03533932
Form P6733
Edition 8
August, 2000

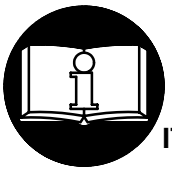
F
E
P

OPERATION AND MAINTENANCE MANUAL FOR SERIES 6W ANGLE WRENCHES

NOTICE

Series 6W Angle Wrenches are designed for running small, threaded fasteners in close–quarter 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 3/8” (10 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.

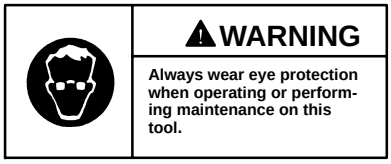
Printed in U.S.A.

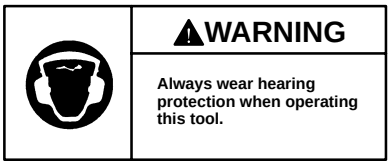
Ingersoll-Rand®

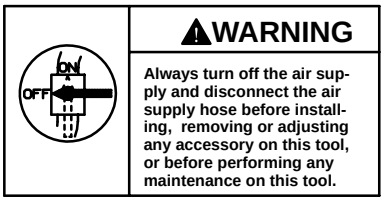
WARNING LABEL IDENTIFICATION

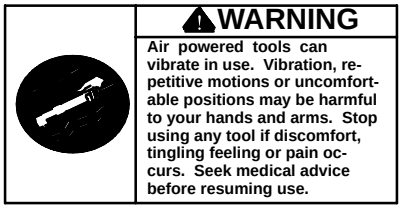
⚠ WARNING

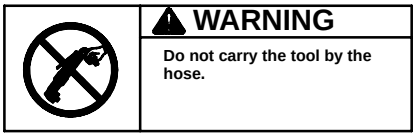
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

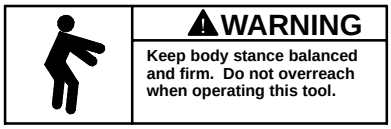


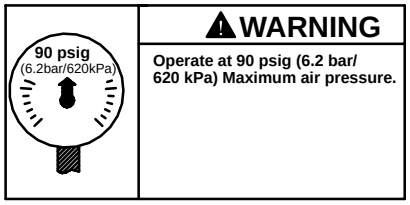












PLACING TOOL IN SERVICE

LUBRICATION

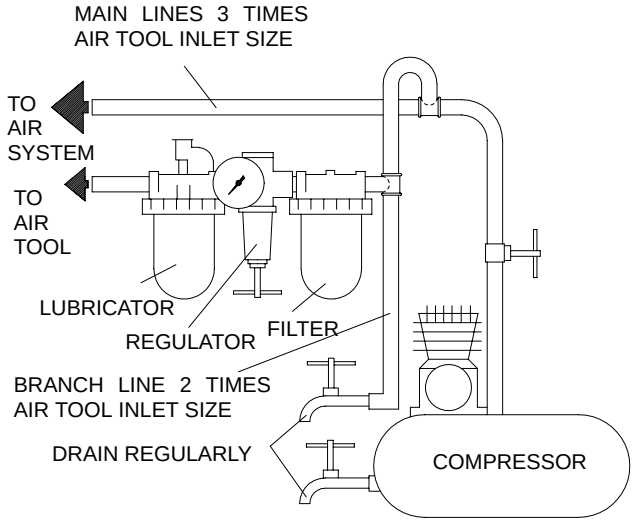
Ingersoll–Rand No. 10 **Ingersoll–Rand No. 67**

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

USA – No. C18–03–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 cc of Ingersoll–Rand No. 10 Oil into the air inlet.

After each 50 000 cycles, or one month of operation, or as experience indicates, inject 2 to 3 cc (for L ratio tools) or 3 to 4 cc (for all other ratio tools) of Ingersoll–Rand No. 67 Grease into the Grease Fitting in the Gear Case.
After each eight hours of operation, or as experience indicates, inject 1 to 2 cc of Ingersoll–Rand No. 67 Grease into the Grease Fitting in the Angle Housing Assembly.



(Dwg. TPD905–1)

ADJUSTMENTS

SHUTOFF VALVE ADJUSTMENT PROCEDURE

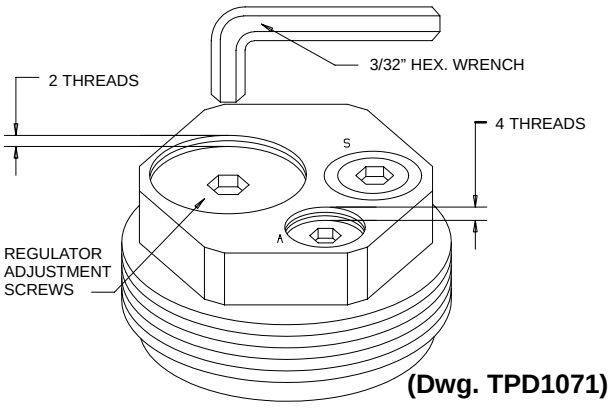
Adjustment of Shutoff Valve (for 6WT or 6WRT)

⚠ WARNING

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 exists are you to adjust the Valve. Adjust the Valve according to the procedures below.

1. Turn the Regulator Adjustment Screw until the top of the Screw is approximately two threads below the face of the Regulator Body. Set the Bleed Adjustment Screw approximately four threads below the face of the Regulator Body. See Dwg. TPD1071.

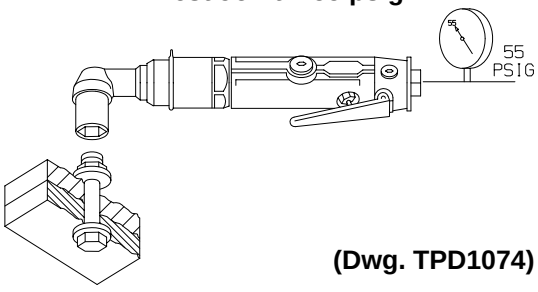
Setup of the Regulator and Bleed Adjustment Screws



(Dwg. TPD1071)

2. Cycle the tool on a test joint to test for shutoff. See Dwg. TPD1074.

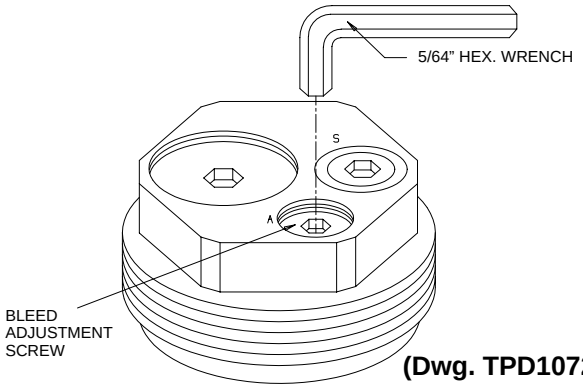
Test Joint – 55 psig



(Dwg. TPD1074)

3. If the tool fails to shut off:
   a. Turn the Bleed Adjustment Screw clockwise a little at a time, until consistent shutoff occurs. If no shutoff occurs, reset the Bleed Adjustment Screw four turns under flush. See Dwg. TPD1072. Set the Regulator Adjustment Screw 1/4 turn deeper and repeat steps 2 and 3. See Dwg. TPD1073.
   b. If tool shutoff occurs, turn the Bleed Adjustment Screw counterclockwise until the tool stalls on a test joint. When the tool stalls, rotate the Bleed Adjustment Screw clockwise, a little at a time, until consistent shutoff occurs. See Dwg. TPD1072.

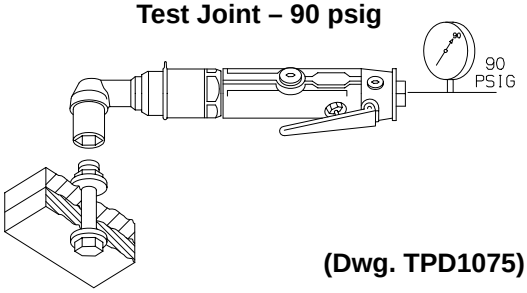
Setting the Regulator Adjustment Screw



(Dwg. TPD1072)

4. Cycle the tool on a test joint to test for shutoff. See Dwg. TPD1075.

Test Joint – 90 psig

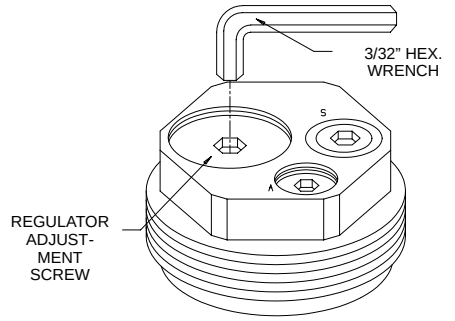


(Dwg. TPD1075)

5. If the tool fails to shut off:
   a. Turn the Regulator Adjustment Screw clockwise, a little at a time, until consistent shutoff occurs. See Dwg. TPD1073.
   b. If tool shutoff occurs, turn the Regulator Adjustment Screw counterclockwise until the tool stalls on a test joint. When the tool stalls, rotate the Regulator Adjustment Screw clockwise 1/8 of turn at a time until consistent shutoff occurs. This adjustment provides maximum torque output at shutoff.

ADJUSTMENTS

Setting the Regulator Adjustment Screw



(Dwg. TPD1073)

6. It is possible that the tool might shut off when the throttle is depressed. This condition is a premature shutoff and can be corrected by turning the Bleed Adjustment Screw counterclockwise a little at a time until the premature shutoff condition is corrected. See Dwg. TPD1072. If the Bleed Adjustment Screw was used to correct a premature shutoff condition, retest the tool for shutoff at 55 and 90 psig.If necessary, repeat steps 2 through 5.

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						
6WRSL3	3.8	5.2	6.7	9.1	1 175	3/8
6WRSM3	5.3	7.2	9.5	12.2	825	3/8
6WRSN3	6.4	8.7	11.5	14.9	700	3/8
6WRSP3	8.1	11.0	14.5	19.0	550	3/8
6WRSQ3	10.6	14.4	19.0	25.8	400	3/8
6WRSR3	13.4	18.2	24.0	32.5	325	3/8
INLINE HANDLE NONREVERSIBLE SHUTOFF						
6WTL3	4.2	5.7	7.5	10.2	1 450	3/8
6WTM3	5.9	8.0	10.5	14.2	1 000	3/8
6WTN3	7.0	9.5	12.5	16.9	850	3/8
6WTP3	9.2	12.5	16.5	22.4	650	3/8
6WTQ3	12.0	16.3	21.5	29.2	500	3/8
6WTR3	15.4	20.9	27.5	37.3	400	3/8
INLINE HANDLE REVERSIBLE SHUT–OFF						
6WRTL3	3.8	5.2	6.7	9.1	1 250	3/8
6WRTM3	5.3	7.2	9.5	12.2	875	3/8
6WRTN3	6.4	8.7	11.5	14.9	750	3/8
6WRTP3	8.1	11.0	14.5	19.0	550	3/8
6WRTQ3	10.6	14.4	19.0	25.8	425	3/8
6WRTR3	13.4	18.2	24.0	32.5	350	3/8
6WRTS3	17.9	24.3	32.0	43.4	245	3/8

F

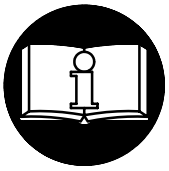
MANUEL D'EXPLOITATION ET D'ENTRETIEN
CLÉS D'ANGLE DE LA SÉRIE 6W

NOTE

Les clés d'angle réversibles de la série 6W sont destinées au serrage de la petite boulonnerie dans des espaces restreints 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 10 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®

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

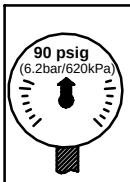
Garder une position équilibrée et ferme. Ne pas se pencher trop en avant pendant l'utilisation de cet outil.

