower Spindle Bearing (118) may be damaged.

3. Using the No. WFS182–26 Bearing Cap Wrench for the No. 8SA53 Angle Head, or using the No. 8SA32–26 Bearing Cap Wrench for the No. 8SA32 Angle Head, unscrew the Spindle Bearing Cap (122).

CAUTION

If more than one angle head is disassembled at a time, take care not to mix Bevel Gears (105) and Bevel Pinions (104) from different Angle Heads. These gear sets are specially matched and are available only as matched sets.

4. Withdraw the Socket Adapter Spindle Assembly (114) from the Angle Housing.
5. If required, remove the Bevel Gear Retainer (119) or Bevel Gear Lock Nut (120), the Bevel Gear (105), and the Lower Spindle Bearing (118) from the Socket Adapter Spindle Assembly.
6. If required, release the Socket Retainer (115) by removing the Socket Retainer Spring (116).
7. Remove the Bevel Pinion Snap Ring (112) and slip the Bevel Pinion Retainer (113), Bevel Pinion Thrust Bearing (110), and Bevel Pinion Thrust Washer (111) from the Bevel Pinion shaft.
8. Remove the Bevel Spacer Retainer (121) and withdraw the Bevel Pinion Bearing Spacer (107).

CAUTION

Do not remove the Pinion from Bevel Pinion Bearing (106) unless you have a new Bearing available.

9. Grasping the bevel pinion shank in leather–covered or copper–covered vise jaws, pull the Pinion from the Angle Housing. Rapping the open end of the Housing with a soft–faced hammer may help remove the Bevel Pinion/Bearing Assembly.
10. Press the Angle Housing Cap (101) and Upper Spindle Bearing (103) out of the Angle Housing Assembly.

Disassembly of Gearing Case Assembly

1. Clamp the Gear Case Assembly (76) in leather–covered or copper–covered vise jaws horizontally.
2. Carefully unscrew the Motor Housing Assembly (1) from the Gear Case.

NOTICE

The rear Spindle Bearing (89), Gear Head Bearing (90), and the Motor Clamp Washer (75) will either stay with the Motor Housing Assembly or the Gear Case Assembly.

3. Remove the Motor Clamp Washer and either Bearing if they stay with the Gear Case Assembly.
   For N, P, or Q Gear Ratios only
4. Remove the Gear Head (78).

NOTICE

The Planet Gear Assembly (79) holds the Rotor Pinion (82) in place.

5. Remove the Planet Gear Shaft (81) that secures the Planet Gear Assembly.
6. Remove the Rotor Pinion.
7. If required, remove the Planet Gear Bearing (80) from the Planet Gear Assembly.
   For all Ratios
8. Remove the Spindle Assembly.
9. Press the Planet Gear Shaft (87) from the splined end of the Spindle Assembly.

Disassembly of Motor

1. Grasp the shaft of the Rotor (38) in leather–covered or copper–covered vise jaws and pull the assembled motor from the Motor Housing Assembly (1).
2. Remove the Front Rotor Bearing Retainer (51) and the Front Rotor Bearing Support Assembly (50).
3. Holding the Cylinder (46), tap the splined end of the Rotor with a light, plastic–faced hammer to remove the Front Rotor Bearing (48), and Front End Plate (47).
4. Remove the Cylinder and Vanes (39) from the Rotor.
5. Remove the Rear Bearing Support Gasket (41) and the Rear Rotor Bearing Support (40).
6. Remove the Rotor Bearing Retaining Nut (43), the Rear Rotor Bearing (42), the Rear End Plate Gasket (44), and the Rear End Plate (45).
7. Examine all motor parts for wear or damage as follows:
   a. **Vanes** – Check for evidence of cracking, chipping or spalling. Replace the complete set of Vanes if any of these conditions exists.
   b. **Rotor Bearings** – Check for looseness or roughness. Replace a Bearing if either condition is detected.
   c. **Cylinder** –Examine the bore. If it is cracked, wavy or rough, replace the Cylinder.
   d. **End Plates** – Examine the rotor side for scoring. Polish out shallow score marks using fine (320 grit) emery cloth placed on a hard, flat surface. Replace End Plates having deep score marks.
   e. **Rotor** – Polish the ends of the Rotor with fine emery cloth to remove score marks. Check the spline for excessive wear. Replace a Rotor with a worn or broken spline.