⚠ ATTENTION

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

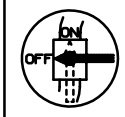
⚠ ATTENTION

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. 67

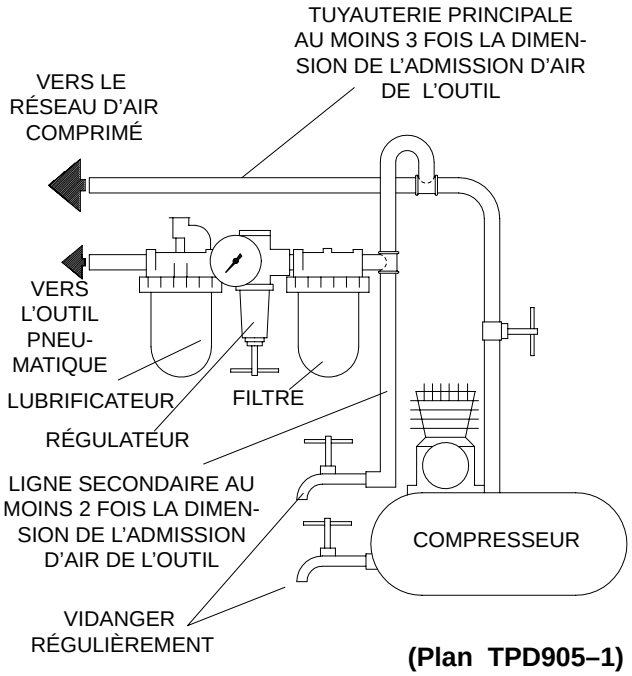
Utiliser toujours un lubrificateur avec ces outils. Nous recommandons l'emploi du filtre–régulateur–lubrificateur suivant :

É.U.– No. C18–03–FKG0–28

Avant de mettre l'outil en marche et toutes les deux ou trois heures de fonctionnement, si un lubrificateur de ligne n'est pas utilisé, débrancher le flexible d'alimentation et verser environ 2 cm^3 d'huile Ingersoll–Rand No. 10 dans le raccord d'admission de l'outil.

T**ous les 50 000 cycles, ou tous les mois**, ou en fonction de l'expérience, injecter 2–3 cm^3 (pour les outils au rapport L) ou 3 à 4 cm^3 (pour tous les autres outils) de graisse Ingersoll–Rand No. 67 dans le raccord de graissage du boîtier d'engrenages.

Toutes les huit heures de fonctionnement, ou en fonction de l'expérience, injecter environ 1–2 cm^3 de graisse Ingersoll–Rand No. 67 dans le raccord de graissage du corps de renvoi.



(Plan TPD905–1)

RÉGLAGES

PROCEDURE DE RÉGLAGE DE LA SOUPAPE D'ARRET

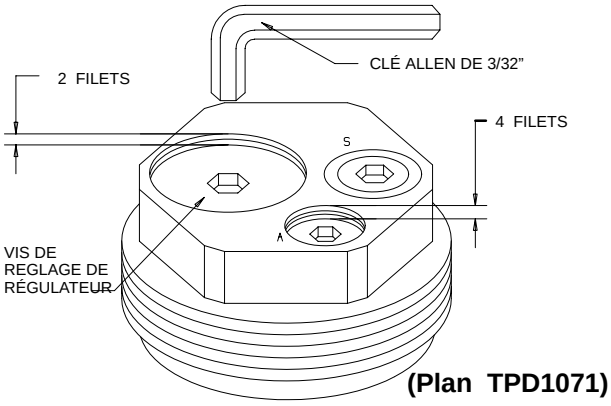
Réglage de la soupape d'arrêt (pour 6WT ou 6WRT)

⚠ ATTENTION

La soupape d'arrêt est préréglée en usine. Ne jamais ajuster une partie quelconque de la soupape à moins qu'après une utilisation prolongée l'outil s'arrêt prématurément ou ne s'arrête pas du tout. Vous ne pouvez ajuster la soupape que si l'une de ces deux conditions se présentent. Dans ce cas, procéder comme suit.

1. Tourner la vis de réglage du régulateur jusqu'à ce que le haut de la vis soit à environ 2 filets en dessous de la face du corps de régulateur. Régler la vis de purge à environ 4 filets en dessous de la face du corps de régulateur. Voir Plan TPD1071.

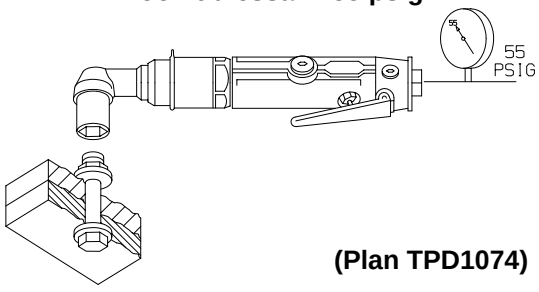
Ajustement de la vis de réglage de purge



(Plan TPD1071)

2. Faire marcher l'outil sur un joint d'essai pour tester l'arrêt. Voir Plan TPD1074.

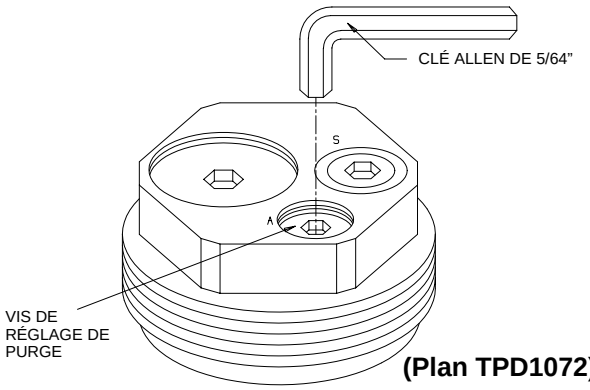
Joint d'essai – 55 psig



(Plan TPD1074)

3. Si l'outil ne s'arrête pas :
   a. Tourner la vis de réglage de purge dans le sens des aiguilles d'une montre très légèrement à la fois jusqu'à ce qu'un arrêt consistant se produise. Si l'outil ne s'arrête toujours pas, remettre la vis de réglage de purge à 4 filets en dessous de la face. Voir Plan TPD1072. Visser la vis de réglage du régulateur d'un quart de tour et répéter les opérations 2 et 3. Voir Plan TPD1073.
   b. Si l'arrêt se produit, tourner la vis de réglage de purge dans le sens inverse des aiguilles d'une montre lorsqu'à ce que l'outil se cale sur un joint d'essai. Lorsque l'outil cale, tourner la vis de réglage de purge dans le sens des aiguilles d'une montre très légèrement à la fois jusqu'à ce qu'un arrêt consistant se produise. Voir Plan TPD1072.

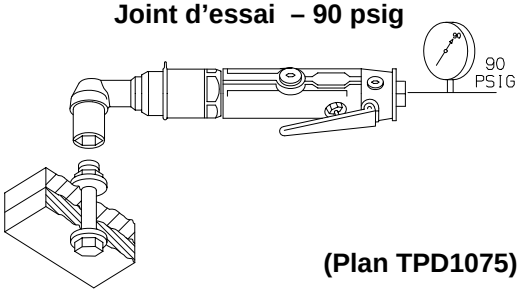
Ajustement de la vis de réglage de purge



(Plan TPD1072)

4. Faire marcher l'outil sur un joint d'essai pour tester l'arrêt. Voir Plan TPD1075.

Joint d'essai – 90 psig

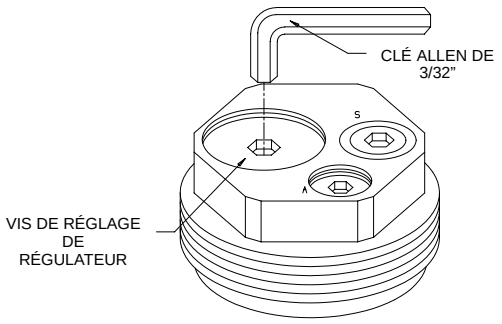


(Plan TPD1075)

5. Si l'outil ne s'arrête pas :
   a. Tourner la vis de réglage du régulateur dans le sens des aiguilles d'une montre très légèrement à la fois jusqu'à ce qu'un arrêt consistant se produise. Voir Plan TPD1073.
   b. Si l'arrêt se produit, tourner la vis de réglage du régulateur dans le sens inverse des aiguilles d'une montre lorsqu'à ce que l'outil se cale sur un joint d'essai. Lorsque l'outil cale, tourner la vis de réglage du régulateur dans le sens des aiguilles d'une montre de 1/8 tour à la fois jusqu'à ce qu'un arrêt consistant se produise. Ce réglage fournit la sortie de couple maximum à l'arrêt.

RÉGLAGES

Ajustement de la vis de réglage de régulateur



(Plan TPD1073)

6. Il arrive parfois que l'outil s'arrête dès l'appui sur le levier de commande. Cet arrêt prématuré peut être corrigé en tournant la vis de réglage de purge dans le sens inverse des aiguilles d'une montre jusqu'à ce que cette condition soit éliminée. Voir Plan TPD1072. Si la vis de réglage de purge est utilisée pour remédier à un arrêt prématuré, retester l'outil à 55 psig et à 90 psig. Si nécessaire, répéter les opérations 2 à 5.

MISE EN SERVICE DE L'OUTIL

SPÉCIFICATIONS

Modèle	Plage de couple (Serrage élastique)		Vitesse libre	entr. carré
	50 psi ft–lbs (Nm)	90 psi ft–lbs (Nm)	tr/mn	in.
6WRSL3	3.8 (5.2)	6.7 (9.1)	1 175	3/8
6WRSM3	5.3 (7.2)	9.5 (12.2)	825	3/8
6WRSN3	6.4 (8.7)	11.5 (14.9)	700	3/8
6WRSP3	8.1 (11.0)	14.5 (19.0)	550	3/8
6WRSQ3	10.6 (14.4)	19.0 (25.8)	400	3/8
6WRSR3	13.4 (18.2)	24.0 (32.5)	325	3/8
6WTL3	4.2 (5.7)	7.5 (10.2)	1 450	3/8
6WTM3	5.9 (8.0)	10.5 (14.2)	1 000	3/8
6WTN3	7.0 (9.5)	12.5 (16.9)	850	3/8
6WTP3	9.2 (12.5)	16.5 (22.4)	650	3/8
6WTQ3	12.0 (16.3)	21.5 (29.2)	500	3/8
6WTR3	15.4 (20.9)	27.5 (37.3)	400	3/8
6WRTL3	3.8 (5.2)	6.7 (9.1)	1 250	3/8
6WRTM3	5.3 (7.2)	9.5 (12.2)	875	3/8
6WRTN3	6.4 (8.7)	11.5 (14.9)	750	3/8
6WRTP3	8.1 (11.0)	14.5 (19.0)	550	3/8
6WRTQ3	10.6 (14.4)	19.0 (25.8)	425	3/8
6WRTR3	13.4 (18.2)	24.0 (32.5)	350	3/8
6WRTS3	17.9 (24.3)	32.0 (43.4)	245	3/8

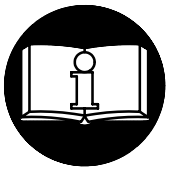
E

MANUAL DE FUNCIONAMIENTO Y MANTENIMIENTO
LLAVES ANGULARES SERIE 6W

NOTA

Las Llaves Angulares Serie 6W están diseñadas para el atornillado de pequeñas uniones roscadas en aplicaciones de acceso reducido que requieran repetibilidad de par con precisión. 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 con aire de diámetro interno de 10 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 maneje, o realice operaciones de mantenimiento en esta herramienta.**
- **Use siempre protección para los oídos cuando maneje 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®

ETIQUETAS DE AVISO

⚠ AVISO

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

⚠ ADVERTENCIA

Usar siempre protección ocular al manejar o realizar operaciones de mantenimiento en esta herramienta.