Disassembly of the Throttle Mechanism

1. Clamp the Motor Housing Assembly (1) in leather–covered or copper–covered vise jaws with the Throttle Lever (29) upward.
2. Drive the Throttle Lever Retaining Pin (30) that secures the Throttle Lever (29), from the Motor Housing.
3. Remove the Throttle Valve Plunger Stop (12), the Throttle Plunger Bushing Assembly (10), and the Throttle Valve Plunger Assembly (8).
4. Rotate the Motor Housing to gain access to the Inlet Bushing (28).
5. Remove the Inlet Bushing, Air Strainer (27), Throttle Valve Spring (17), Throttle Valve Ball (16), Valve Seat Face (14), Throttle Valve Seat Assembly (13), and the Valve Seat Seal (15).

Disassembly of the Shutoff Valve

For Series 9T only

1. Remove the Regulator Body Cap (25).
2. Loosen the Lock Screw (22) and remove the Regulator Adjusting Screw (21).
3. Remove the Regulator Spring (19), and the Regulator Ball (20).
4. Carefully remove the Regulator Body Assembly (18).
5. Remove the Shutoff Valve (2), the Shutoff Valve Body (2A), the Shutoff Valve Spring (3), and the Shutoff Valve Stop (3A).

Disassembly of the Reverse Valve

For Series 9RS only

NOTICE

The Detent Ball (35) is spring–loaded. Do not lose the Detent Ball or the Detent Spring (36).

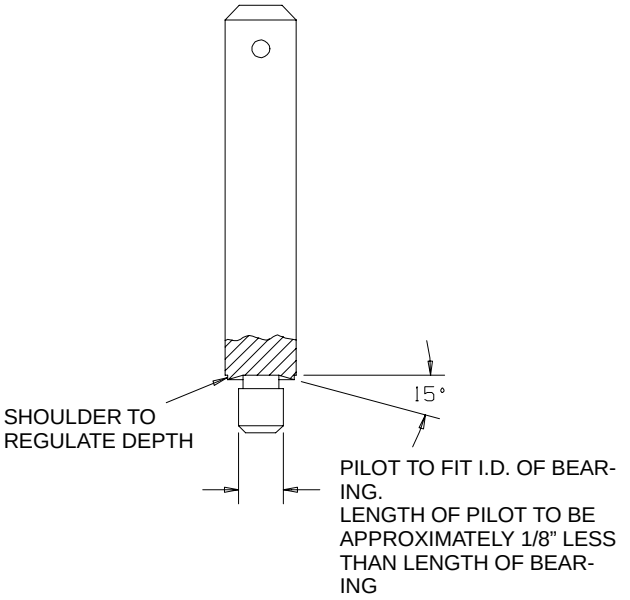
1. Carefully unscrew the Detent Adjusting Screw (37) and remove the Detent Spring and the Detent Ball.
2. Remove the Reverse Valve Knob Pin (34) and the Reverse Valve Knob (33).
3. Pull the Reverse Valve Assembly (31) from the bushing in the Motor Housing Assembly (1).

ASSEMBLY

General Instructions

1. Always press on the **inner** ring of a ball–type bearing when installing the bearing on a shaft.
2. Always press on the **outer** ring of a ball–type bearing when pressing the bearing into a bearing recess.
3. Whenever grasping a tool or part in a vise, always use leather–covered or copper–covered vise jaws. Take extra care with threaded parts and housings.
4. Always clean every part and wipe every part with a thin film of oil before installation.
5. Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in a clean, suitable, cleaning solution and dry with a clean cloth. **Sealed or shielded bearings should not be cleaned.** Work grease into every open bearing before installation.
6. Apply a film of o–ring lubricant to every O–ring before installation.
7. Unless otherwise noted, always press on the stamped end of a needle bearing when installing a needle bearing into a recess. Use a bearing inserting tool similar to the one shown in Drawing TPD786.