⚠ 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

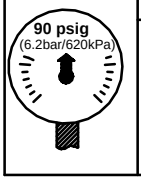
Mantener una postura del cuerpo equilibrada y firme. No estirar demasiado los brazos al manejar la herramienta.

⚠ ADVERTENCIA

Usar siempre protección para los oídos al manejar esta herramienta.

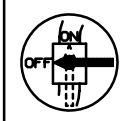
⚠ ADVERTENCIA

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

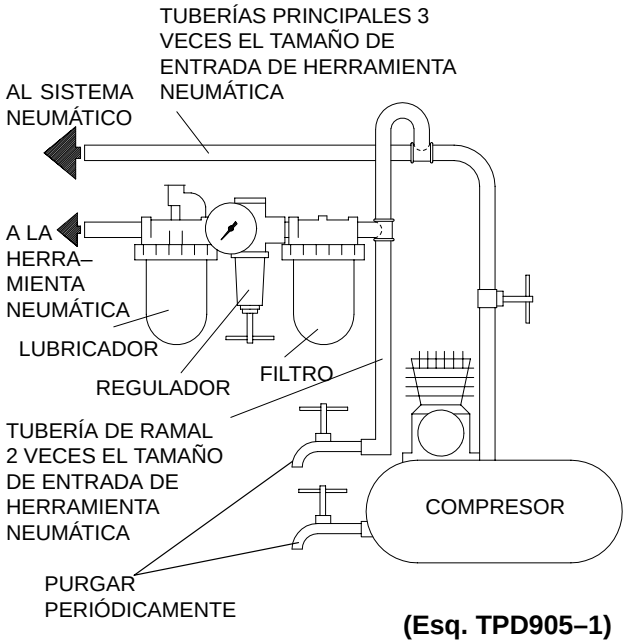
LUBRICACIÓN

Ingersoll–Rand Nº 10 **Ingersoll–Rand Nº 67**

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

EE. UU. – Nº. C18–03–FKG0–28

Antes de poner la herramienta en marcha y después de cada dos o tres horas de uso, a menos que se use un lubricante de línea de aire comprimido, desconecte la manguera de aire e inyecte unos 2 cc de Aceite Ingersoll–Rand Nº 10 en la admisión de aire.
Después de cada 50 000 ciclos, o de un mes de funcionamiento, o según indique la experiencia, inyecte de 2 a 3 cc (para herramientas de radio L) ó de 3 a 4 cc (para todos los otros radios) de Grasa Ingersoll–Rand Nº 67 en el Engrasador en la Carcasa de Engranajes.
Después de cada cuarenta y ocho horas de uso, o como indique la experiencia, inyecte de 1 a 2 cc de Grasa Ingersoll–Rand Nº 67 en el Engrasador situado en el Conjunto de Carcasa Angular.



(Esq. TPD905–1)

AJUSTES

AJUSTE DE VÁLVULA DE CIERRE—— PROCEDIMIENTO

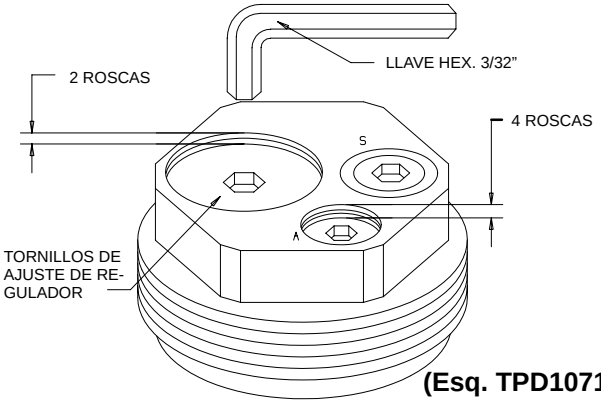
Ajuste de Válvula de Cierre (para 6WT ó 6WRT)

⚠ AVISO

El ajuste de sistema de Válula de cierre se coloca en fábrica. No ajuste ninguna parte de la Válvula a menos que, después de un uso prolongado de la herramienta, ésta se cerrara prematuramente o fallara en su cierre. Solamente si se diera alguna de estas dos condiciones, deberá ajustar laVálvula. Ajuste la Válvula de acuerdo al procedimiento indicado más abajo:

1. Gire el Tornillo de Ajuste de Regulador hasta que la parte superior del tornillo esté aproximadamente dos roscas debajo de la superficie de la Carcasa de Regulador. Coloque el Tornillo de Ajuste de Purga aproximadamente cuatro roscas debajo de la superficie de la Carcasa de Regulador. Vea Esq. TPD1071.

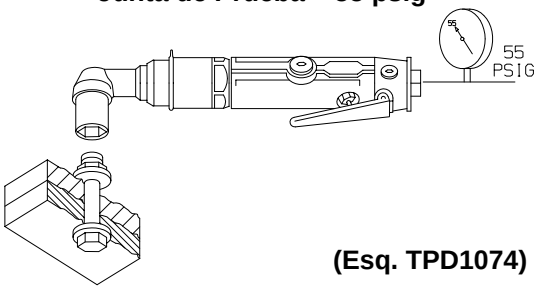
Colocación de los Tornillos de Ajuste de Regulador y Purga



(Esq. TPD1071)

2. Haga ciclo de herramienta en una junta de prueba para probar el cierre. Vea Esq. TPD1074.

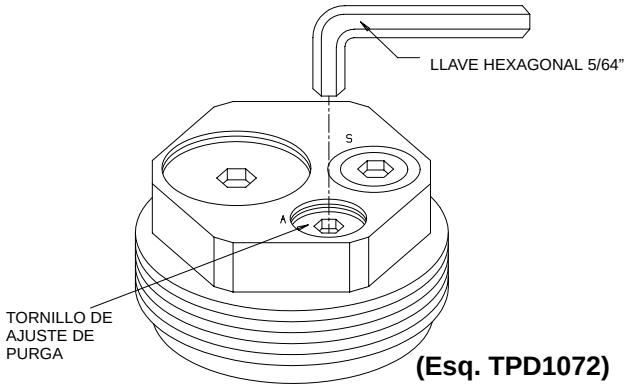
Junta de Prueba – 55 psig



(Esq. TPD1074)

3. Si la herramienta fallara en el cierre:
   a. Gire el Tornillo de Ajuste de Purga a la derecha poco a poco, hasta que se logre un cierre consistente. Si no hubiera cierre, recoloque el Tornillo de Ajuste de Purga cuatro roscas debajo de la superficie. (Vea la Figura 6). Coloque el Tornillo de Ajuste de Regulador 1/4 de vuelta más profundo y repita los pasos 2 y 3. (Vea la Figura 4)
   b. Si se cerrara la herramienta, gire el Tornillo de Ajuste de Purga a la izquierda hasta que se cale la herramienta en una junta de prueba. Cuando se cale dicha herramienta, gire el Tornillo de Ajuste de Purga a la derecha poco a poco, hasta que se logre un cierre consistente. Vea Esq. TPD1072.

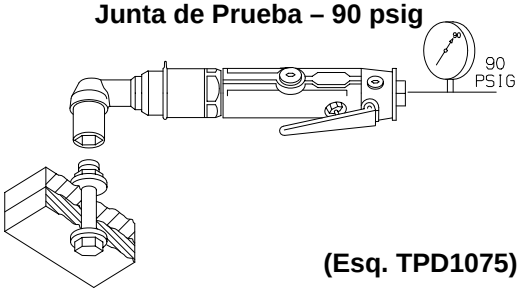
Colocación de Tornillo de Ajuste de Regulador



(Esq. TPD1072)

4. Haga ciclo de herramienta en una junta de prueba para probar el cierre. Vea Esq. TPD1075.

Junta de Prueba – 90 psig

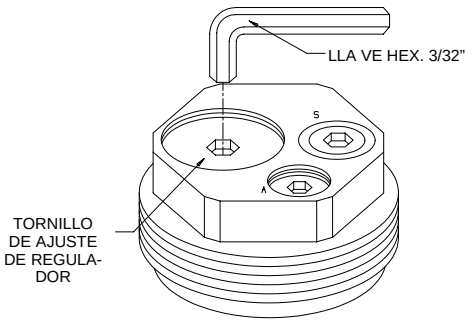


(Esq. TPD1075)

5. Si la herramienta fallara en el cierre:
   a. Gire el Tornillo de Ajuste de Regulador a la derecha poco a poco, hasta que se logre un cierre consistente. Vea Esq. TPD1073.
   b. Si hubiera cierre de herramienta, gire el Tornillo de Ajuste de Regulador a la izquierda hasta que se cale la herramienta en una junta de prueba. Cuando se cale dicha herramienta, gire el Tornillo de Ajuste de Regulador a la derecha 1/8 de vuelta cada vez hasta que se logre un cierre consistente. Este ajuste ofrece máximo par de cierre.

AJUSTES

Colocación del Tornillo de Ajuste de Regulador



(Esq. TPD1073)

6. Es posible que la herramienta se cierre al apretar el estrangulador. Esta condición es un cierre prematuro y puede corregirse girando poco a poco el Tornillo de Ajuste de Purga a la izquierda hasta corregir la condición de cierre prematuro. Vea Esq. TPD1072. Si se hubiera utilizado el Tornillo de Ajuste de Purga para corregir una condición de cierre prematuro, vuelva a probar el cierre de la herramienta a 55 y 90 psig. Si es necesario repita los pasos 2 a 5.

PARA PONER LA HERRAMIENTA EN SERVICIO

ESPECIFICACIONES

Modelo	Par de apriete (Junta blanda)		Velocidad Libre	Cuadradillo
	50 psi ft–lbs (Nm)	90 psi ft–lbs (Nm)	rpm	pulg.
6WRSL3	3.8 (5.2)	6.7 (9.1)	1 175	3/8
6WRSM3	5.3 (7.2)	9.5 (12.2)	825	3/8
6WRSN3	6.4 (8.7)	11.5 (14.9)	700	3/8
6WRSP3	8.1 (11.0)	14.5 (19.0)	550	3/8
6WRSQ3	10.6 (14.4)	19.0 (25.8)	400	3/8
6WRSR3	13.4 (18.2)	24.0 (32.5)	325	3/8
6WTL3	4.2 (5.7)	7.5 (10.2)	1 450	3/8
6WTM3	5.9 (8.0)	10.5 (14.2)	1 000	3/8
6WTN3	7.0 (9.5)	12.5 (16.9)	850	3/8
6WTP3	9.2 (12.5)	16.5 (22.4)	650	3/8
6WTQ3	12.0 (16.3)	21.5 (29.2)	500	3/8
6WTR3	15.4 (20.9)	27.5 (37.3)	400	3/8
6WRTL3	3.8 (5.2)	6.7 (9.1)	1 250	3/8
6WRTM3	5.3 (7.2)	9.5 (12.2)	875	3/8
6WRTN3	6.4 (8.7)	11.5 (14.9)	750	3/8
6WRTP3	8.1 (11.0)	14.5 (19.0)	550	3/8
6WRTQ3	10.6 (14.4)	19.0 (25.8)	425	3/8
6WRTR3	13.4 (18.2)	24.0 (32.5)	350	3/8
6WRTS3	17.9 (24.3)	32.0 (43.4)	245	3/8

P

MANUAL DE FUNCIONAMENTO E MANUTENÇÃO FERRAMENTAS PNEUMÁTICAS ANGULARES COM CONTROLO DE BINÁRIO SÉRIE 6W

AVISO

As Ferramentas Pneumáticas Angulares Série 6W são concebidas para executar pequenas operações, de aperto de roscas que necessitam de repetitividade de aperto preciso.