Needle Bearing Inserting Tool



(Dwg. TPD786)

Assembly of the Reverse Valve

For Series 9RS only

1. If required, place new Reverse Valve Seals (32) in the grooves on the Reverse Valve Assembly (31).
2. From the Lever (29) side, push the Reverse Valve into the reverse valve bushing in the Motor Housing (1).
3. Place the Reverse Valve Knob (33) onto the exposed hub of the Reverse Valve and secure it using the Reverse Valve Knob Pin (34).
4. Insert the Detent Ball (35), followed by the Detent Spring (36), into the small hole in the Reverse Valve Knob and secure them using the Detent Adjusting Screw (37).

Assembly of the Shut–off Valve

For Series 9T only

1. Place the Shutoff Valve Stop (3A), the Shutoff Valve Spring (3), and the Shutoff Valve Body (2A) and the Shutoff Valve (2) into the bushing in the Motor Housing.

NOTICE

Make certain the Shutoff Valve Spring seats in the recess in the Shutoff Valve.

2. Place the Regulator Body Seal (26) on the Regulator Body Assembly (18), apply Loctite Pipe Sealant with Teflon®* to the threads on the Body and thread the Regulator Body into the Motor Housing Assembly (1) so that it fits snugly.

NOTICE

Do not tighten the Regulator Adjusting Screw (21). The Regulator Spring (19) may be damaged if the Screw is brought down snug.

3. Place the Regulator Ball (20) followed by the Regulator Spring, smaller diameter first, into the large hole in the top of the Regulator Body. Retain the Ball and Spring using the Regulator Adjusting Screw.
4. Apply Loctite Pipe Sealant with Teflon to the threads of the Sensor Port Plug (24) and insert it into the tapped hole adjacent to the Regulator Adjusting Screw (21) hole.
5. Lock the Regulator Adjusting Screw with the Lock Screw (22).
6. Install the Exhaust Deflector Seals (6) into their grooves on the Motor Housing. Wrap the Exhaust Silencer (4) around the Housing in its recess. Slide the Exhaust Deflector (5) over the Seals and retain them using the Deflector Retaining Ring (7). If a Horizontal Hanger (52) is to be used, slide it over the Housingafter the Exhaust Deflector and retain it using the Retaining Ring.
7. After assembling the Angle Wrench, adjust the shutoff mechanism as instructed in **Adjustment of the Shutoff Valve**.

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Assembly of Throttle

1. Insert the Valve Seat Face (14) into the internal groove and the Valve Seat Seal (15) to the external groove of the Throttle Valve Seat Assembly (13).
2. Insert and firmly seat the assembled Valve Seat, small diameter first, into the tapped end of the Motor Housing (1).
3. With the Housing held firmly in leather–covered or copper–covered vise jaws, inlet bushing end up, place the Throttle Valve Ball (16), the Throttle Valve Spring (17), smaller diameter first, and the Air Strainer (27) into the inlet bushing end.

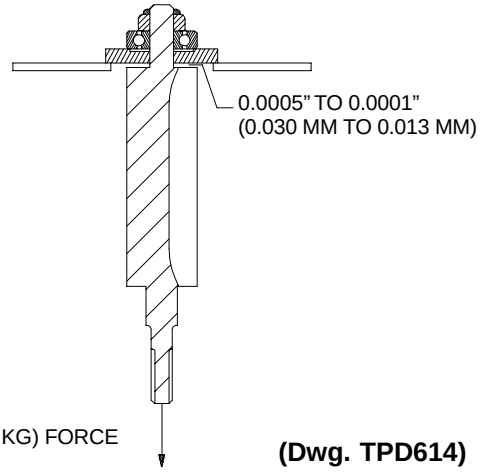
NOTICE

Make certain that the Air Strainer sits within the Inlet Bushing (28).

4. Thread the Inlet Bushing into the Motor Housing and tighten it to 35 to 45 ft–lb (47 to 61 Nm) torque.
5. Place the Throttle Plunger Bushing Seal (11) on the Throttle Plunger Bushing Assembly (10) and thread the Bushing Assembly into the Motor Housing.
6. Place the Throttle Plunger Seal (9) on the Throttle Valve Plunger Assembly (8) and insert the Plunger, beveled end first, through the Throttle Plunger Bushing Assembly.
7. Install the Throttle Lever (29) using the Throttle Lever Retaining Pin (30) and operate the lever to check for free movement.