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 10 mm (3/8").**
- **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®

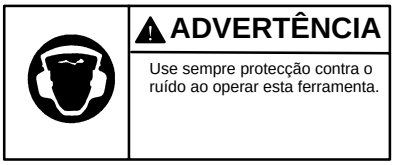
IDENTIFICAÇÃO DO RÓTULO DE ADVERTÊNCIA

⚠ ADVERTÊNCIA

O NÃO CUMPRIMENTO DAS SEGUINTES ADVERTÊNCIAS PODE RESULTAR EM FERIMENTO.

⚠ ADVERTÊNCIA

Use sempre óculos de protecção quando estiver operando ou executando algum serviço de manutenção nesta ferramenta.



⚠ ADVERTÊNCIA

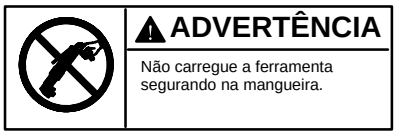
Use sempre protecção contra o ruído ao operar esta ferramenta.

⚠ ADVERTÊNCIA

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 algum serviço de manutenção nesta ferramenta.

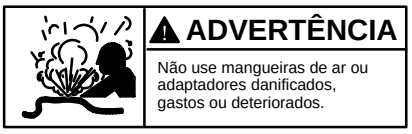
⚠ ADVERTÊNCIA

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.



⚠ ADVERTÊNCIA

Não carregue a ferramenta segurando na mangueira.

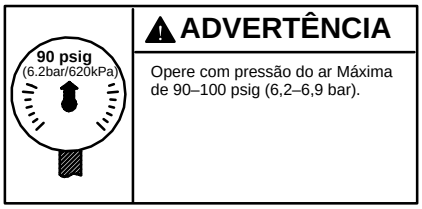


⚠ ADVERTÊNCIA

Não use mangueiras de ar ou adaptadores danificados, gastos ou deteriorados.

⚠ ADVERTÊNCIA

Mantenha a posição do corpo equilibrada e firme. Não exagere quando operar esta ferramenta. Torques de reacção elevados podem ocorrer sob a pressão de ar recomendada.



⚠ ADVERTÊNCIA

Opere com pressão do ar Máxima de 90–100 psig (6,2–6,9 bar).

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

LUBRIFICAÇÃO

Ingersoll–Rand No. 10

Ingersoll–Rand No. 67

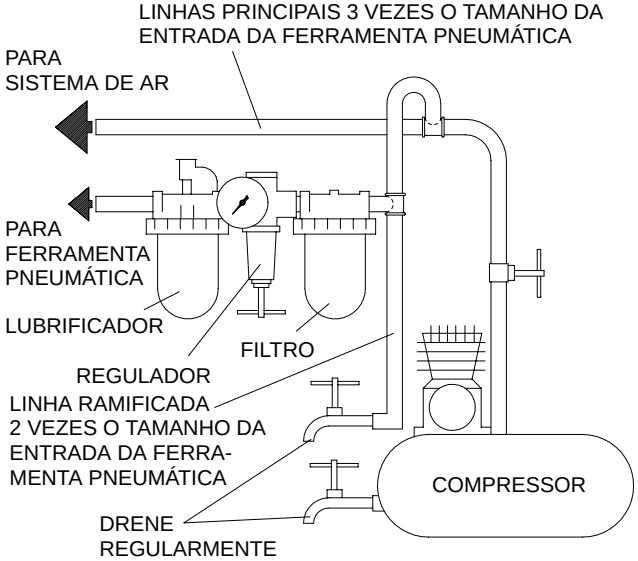
Use sempre um lubrificador de ar de linha com estas ferramentas. Nós recomendamos a seguinte Unidade Filtro–Lubrificador–Regulador:

E.U.A. – No. C18–03–FKG0–28

Antes de operar a Ferramenta e depois de 8 horas de operação, a menos que esteja usando um lubrificador de ar de linha, remova mangueira de ar e injecte cerca de 2 cc de Óleo Ingersoll–Rand No. 10 na entrada de ar.

Depois de 50 000 ciclos, ou um mês de operação, ou quando a experiência indicar, injecte de 2 a 3 cc (para as ferramentas de razão L) ou de 3 a 4 cc (para as ferramentas de outras razões) de Massa Lubrificadora Ingersoll–Rand No. 67 no Adaptador de Massa Lubrificadora (57) na Caixa de Engrenagem (56).

Depois de oito horas de operação, ou como a experiência indicar, injecte de 1 a 2 cc de Massa Lubrificadora Ingersoll–Rand No. 67 no Adaptador de Massa Lubrificadora (102) no Conjunto do Corpo do Ângulo (101).



(Desenho TPD905–1)

PROCEDIMENTO DE AJUSTE DA VÁLVULA DE CORTE

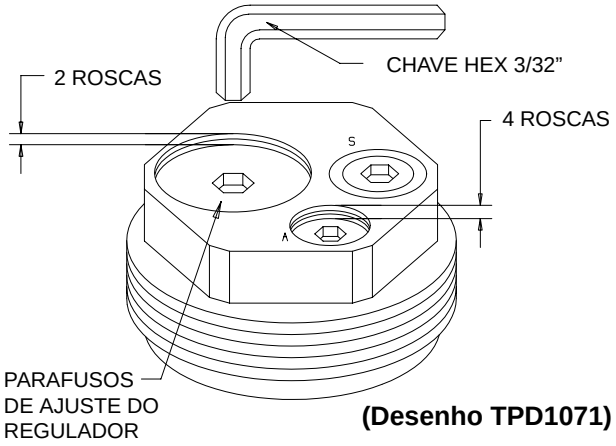
Ajuste da Válvula de Corte (para 6 WT ou 6WRT)

⚠ ADVERTÊNCIA

O Ajuste o Sistema de Válvula de Corte é feito na fábrica. Não ajuste qualquer parte da Válvula a menos que depois de uso prolongado da ferramenta, a Ferramenta desligue prematuramente ou não desligue. Somente numa destas circunstâncias se deve ajustar a Válvula. Ajuste a Válvula de acordo com o procedimento a seguir indicado.

1. Gire o Parafuso de Ajuste do Regulador até que o topo do parafuso esteja a aproximadamente duas roscas abaixo da face do Corpo do Regulador. Regule o Parafuso Sextavado Interior a aproximadamente quatro roscas abaixo da face do Corpo do Regulador.
   Veja o desenho TPD1071.

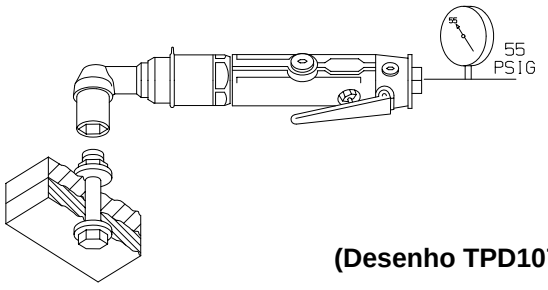
Montagem dos Parafusos de Ajuste Regulador e de Fixação



(Desenho TPD1071)

2. Conecte a ferramenta ao circuito com uma junção de teste para corte.
   Veja o Desenho TPD1074.

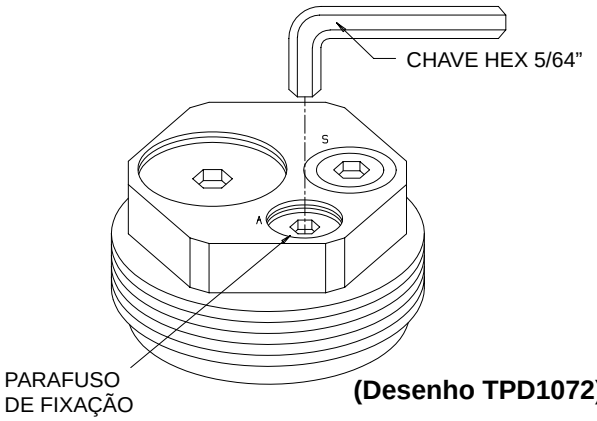
Junção Teste – 55 psig



(Desenho TPD1074)

3. Se a ferramenta não desligar:
   a. Gire o Parafuso Sextavado Interior no sentido horário um pouco de cada vez, até que um corte persistente começe a ocorrer. Se não ocorrer algum corte reajuste o Parafuso Sextavado Interior quatro voltas abaixo do fluxo. (Veja Figura 6.) Ajuste o Parafuso do Regulador, 1/4 de volta mais fundo e repita os passos 2 e 3. (Veja Figura 4).
   b. Se não houver paragem da ferramenta, gire o Parafuso Sextavado Interior no sentido contrário ao dos ponteiros do relógio até que a ferramenta perca a força na junção de teste. Quando a ferramenta perder a força, gire o Parafuso Sextavado Interior no sentido horário, um pouco de cada vez até que o corte persistente da ferramenta ocorra.
   Veja o Desenho TPD1072.

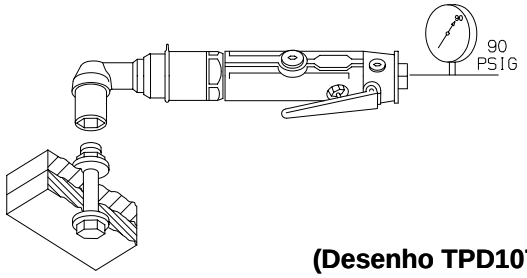
Ajustando o Parafuso de Ajuste do Regulador



(Desenho TPD1072)

4. Ligue a ferramenta a um circuito com uma junção de teste para corte.
   Veja o Desenho TPD1075.

Junção Teste – 90 psig

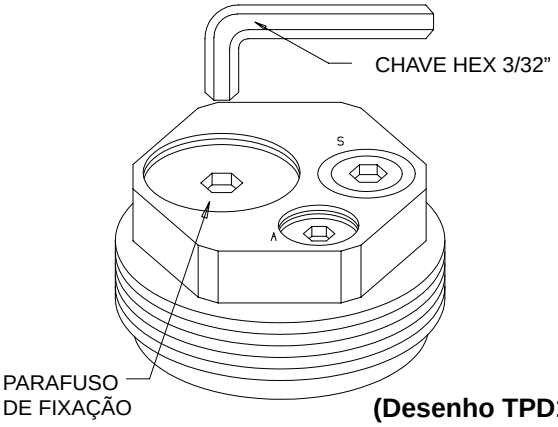


(Desenho TPD1075)

5. Se a ferramenta não desligar:
   a. Gire o Parafuso de Fixação no sentido horário um pouco de cada vez, até que uma paragem persistente começe a ocorrer.
   Veja o Desenho TPD1073.
   b. Se a paragem da ferramenta ocorrer, gire o Parafuso de Fixação no sentido contrário ao do dos ponteiros do relógio até que a ferramenta pare na junção de teste. Quando a ferramenta parar, gire o Parafuso de Fixação no sentido horário 1/8 de uma volta, um pouco de cada vez até que a paragem persistente da ferramenta ocorra. Este ajuste proporciona torque de saída máximo no corte.

AJUSTES

Ajustando o Parafuso de Ajuste do Regulador



(Desenho TPD1073)

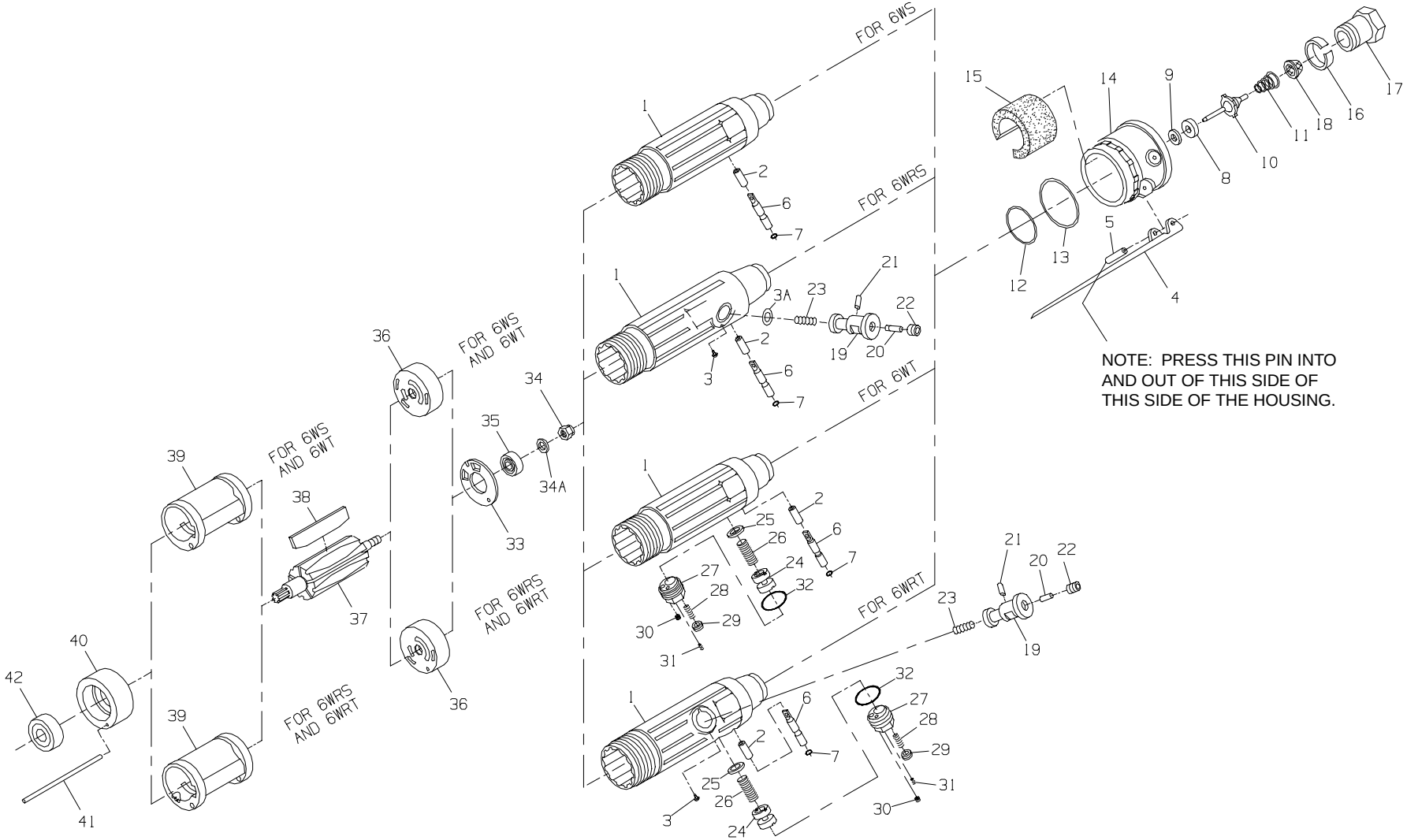
6. É possível que a ferramenta possa desligar quando a pressão reguladora for pressionada. Esta condição é um corte prematuro e pode ser corrigido ao girar o Parafuso de Ajuste de Escorrimento no sentido contrário ao do dos ponteiros do relógio um pouco de cada vez até que a paragem prematura seja corrigida. Veja o Desenho TPD1072. Se o Parafuso de Fixação foi usado para corrigir uma situação de paragem prematura, teste novamente a ferramenta para corte a 55 e 90 psig. Se necessário, repita os passos 2 a 5.

COLOCANDO A FERRAMENTA EM SERVIÇO

ESPECIFICAÇÕES

Modelo	Intervalo de Torque (Apertos Ligeiros)		Velocidade Livre	Encabadouro Quadrado
	50 psi Nm (pés–lb)	90 psi Nm (pés–lb)	rpm	pol.
6WRSL3	5,2 (3,8)	9,1 (6,7)	1 175	3/8
6WRSM3	7,2 (5,3)	12,2 (9,5)	825	3/8
6WRSN3	8,7 (6,4)	14,9 (11,5)	700	3/8
6WRSP3	11,0 (8,1)	19,0 (14,5)	550	3/8
6WRSQ3	14,4 (10,6)	25,8 (19,0)	400	3/8
6WRSR3	18,2 (13,4)	32,5 (24,0)	325	3/8
6WTL3	5,7 (4,2)	10,2 (7,5)	1 450	3/8
6WTM3	8,0 (5,9)	14,2 (10,5)	1 000	3/8
6WTN3	9,5 (7,0)	16,9 (12,5)	850	3/8
6WTP3	12,5 (9,2)	22,4 (16,5)	650	3/8
6WTQ3	16,3 (12,0)	29,2 (21,5)	500	3/8
6WTR3	20,9 (15,4)	37,3 (27,5)	400	3/8
6WRTL3	5,2 (3,8)	9,1 (6,7)	1 250	3/8
6WRTM3	7,2 (5,3)	12,2 (9,5)	875	3/8
6WRTN3	8,7 (6,4)	14,9 (11,5)	750	3/8
6WRTP3	11,0 (8,1)	19,0 (14,5)	550	3/8
6WRTQ3	14,4 (10,6)	25,8 (19,0)	425	3/8
6WRTR3	18,2 (13,4)	32,5 (24,0)	350	3/8
6WRTS3	24,3 (17,9)	43,4 (32,0)	245	3/8

POWER UNITS



(Dwg. TPA1117–2)

	Motor Housing Assembly	
	for 6WRS	6WRS–A40
	for 6WRS–EU	6WRS–EU–A40
	for 6WRT	6WRT–A40
	for 6WRT–EU	6WRT–EU–A40
	for 6WS	6WS–A40
	for 6WS–EU	6WS–EU–A40
	for 6WT	6WT–A40
	for 6WT–EU	6WT–EU–A40
1	Motor Housing	
	for 6WRS	6WRS–B40
	for 6WRS–EU	6WRS–EU–B40
	for 6WRT	6WRT–B40
	for 6WRT–EU	6WRT–EU–B40
	for 6WS	6WS–B40
	for 6WS–EU	6WS–EU–B40
	for 6WT	6WT–B40
	for 6WT–EU	6WT–EU–B40
*	Warning Label	
	for models ending in –EU	EU–99
	for all other models	WARNING–7–99
2	Throttle Plunger Bushing	
	for 6WS	7L–91
	for 6WRS, 6WRT and 6WT	5RLK2C–91
3	Reverse Valve Bushing	
	Retainer (for 6WRS and 6WRT)	6WRT–667
3A	Reverse Valve Bushing Seal	
	(for 6WRS only)	6WRS–290
4	Throttle Lever	7L–273
5	Throttle Lever Pin	7L–120

	Throttle Plunger Assembly	
	for 6WS	5LK2C–A94
	for 6WT, 6WRS or 6WRT	6WT–A94
6	Throttle Plunger	
	for 6WS	5LK2C–94A
	for 6WT, 6WRS or 6WRT	6WT–94
• 7	Throttle Plunger Seal	
	for 6WS	6LL–259
	for 6WT, 6WRS or 6WRT	8SL–259
8	Throttle Valve Seat	7RAK–303
9	Throttle Valve Seat Support	7RAK–304
10	Throttle Valve	7RAK–302
11	Throttle Valve Spring	7L–5l
12	Silencer Seal Ring	WWV100A1–43
• 13	Exhaust Deflector Seal	R00A2–103
14	Rear Muffler	
	for 6WT or 6WRT	6WT–A23
	for all others	6WS–A23
• 15	Muffler Element	3RA–310
16	Inlet Bushing Spacer	7AH–65
17	Inlet Bushing	7L–565
• 18	Air Strainer Screen	R0A2–61
19	Reverse Valve	
	for 6WRS	55RP–329
	for 6WRT	6WRT–329
20	Lock Pin Retainer	
	(for 6WRS and 6WRT)	7RL–56
21	Reverse Valve Lock Pin	
	(for 6WRS and 6WRT)	SPA102R–668

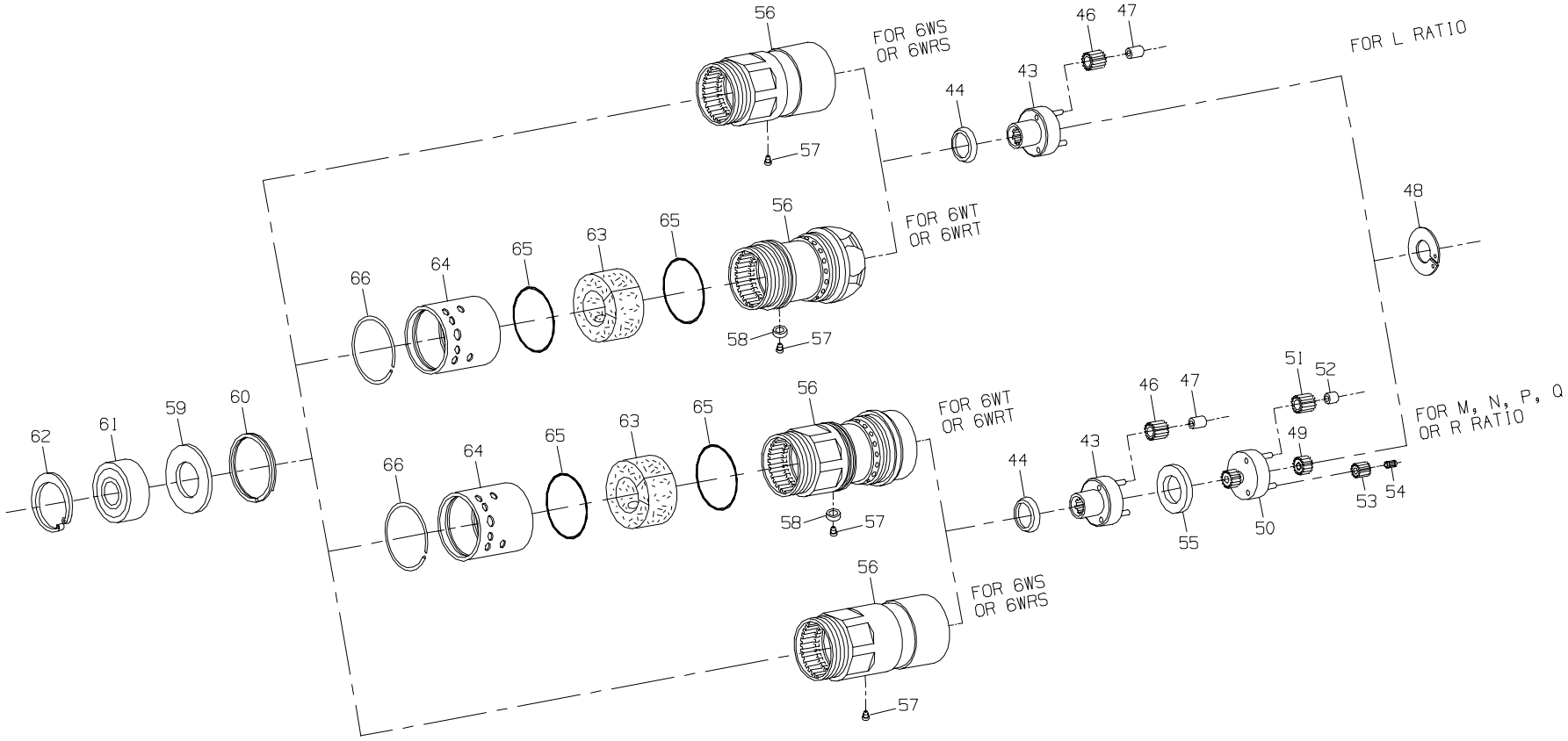
* Not illustrated.