Assembly of Motor

1. Slide the Rear End Plate (45), recessed face trailing, followed by the Rear Rotor Bearing (42), shielded side trailing, onto the threaded hub of the Rotor (38). Thread the Rotor Bearing Retaining Nut (43) onto the hub a few turns.
2. Support the Rear End Plate, see Dwg. TPD614, and place one 0.001” (0.03 mm) thick shim between the End Plate and a solid rotor boss.



(Dwg. TPD614)

3. While applying a 10 lb (4.54 kg) force downward as illustrated, tighten the Retaining Nut until the spacing of the Rotor and End Plate is approximately 0.001”. Remove the shim and manually rotate the preloaded Rotor to detect rubbing between the Rotor and End Plate. If rubbing is detected, back the Nut off a turn and repeat this procedure.
4. Stand the assembled Rotor on a workbench with the splined end up. Slide the Cylinder (46) over the Rotor so the 1/8” (3 mm) diameter hole in the Cylinder is aligned with the slot in the Rear End Plate and so the recess port in the end of the Cylinder is to the left of the 1/8” hole when viewed from the splined end.
5. Wipe each Vane (39) with a light coat of Ingersoll–Rand No. 10 Oil. Insert a Vane into each slot in the Rotor. Slide the Front End Plate (47), recessed face trailing, onto the splined Rotor hub.
6. Press the Front Rotor Bearing (48) onto the splined hub and rotate the Rotor manually to make certain it moves freely without binding.

NOTICE

The dowel hole in the bore of the Housing is in line with the Throttle Lever.

7. Using an 1/8” (3 mm) diameter rod as a guide going through the notch in the Front End Plate, through the hole in the Cylinder, the notch in the Rear End Plate, and the holes in the Rear End Plate Gasket and the Rear Rotor Bearing Support, guide the motor into the bore of the Motor Housing Assembly (1).
8. Carefully remove the guide rod and replace it with the Cylinder Dowel (49).
9. Install the Front Rotor Bearing Retainer (51) in its groove inside the Front Rotor Bearing Support (50).

Assembly of the Gear Case Assembly

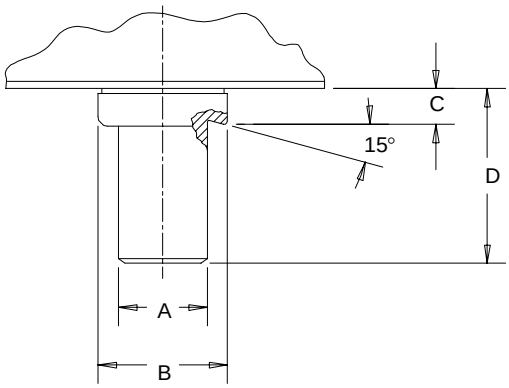
For L and M Ratio Gearing

NOTICE

An L or M is stamped on the web of Spindles for L or M ratio gearing.

1. Press a Planet Gear Bearing (86) into each Spindle Planet Gear (85) to a depth of 0.000” to 0.010” (0.00 mm to 0.25 mm) from the face of the Gear using the proper bearing inserting tool, see Dwg. TPD637–1 and Table A, shown on page 25, and lubricate the Bearings as instructed in **LUBRICATION**.

Planet Gear Bearing Inserting Tool



(Dwg. TPD637–1)

TABLE A

Bearing Number	A		B		C		D	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
WFS182–654	0.152” (3.86 mm)	0.153” (3.89 mm)	0.265” (6.73 mm)	0.266” (6.76 mm)	0.051” (1.30 mm)	0.059” (1.50 mm)	0.296” (7.52 mm)	0.312” (7.92 mm)
8SL–500	0.1207” (3.07 mm)	0.1217” (3.09 mm)	0.234” (5.94 mm)	0.235” (5.97 mm)	0.005” (0.13 mm)	0.010” (0.25 mm)	0.125” (3.18 mm)	0.140” (3.56 mm)
9SN–500	0.1207” (3.07 mm)	0.1217” (3.09 mm)	0.234” (5.94 mm)	0.235” (5.97 mm)	0.005” (0.13 mm)	0.010” (0.25 mm)	0.125” (3.18 mm)	0.140” (3.56 mm)
W22–654	0.152” (3.86 mm)	0.153” (3.89 mm)	0.265” (6.73 mm)	0.266” (6.76 mm)	0.051” (1.30 mm)	0.059” (1.50 mm)	0.296” (7.52 mm)	0.312” (7.92 mm)

2. Insert an assembled Planet Gear into each slot in the Spindle Assembly and press a Planet Gear Shaft (87) into the Spindle through each Planet Gear from the smooth bore hub end of the Spindle.
3. Using the Rotor (50) as a pilot inside the Spindle, insert the Spindle Assembly into the Gear Case Assembly (76).
4. Turn the Gear Case end for end, with the small diameter of the Gear Case up, and slide the Spindle Spacer (88) onto the end of the Spindle.
5. Support the motor end of the Spindle and press the front Spindle Bearing (89) onto the end of the Spindle.
6. Place the Motor Clamp Washer (75), concave (dished) face first, over the unsplined end of the Spindle.
7. Press the Gear Head Bearing (90) into the large recess in the Front Rotor Bearing Support (50) and slide the Bearing and Support onto the hub of the Spindle.
8. Thread the assembled Gear Case onto the assembled Motor Housing (1) and tighten to a minimum of 35 ft–lb (47 Nm).

For N, P and Q Ratio Gearing

NOTICE

An N, P, or Q is stamped on the web of Gear Heads for N, P and Q ratio gearing.

1. **For N ratio gearing** – Press two Planet Gear Bearings (86) into each Spindle Planet Gear (85), to a depth of 0.000” to 0.005” (0.00mm to 0.13 mm).
   For P and Q ratio gearing – Press two Planet Gear Bearings (86) into each Spindle Planet Gear (85) to a depth of 0.037” to 0.045” (0.95 mm to 1.15 mm) from the face of the Gear.
2. Insert an assembled Gear into each slot in the Spindle (84) and press a Planet Gear Shaft (87) from the smooth bore end of the Spindle into the pin holes to retain the Gears.
3. Using the unassembled Gear Head (78) as a pilot through the center of the assembled Spindle Assembly, insert the Spindle and Planet Gears into the Gear Case. Take care to engage the Planet Gears with the internal gear in the Gear Case.
4. Slowly withdraw the Gear Head from the Gear Case.

5. Press two Planet Gear Bearings (80) into each of the Planet Gears (79).
6. Insert an assembled Planet Gear into each slot in the Gear Head, capturing the Rotor Pinion (82) in the Gear Head, and retain the Planet Gears by pressing the Planet Gear Shafts (81) from the smooth outside diameter end of the Gear Head.
7. Slide the Gear Head Spacer (83) over the geared end of the Gear Head and insert this assembly into the ear Case. Make certain the Gear Head properly meshes with the Spindle Planet Gears Assembly (85).
8. Place the Gear Case Assembly on the workbench with the small diameter up and slide the Spindle Spacer (88) onto the end of the Spindle.
9. Support the motor end of the Gear Head and press the front Spindle Bearing (89) onto the Spindle.
10. Turn the Gear Case end for end and place the Motor Clamp Washer (75), concave (dished) face first, over the Gear Head. Make certain that the outside diameter of the Motor Clamp Washer contacts the end of the shoulder in the Gear Case.
11. Slide the Reaction Bar Adapter Assembly (91) over the Gear Case Assembly. Secure it to the Gear Case by tightening the Adapter Bolt (93). Place the Torque Reaction Bar (94) into the Reaction Bar Holder Assembly and secure it with the Bar Lock Screw (92).
12. Press the Gear Head Bearing (90) into the large recess in the Front Rotor Bearing Support and slide the Bearing onto the hub of the Gear Head.
13. Thread the assembled Gear Case onto the assembled Motor Housing (1) and tighten to a minimum of 35 ft–lb (47 Nm) torque.