• 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				PART NUMBER FOR ORDERING
	22	Retainer Setscrew (for 6WRS and 6WRT)	7RL–669		35	Rear Rotor Bearing DG20–22
	23	Reverse Valve Spring (for 6WRS and 6WRT)	55RP–515		36	Rear End Plate for 6WRS and 6WRT 6WRT–12
	24	Shutoff Valve (for 6WRT and 6WT)	6WT–172			for 6WS and 6WT 6WT–12
	25	Shutoff Valve Stop (for 6WRT and 6WT)	6WT–176		37	Rotor for L ratio (6 teeth) 6WTL–53
	26	Shutoff Valve Spring (for 6WRT and 6WT)	6WT–171			for M, N and P ratios (9 teeth) 6WTM–53
		Regulator Body Assembly (for 6WRT and 6WT)	6WT–A173			for Q ratio (12teeth) 6WTQ–53
	27	Regulator Body	6WT–173			for R ratio (9 teeth) 6WTK–53
	28	Regulator Spring	6WT–180	•	38	Vane Packet (set of 5 Vanes) 6WT–42–5
	29	Regulator Adjustment Screw	6WT–174		39	Cylinder for 6WRS and 6WRT 6WRT–3
	30	Pressure Port Plug	5081T–266			for 6WS and 6WT 6WT–3
	31	Bleed Adjustment Screw	6WT–175A		40	Front End Plate 6WT–11
	32	Regulator Body Seal (for 6WRT and 6WT)	182A53–610		41	Cylinder Dowel 6WT–98
•	33	Rear End Plate Gasket	6WRT–739		42	Front Rotor Bearing R00H–97
•	34	Rear Rotor Bearing Retaining Nut	6WT–118			
•	34A	Bearing Thrust Washer	6WT–117			

- 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 UNITS



(Dwg. TPA1118–1)

PART NUMBER FOR ORDERING

	43	Spindle Assembly		52	Gear Head Planet Gear Bearing	
		for L ratio	6LL–A8		(1 for each Gear)	
		for M or N ratio	6LN–A8		for N or P ratio	7AH–500
		for P, Q or R ratio	6LP–A8		for Q ratio	WFS182–654
	44	Seal Support	5RAK–5		for R ratio	7AJ–500
+	46	Spindle Planet Gear Assembly (3)		53	Gear Head Planet Gear	
		for L ratio (20 teeth)	6WTL–A10		(for M ratio) (3)	6WTM–10
		for M or N ratio (16 teeth)	6WTN–A10	54	Gear Head Planet Gear Bearing	
		for P, Q or Rratio (15 teeth)	6WTP–A10		(for M ratio) (3)	6WTM–500
	47	Spindle Planet Gear Bearing		55	Gear Head Spacer (for M, N, P, Q or R ratio)	6LM–80
		(1 for each Gear)			Gear Case Assembly	
		for L ratio	7AJ–500		for 6WS or 6WRS	
		for M or N ratio	7AH–500		(for L ratio)	6LL–A37
		for P, Q or R ratio	WFS182–654		for 6WS or 6WRS	
	48	Gear Retainer	6LL–81		(for M, N, P, Q or R ratio)	6LM–A37
	49	Rotor Pinion			for 6WT or 6WRT	
		for M ratio	6WTM–17		(for L ratio)	6WTL–A37
		for N or P ratio	6WTN–17		for 6WT or 6WRT	
	50	Gear Head			(for M, N, P, Q or R ratio)	6WTM–A37
		for M ratio (marked M)	6LM–216	56	Gear Case	
		for N ratio (marked N)	6LN–216		for 6WS or 6WRS (for L ratio)	6LL–B37
		for P ratio (marked P)	6LP–216		for 6WS or 6WRS	
		for Q ratio (marked Q)	6LQ–216A		(for M, N, P, Q or R ratio)	6LM–B37
		for R ratio (marked R)	6LR–216A		for 6WT or 6WRT (for L ratio)	6WTL–B37
+	51	Gear Head Planet Gear Assembly (3)			for 6WT or 6WRT	
		for N or P ratio (16 teeth)	6WTN–A10		(for M, N, P, Q or R ratio)	6WTM–B37
		for Q ratio (15 teeth)	6WTP–A10			
		for R ratio (20 teeth)	6WTK–A10			

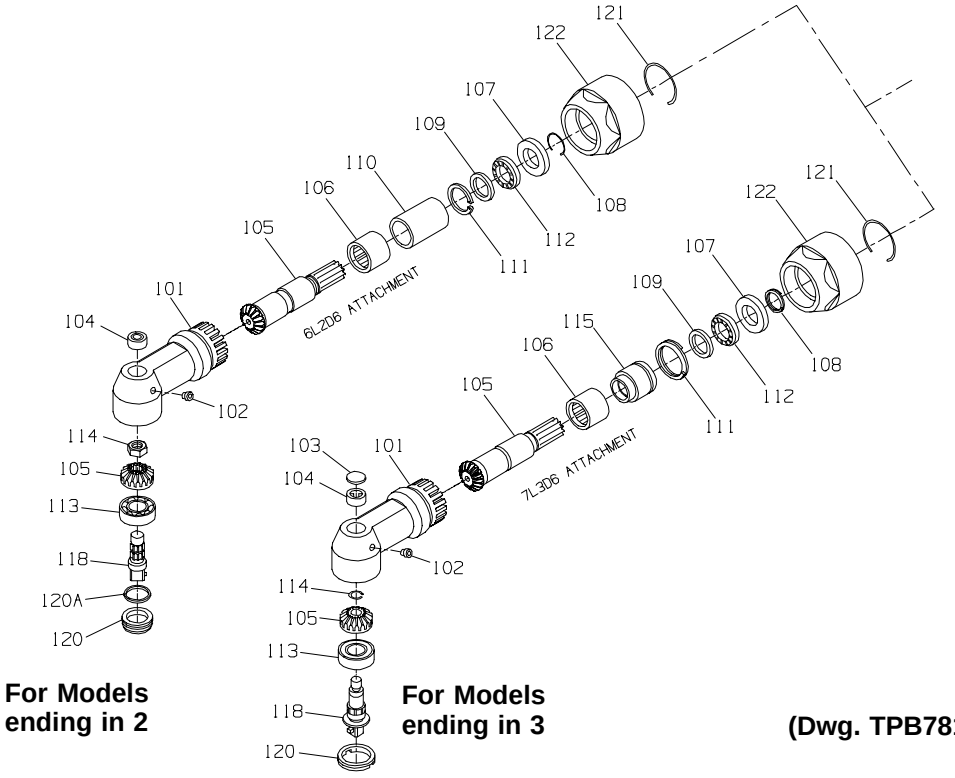
+ Although the gears are different, the gears used in both the Spindle Planet Gear Assembly (46) (Part No. 6WTL–A10) and Gear Head Planet Gear Assembly (51) (Part No. 6WTK–A10) have 20 teeth. The Gear (Part No. 6WTK–A10) can be distinguished by the annular groove through the middle of the teeth.

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
	57	Grease Fitting	D0F9–879	*	Horizontal Hanger 6WS–366
	58	Grease Fitting Collar (for 6WT or 6WRT)	6WT–880	*	Vertical Hanger 7L–365
				*	Grease Gun R000A2–228
	59	Grease Shield	5R–701	*	Piped–Away Exhaust Kit (for 6WS or 6WRS) 7L–K284
	60	Grease Shield Retainer	6LL–343	*	Tune–up Kit (includes illustrated items
	61	Spindle Bearing	R1L–24		7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 32, 33,
	62	Spindle Bearing Retainer	7L–28		34, 34A, 35, 38, 42, 63 and 65 [2]) 6WT–TK1
•	63	Muffler Element (for 6WT or 6WRT)	6WT–311		
	64	Exhaust Deflector (for 6WT or 6WRT)	6WT–23		
•	65	Exhaust Deflector Seal (for 6WT or 6WRT)(2)	AG20–103		
	66	Deflector Retaining Ring (for 6WT or 6WRT)	6WT–203		

* 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.

ANGLE ATTACHMENTS



For Models ending in 2

For Models ending in 3

(Dwg. TPB781–1)

PART NUMBER FOR ORDERING

		For Models ending in 2	For Models ending in 3
	Angle Attachment	6L2D6 ♣	7L3D6
101	Angle Housing Assembly	6L2D–B550	7L3A–B550
102	Grease Fitting	121F9–879	D0F9–879
103	Angle Housing Cap	———	8SA32–110
• 104	Upper Spindle Bearing	l20A4–603	8SA32–603
• 105	Matched Bevel Gear Set	6L2D–A552	7L3A–A552
• 106	Bevel Pinion Bearing	H54U–511B	182A53–606
107	Rear Thrust Bearing Seat	7L2A–682	7L2A–682
• 108	Bearing Seat Retainer	1415A12–6	1415A12–6
109	Front Thrust Bearing Seat	141A12–683	l41A12–683
110	Pinion Bearing Spacer	7L2A–165	———
• 111	Bearing Spacer Retainer	RXA21–343	182A53–685
112	Bevel Pinion Thrust Bearing	161A32–105	161A32–105
• 113	Lower Spindle Bearing	6L2D–59	8SA32–593
• 114	Bevel Gear Retainer	120A4–578	8SA32–578
115	Bevel Pinion Bearing Spacer	———	182A53–165

- 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.

♣ The 6L2D6 Angle Attachment is an optional attachment for non–catalogued models rated at less than 8 ft–lbs torque. It is not warranted for applications exceeding 8 ft–lbs torque.