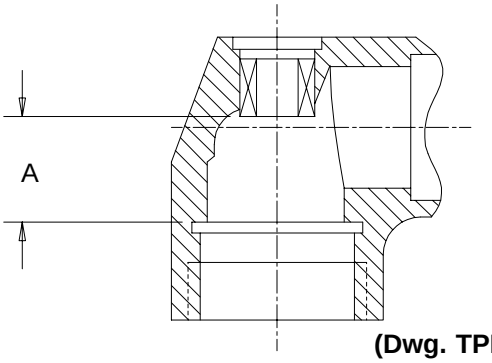
Assembly of Angle Attachment

1. Lubricate the Bevel Pinion (104) as instructed in **LUBRICATION** and insert it, gear end first, into the long bore of the Angle Housing Assembly (100).
2. Lubricate the Bevel Pinion Bearing (106) as instructed in **LUBRICATION** and insert it, unstamped end first, into the bore of the Angle Housing, after the Bevel Pinion.
3. Using a bearing inserting tool, see Dwg. TPD786, press the Bearing so the stamped face is 1–11/32" (34 mm) below the end face of the Angle Housing.
4. Install the Front Seal (108) and the Rear Seal (109) onto the Bevel Pinion Bearing Spacer (107).
5. Insert the Spacer, small diameter first, into the long bore of the Angle Housing and retain it using the Bevel Spacer Retainer (121).
6. Lubricate the Bevel Pinion Thrust Bearing (110) as instructed in **LUBRICATION**. Install, in the following order; the Bevel Pinion Thrust Washer (111), Bevel Pinion Thrust Bearing and the Bevel Pinion Retainer (113), recessed face trailing, over the splined end of the Bevel Pinion. Retain these parts using the Bevel Pinion Snap Ring (112).
7. If the Lower Spindle Bearing (118) has been removed, press the new Bearing onto the Socket Adapter Spindle Assembly (114) with the red side closest to the square drive end.
8. Press the Bevel Gear (105), geared side trailing, onto the ground end of the Spindle and into contact with the Lower Spindle Bearing.
9. **For No. 8SA32** – Retain the Bevel Gear using the Bevel Gear Retainer (119).
   For No. 8SA53 and 9SA83 – Clean the threads on the Spindle, apply a film of thread locking compound to the threads, apply the Bevel Gear Lock Nut (120) and tighten it to a minimum of 50 ft–lb (68 Nm) torque.

CAUTION

Press on the stamped face of the Upper Spindle Bearing (103). Failure to do so will cause damage to the Bearing.

10. If the Upper Spindle Bearing was removed, press a new Bearing into the Angle Housing (100) from the large threaded end to the dimension, shown in Dwg. TPD636 and Table B.



(Dwg. TPD636)

TABLE B

Minimum Dimension "A"		
Angle Attachment	**in**	**mm**
8SA32	0.718	18.25
8SA53	0.683	17.35
9SA83	0.720	18.30
Maximum Dimension "A"		
8SA32	0.728	18.50
8SA53	0.693	17.60
9SA83	0.730	18.55

11. Lubricate the Upper Spindle Bearing as instructed in **LUBRICATION** and press the Angle Housing Cap (101) into its recess.

12. Insert the assembled Socket Adapter Spindle Assembly (114) into the Angle Housing, clean the threads on the Angle Housing and Spindle Bearing Cap (122), apply a film of thread locking compound to the threads and tighten the Bearing Cap to a minimum of 25 ft–lb (34 Nm) torque.
13. Slide the Attachment Coupling Nut (124), threaded end trailing, over the splined end of the Angle Housing.
14. Apply the Coupling Nut Retainer (125) to the external groove on the splined end of the Angle Housing.
15. Engage the spline on the Bevel Pinion (104) with the matching spline on the Spindle Assembly (84) and tighten the Coupling Nut (124) to a minimum of 35 ft–lb (47 Nm) torque.

Adjustment of Shutoff Valve

NOTICE

Adjustment to the Shutoff Valve system is preset at the factory. Do not adjust any part of the Valve unless, after prolonged use of the Tool, the Tool shuts off prematurely or the Tool fails to shut off. Only if either of these conditions exist are you to adjust the Valve. Adjust the Valve according to the procedures below.
If premature shutoff occurs, proceed as follows:

NOTICE

The Bleed Adjusting Screw is located in the tapped port marked "A" on the face of the Regulator Body Assembly. The port marked "S" is a signal port to be used with monitoring equipment.

1. Set the inlet air pressure at 90 psig (6.2 bar/620 kPa) with the motor running. Slightly rotate the Bleed Adjusting Screw (23) counterclockwise and slowly depress the Throttle Lever to determine continual motor operation. If necessary, repeat this procedure until the motor runs and remains running with the Lever depressed.
2. Securely anchor the Wrench and run it on a Model J Skidmore Test Stand a number of times at 50 psig (3.4 bar/340 kPa) air pressure and at 90 psig (6.2 bar/620kPa) air pressure. The tool must shut off when tested at each pressure setting. If the Angle Wrench fails to shut off, adjust the Shutoff Valve as follows:
3. Operate the Tool at 90 psig as instructed in Step 2. Release the Throttle Lever and rotate the Bleed Adjusting Screw slightly clockwise and retest the Tool. Continue testing and adjusting the Valve a slight amount each time until the Wrench shuts off properly.

TEST AND INSPECTION PROCEDURE

Run the performance tests at 90 psig (6.2 bar/620 kPa) air pressure at the inlet of the tool using 1/2" (13 mm) inside diameter supply hose.

1. Check the free speed of the Angle Wrench using a hand–held tachometer applied to the spindle. The minimum allowable free speeds are listed below.

Model	Stamped Free Speed rpm (r/min)	Minimum Free Speed rpm (r/min)
9SQ83	300	270
9RSM53	665	600
9RSN53	535	480
9RSP53	425	380
9RSQ83	300	270
9TM53	780	700
9TN53	630	565
9TP53	500	450
9TQ83	355	320

2. Using a Model J Skidmore tester, operate the Wrench to determine torque output. The minimum allowable torque levels are as follows.
3. There must be no objectionable leaks in any non–exhaust areas. The exhaust deflector must rotate manually.
4. The throttle must operate freely and must not remain open when the lever is released with air at the inlet.
5. The angle attachment, gear case and motor case must not generate excessive heat. Operate the tool at free speed for 20 seconds.

⚠ WARNING

Disconnect the air supply hose to the tool before proceeding.

6. Rotate the output spindle using a wrench. The spindle must rotate smoothly with no binding.
7. Examine the Tool to see that the Throttle Lever is on the opposite side of and in line with the output spindle

Model	Minimum Torque ft–lb	Minimum Torque Nm
9SQ83	85	115
9RSM53	40	41
9RSN53	50	68
9RSP53	65	88
9RSQ83	85	115
9TM53	40	41
9TN53	50	68
9TP53	65	88
9TQ83	85	115

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Low power or low free speed	Low air pressure	Check the air pressure at the inlet. The pressure must not exceed 90 psig (6.2 bar/620 kPa).
	Plugged Inlet Bushing Screen or Air Strainer Screen	Clean the Screen in a clean, suitable, cleaning solution. If it cannot be cleaned, replace it.
	Worn or broken Vanes	Replace the complete set of Vanes.
	Loose Rotor Bearing Retaining Nut	Tighten the Nut.
	Worn or broken Cylinder	Replace the Cylinder if it is worn or broken or if the bore is scored or wavy.
	Scoring of End Plates	Replace End Plates if they are scored.
	Improper lubrication or dirt build–up in the motor.	Lubricate the Wrench as instructed in **LUBRICATION.** If lubrication does not result in satisfactory operation, disassemble the motor inspect and clean all parts.
Scoring	Improper assembly	Make certain that all motor or Cylinder parts are properly aligned prior to clamping the motor assembly.
Gear Case gets hot	Excessive grease	Clean and inspect the Gear Case gearing parts and lubricate as instructed in **LUBRICATION.**
	Worn or damaged parts	Clean and inspect the Gear Case and gearing. Replace worn or broken components.
Tool fails to shut off	Dirt or Burrs on Shutoff Valve or Bushing	Clean the parts and remove the burrs.
	Bleeder ports plugged	Clean the bleeder ports with a fine wire.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.