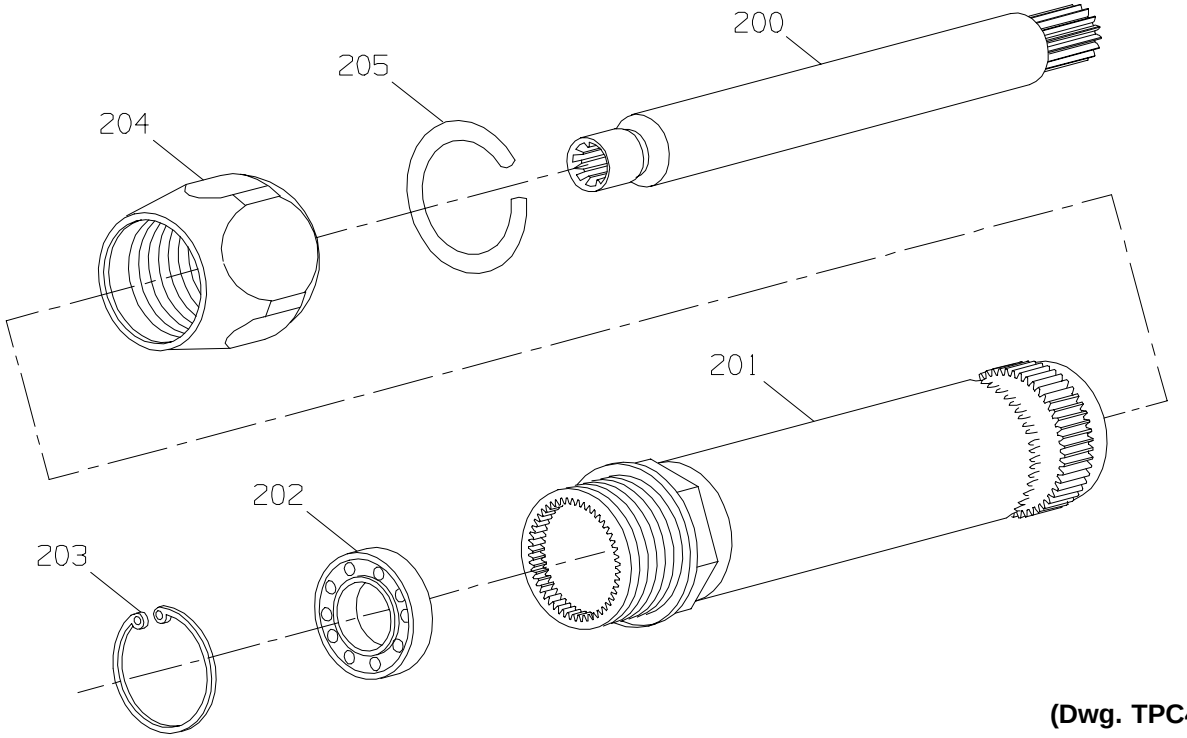
PART NUMBER FOR ORDERING

		For Models ending in 2	For Models ending in 3
118	Socket Adapter Spindle Assembly (3/8" Square Drive) . . .	6L2D–A607	8SA32–P507–3/8
*	Socket Retaining Spring	401–718	401–718
*	Socket Retaining Pin	5020–716	5020–716
120	Spindle Bearing Cap	6L2D–531	8SA32–531
120A	Spindle Seal	6L2D–720	———
121	Coupling Nut Retainer	5C1–29	5C1–29
122	Coupling Nut	7L–27	7L–27
*	Lower Bearing Cap Wrench	141A12–26	8SA32–26
⊕	Bearing Inserting Tool	7L2A–950	7L3A–950

* Not illustrated.

⊕ Illustrated on page 28.

ANGLE HOUSING EXTENSION



(Dwg. TPC487)

PART NUMBER FOR ORDERING

	4" Angle Housing Extension Assembly	6WT–A327–4
200	Extension Arbor	6WT–327–4
201	Arbor Housing	6WT–43–4
202	Arbor Bearing	R1L–24
203	Bearing Retaining Ring	7L–28
204	Coupling Nut	7L–27
205	Coupling Nut Retainer	5C1–29

⚠ 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 6W Angle Wrenches are disassembled for maintenance, repair or replacement of parts, lubricate the tool as follows:

1. Work approximately 1.5 cc of Ingersoll–Rand No. 67 Grease into the Rear Rotor Bearing (35), Front Rotor Bearing (42), and the Spindle Bearing (61).
2. Work 6 cc to 8 cc of Ingersoll–Rand No. 67 Grease into the L ratio gear train and 10 cc to 12 cc of the grease into the gear train of all other ratios. Grease the Planet Gear Bearings (47, 52, and 54), the gear teeth inside the Gear Case (56) and the planet gear shafts on the Spindle (43) and the Gear Head (50).
3. Work 0.5 cc to 1.0 cc of Ingersoll–Rand No. 67 Grease into the Lower Spindle Bearing (113).
4 Work 0.5 cc to 1.0 cc of Ingersoll–Rand No. 67 Grease into the Upper Spindle Bearing (104), Bevel Pinion Bearing (106), and Bevel Pinion Thrust Bearing (112). Apply 2 cc to 3 cc of the Grease to the Matched Bevel Gear Set used in 6L2D6 Angle Attachments.

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.

Disassembly of the Angle Attachment

1. Carefully clamp the flats of the Coupling Nut (122) in leather–covered or copper–covered vise jaws, with the Angle Housing Assembly (101) facing downward.

NOTICE

The Gear Case (56) has left–hand threads.

2. Using a wrench on the flats of the Gear Case, loosen the Gear Case from the Coupling Nut. Remove the tool from the vise. Unscrew and remove the Coupling Nut from the Gear Case.
3. Carefully grasp the Angle Housing Assembly in leather–covered or copper–covered vise jaws with the Spindle (118) facing upward.

NOTICE

The Spindle Bearing Cap (120) has left–hand threads.

4. Using No. 8SA32–26 or No. 141A12–26 Lower Bearing Cap Wrench, unscrew and remove the Spindle Bearing Cap.
   For 6L2D6, remove the Spindle Seal (120A). Withdraw the Socket Adapter Spindle Assembly (118) from the Angle Housing.
5. Inspect the Lower Spindle Bearing (113) for looseness or roughness. If either of these conditions exists, replace the Bearing as follows:
   For 7L3D6 Angle Head
   a. Remove the Bevel Gear Retainer (114).
   b. Press the Bevel Gear (105) from the Spindle.
   c. Press the Lower Spindle Bearing from the Spindle.
   For 6L2D6 Angle Head
   a. Grasp the square drive end of the Spindle in leather–covered or copper–covered vise jaws.
   b. Unscrew the Bevel Gear Retainer (114) and lift the Bevel Gear (105) off the Spindle.
   c. Press the Lower Spindle Bearing from the Spindle.

NOTICE

Do not remove the Upper Spindle Bearing (104) unless you have a new Bearing ready to install. This type of Bearing is always damaged during the removal process.

NOTICE

The 7L3D6 Angle Head will require a new Angle Housing Cap (103) when the Upper Spindle Bearing is installed.

6. If the Upper Spindle Bearing appears rough or loose, press it from the Angle head.
7. Remove the Bearing Seat Retainer (108) and slide off the Rear Thrust Bearing Seat (107), Bevel Pinion Thrust Bearing (112) and Front Thrust Bearing Seat (109) from the pinion shaft.

8. **For 7L3D6 Angle Head,** use a thin blade screwdriver to pry out and under the tab of the Bearing Spacer Retainer (111). Rotate the screwdriver around the pinion shaft to spiral the Retainer out of its groove. Using a hooked tool, reach into the Bevel Pinion Bearing Spacer (115) and hook the drilled cross–hole in the Spacer. Pull the Spacer from the Angle Housing.
   For 6L2D6 Angle Head, use snap ring pliers to remove the Bearing Spacer Retainer (111). Remove the Pinion Bearing Spacer (110).

NOTICE

Do not remove the Bevel Pinion (105) and Bevel Pinion Bearing (106) unless you have a new Bearing on hand. After the Angle Attachment is disassembled, check all parts for damage or wear.

NOTICE

If the gear teeth on either the Bevel Pinion or Bevel Gear are worn or chipped, replace both parts. These are a matched set and must be replaced with another matched set.

9. Grasp the spline of the pinion shaft in leather–covered or copper–covered vise jaws and while gently tapping the rear face of the Angle Attachment with a soft hammer, pull the Bevel Pinion and Bevel Pinion Bearing from the Angle Attachment.

Disassembly of the Gearing

1. Being careful not to distort the Motor Housing (1), grasp the flats on the Housing in leather–covered or copper–covered vise jaws with the Gear Case (56) facing upward.
2. Using a wrench on the flats of the Gear Case, loosen, but do not remove the Gear Case.

NOTICE

Be certain to hold the tool over a workbench so that you will not lose any parts as the Gear Case and the Motor Housing are separated.

3. Remove the tool from the vise and, while holding the tool horizontally, carefully unscrew the Gear Case by hand and pull it away from the Motor Housing.
4. Using snap ring pliers, remove the Gear Retainer (48).
5. **For M, N or P ratio,** the Rotor Pinion (49) may come out with the Gear Case, or it may have remained with the Rotor (37) when the Gear Case was removed. Remove the Rotor Pinion.
6. **For M, N, P, Q or R ratio,** remove the Gear Head Planet Gear Assembly (51), Gear Head (50) and Gear Head Spacer (55).
7. Remove the Spindle Planet Gear Assembly (46).
8. Position the Gear Case vertically in an arbor press with the motor end down. Using a 7/16" (11 mm) diameter brass rod against the outer rim of the Spindle (43), press the Spindle from the Gear Case.
9. Using snap ring pliers, remove the Spindle Bearing Retainer (62).
10. Tap the externally threaded end of the Gear Case on a workbench to remove the Spindle Bearing (61) and Grease Shield (59).
11. Remove the Seal Support (44) from the Spindle.
12. If the Grease Shield Retainer (60) must be removed, insert a thin blade screwdriver under the tab, and using a rotary motion, spiral the Retainer out of the groove in the Gear Case.
13. **For 6WT or 6WRT,** spread the ends of the Deflector Retaining Ring (66) and remove it from the Gear Case.
14. **For 6WT or 6WRT,** slide the Exhaust Deflector (64) off the Gear Case and remove the Muffler Element (63) and two Exhaust Deflector Seals (65).

Disassembly of the Motor and Throttle

1. Using a pin punch and hammer, drive the Throttle Lever Pin (5) out of the Rear Muffler (14) to release the Throttle Lever (4).
2. Grasp the splined end of the Rotor (37) in leather–covered or copper–covered vise jaws and pull the assembled motor from the Motor Housing (1).
3. Remove the Rear End Plate Gasket (33) from the Motor Housing.
4. Using a wrench, unscrew and remove the Rear Rotor Bearing Retaining Nut (34).
5. Remove the Rotor from the vise and remove the Bearing Thrust Washer (34A), Rear End Plate (36), Cylinder (39) and Vanes (38).
6. Check the Front Rotor Bearing (42) for damage or roughness. If replacement is necessary, support the Front End Plate (40) between two blocks of wood on the table of an arbor press. Press the Rotor from the Front Rotor Bearing. Using a flat face punch on the inner ring, tap the Bearing out of the End Plate.
7. Check the Rear Rotor Bearing (35) for damage or roughness. If replacement is necessary, use a flat face punch on the inner ring and tap the Bearing out of the End Plate.
8. Being careful not to distort the Housing, grasp the flats on the Motor Housing in leather–covered or copper–covered vise jaws with the inlet upward.
9. Using a wrench on the flats, unscrew and remove the Inlet Bushing (17).
10. Remove the Throttle Valve Spring (11) and the Air Strainer Screen (18).

11. Remove the Rear Muffler (14), Inlet Bushing Spacer (16), Muffler Element (15), Exhaust Deflector Seal (13) and the Silencer Seal Ring (12).
12. Lift out the Throttle Valve (10) and Throttle Plunger Assembly.
13. Remove the Throttle Plunger Seal (7) from the Throttle Plunger (6).

NOTICE

Only remove the Throttle Valve Seat (8) when replacing it or when the Throttle Plunger Bushing (2) must be replaced.

14. To remove the Throttle Valve Seat, insert a wire hook through the central hole of the Seat and hooking the underside of the Throttle Valve Seat Support (9), pull the Support and Seat out of the Motor Housing.
15. Before removing the Throttle Plunger Bushing (2), all seals and components must be removed from the Motor Housing.
    For 6WRS or 6WRT, remove the Reverse Valve. Refer to the section **Disassembly of the Reverse Valve.**
    For 6WT or 6WRT, remove the Shutoff Valve. Refer to the section **Disassembly of the Shutoff Valve.**
    To remove the Throttle Plunger Bushing, proceed as follows:
    a. Grasp the rear hub of the Motor Housing in leather–covered or copper–covered vise jaws with the Throttle Plunger Bushing upward.

CAUTION

Apply enough heat to warm the Housing, but not enough heat to distort it.

    b. Using a torch, apply heat to the Motor Housing around the Bushing.
    c. **For 6WS,** thread a 5/16”–l8 tap into the Bushing and pull the Bushing out of the Housing with the tap.
    For 6WT, 6WRS or 6WRT, thread a No. 10–32 tap into the Bushing and pull the Bushing out of the Housing with the tap.

Disassembly of the Reverse Valve (for 6WRS or 6WRT)

1. Using a 3/32” Allen Wrench, remove the Retainer Setscrew (22).
2. Remove the Lock Pin Retainer (20).

NOTICE

Be careful not to lose the Reverse Valve Spring (23) when removing the Reverse Valve (19).

3. **For 6WRS,** hold the Motor Housing horizontally with the throttle plunger hole downward. While applying light inward pressure to the Reverse Valve, tap the top side of the Housing with a plastic hammer to dislodge the Reverse Valve Lock Pin (21). Remove the Reverse Valve Bushing Seal (3A).
   For 6WRT, hold the Motor Housing vertically with the motor end downward. While applying light inward pressure to the Reverse Valve, tap the inlet end of the Housing with a plastic hammer to dislodge the Reverse Valve Lock Pin (21).
4. Withdraw the Reverse Valve from the Housing.

Disassembly of the Shutoff Valve (for 6WT or 6WRT)

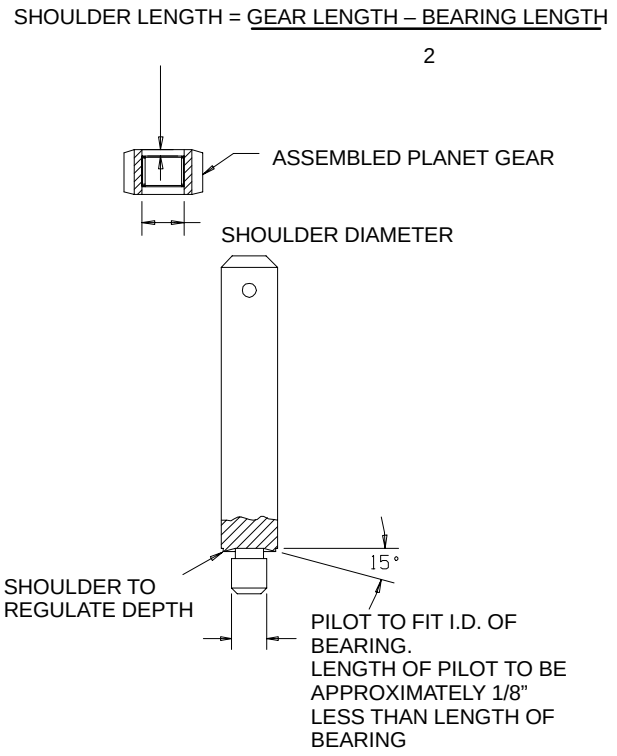
1. Using a wrench, loosen and remove the Regulator Body (27).
2. With one hand over the Shutoff Valve opening, invert the Motor Housing and drop the Shutoff Valve (24) and Shutoff Valve Spring (26) out of the Housing.
3. Using a pointed pick, remove the Regulator Body Seal (32) and the Shutoff Valve Stop (25) from the Housing.

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. Unless otherwise noted, always press on the stamped end of a needle bearing when installing the needle bearing in a recess.
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 all O–rings before final assembly.
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 Dwg TPD488.

Needle Bearing Inserting Tool for Planet Gears



(Dwg. TPC488)

Assembly of the Shutoff Valve (for 6WT or 6WRT)

1. Using a wooden dowel, push the Shutoff Valve Stop (25) to the bottom of the Shutoff Valve opening.
2. Install the Regulator Body Seal (32) in the groove near the bushing inside the Shutoff Valve opening.

NOTICE

Make certain the Shutoff Valve Spring (26) seats in the Shutoff Valve (24) recess.

3. Insert the Shutoff Valve Spring and the Shutoff Valve into the Motor Housing (1).
4. Screw the Regulator Body (27) into the Housing and tighten it to 12 to 15 ft–lb (16 to 20 Nm) torque.

Assembly of the Reverse Valve (for 6WRS or 6WRT)

1. **For 6WRS**, install the Reverse Valve Bushing Seal (3A).
2. Insert the Reverse Valve Lock Pin (21) into the hole in the side of the Reverse Valve (19).
3. Slip the Reverse Valve Spring (23) into the end of the Reverse Valve opposite the Reverse Valve knob.

NOTICE

If the Reverse Valve comes out of the Housing, the Lock Pin did not enter the L–shaped slot.

4. Holding the Reverse Valve with the Lock Pin upward, align the L–shaped slot inside the reverse valve bushing with the Lock Pin. Slide the Reverse Valve into the bushing until the Reverse Valve Spring is partially compressed. Rotate the assembled Housing and Valve one–half turn (180°) and tap the Housing opposite the Lock Pin with a plastic hammer until the Lock Pin drops into the L–shaped slot. Slowly release the Reverse Valve.
5. Install the Lock Pin Retainer (20) and Retainer Setscrew (22) in the end of the Reverse Valve. The Setscrew must not protrude from the Reverse Valve.
6. Operate the Reverse Valve to make certain it functions properly.

Assembly of the Motor and Throttle

1. If the Throttle Plunger Bushing (2) was removed, proceed as follows:
   a. Insert the Throttle Plunger Bushing into the Motor Housing (1) to a depth approximately one–half the length of the Bushing.
   b. Put a few drops of Permabond®* sealant in the counterbore surrounding the outside diameter of the Bushing.
   c. Rotate the Bushing approximately 180° to make certain the sealant makes complete contact around the outside of the Bushing.
   d. Push the Bushing into the Housing until it bottoms against the shoulder inside the Housing.
   e. Allow the sealant to cure for eight hours at room temperature.
2. Carefully grasp the flats on the Motor Housing (1) in leather–covered or copper–covered vise jaws, inlet end facing upward.
3. If the Throttle Valve Seat (8) and Throttle Valve Seat Support (9) were removed, use a flat–faced rod 1/2" (12.7 mm) in diameter by 3" (76 mm) long to push the Seat Support into the Motor Housing until it seats. Use the same rod to push the Valve Seat into the Housing until it seats against the Seat Support.
4. Install the Throttle Plunger Seal (7) in the groove of the Throttle Plunger (6).
5. Insert the Throttle Plunger into the Plunger Bushing and rotate the Plunger until the hole in the Plunger aligns dead center with the hole in the Throttle Valve Seat.

* Registered trademark of Permabond International.

6. Using needle nose pliers to hold the short–stem end of the Throttle Valve (10), install the Valve inserting the long stem end through the hole in the Throttle Valve Seat and Throttle Plunger.
7. After folding the Muffler Element (15) lengthwise, and with the fold trailing, install the Element by wrapping it horseshoe fashion around the inside of the Rear Muffler (14) covering all exhaust holes.
8. Install the Exhaust Deflector Seal (13) into the groove on the front end of the Rear Muffler.
9. Install the Silencer Seal Ring (12) over the hub of the Motor Housing approximately halfway down the hub.

NOTICE

Tabs on the Rear Muffler match notches on the Motor Housing. Do not force the Muffler into place.

10. Install the Rear Muffler over the hub of the Motor Housing, aligning the wide tab on the Rear Muffler with the Throttle Plunger hole in the Motor Housing.
11. Insert the Air Strainer Screen (18), closed end first, inside the the Inlet Bushing (17).
12. Insert the Throttle Valve Spring (11), large coil end first, into the Inlet Bushing making sure it contacts the Air Strainer Screen.
13. Install the Inlet Bushing Spacer (16) in the large hole in the Rear Muffler.
14. Thread the Inlet Bushing into the Motor Housing, making certain the Throttle Valve Spring encircles the short–stem end of the Throttle Valve. Tighten the Inlet Bushing to a minimum 26 ft–lb (35 Nm) torque. The Inlet Bushing must securely clamp the Rear Muffler.
15. Note that the Throttle Lever pinhole in the Rear Muffler is larger at one end than the other. Install the Throttle Lever (4), pressing the Throttle Lever Pin (5) into the large end of the pinhole.
16. If the Rear Rotor Bearing (35) was removed, use a sleeve that contacts the outer ring of the Rear Rotor Bearing, press the Rear Rotor Bearing into the Rear End Plate (36).

NOTICE

The Rotor (37) must spin freely while holding the Rear End Plate.

17. Place the Rear End Plate, bearing end trailing, on the threaded hub of the Rotor. Insert a 0.001" feeler gauge or shim between the face of the Rotor and End Plate. Place the Bearing Thrust Washer (34A) on the threaded hub of the Rotor. Thread the Rear Rotor Bearing Retaining Nut (34) onto the hub of the Rotor and tighten it until the feeler gauge has a slight drag during removal.
18. Lightly grasp the threaded hub of the Rotor in leather–covered or copper–covered vise jaws with the splined hub upward.
19. Wipe each Vane (38) with a film of Ingersoll–Rand No. 10 Oil and place a Vane in each slot in the Rotor.
20. **For 6WS or 6WT**, looking down the axis of the Rotor and Cylinder (39), position the Cylinder over the Rotor with the cylinder dowel hole at twelve o'clock, the notch in cylinder face at ten o'clock and the two slots in the side of the Cylinder at two o'clock. Place the Cylinder down over the Rotor and Vanes and against the Rear End Plate.
    For 6WRS or 6WRT, place the Cylinder (39) down over the Rotor and Vanes and against the Rear End Plate.

NOTICE

Align the Cylinder Dowel hole in the Rear End Plate, Cylinder and Front End Plate (40) before pressing the Front Rotor Bearing (42) onto the shaft.

21. Push the Front Rotor Bearing into the recess in the Front End Plate.
22. Remove the assembled Rotor from the vise and using a sleeve that contacts the inner ring of the Front Rotor Bearing, press the Bearing, flat side of the Front End Plate first, onto the rotor shaft. After pressing the Bearing onto the shaft, lightly rap the end of the splined hub with a plastic hammer to relax the load on the Bearing. The Rotor must rotate in the Bearing without drag.
23. Position the Rear End Plate Gasket (33) in the bottom of the motor housing bore so that the dowel hole and air inlet port in the Gasket align with the dowel hole and air inlet in the housing bore face.
24. Using an assembly dowel 3/32" in diameter by 10" long (2.3 mm x 254 mm), align the dowel holes in the Front End Plate, Cylinder and Rear End Plate. Insert the assembly rod through the aligned holes so that about 3" (76 mm) of the rod extends beyond the Rear End Plate. Insert the extension into the dowel hole at the bottom of the housing bore, and slide the motor into the Motor Housing until it seats.
25. Withdraw the assembly dowel and insert the Cylinder Dowel (41) until the Cylinder Dowel is slightly below the surface of the Front End Plate.

Assembly of the Gearing

1. If the Grease Shield Retainer (60) was removed, install it in the second groove below the front face of the Gear Case (56).
2. Support the face of the Spindle (43), pin end downward, on the table of an arbor press.
3. Install the Seal Support (44), large end first, and Grease Shield (59) over the hub of the Spindle.
4. Using a sleeve that contacts the inner ring of the Bearing, press the Spindle Bearing (61) onto the hub of the Spindle until the Bearing seats against the Seal Support.
5. Insert the assembled Spindle, pin end first, into the front end of the Gear Case until the Grease Shield is flush against the Grease Shield Retainer.
6. Using snap ring pliers, install the Spindle Bearing Retainer (62) in the groove ahead of the Spindle Bearing.

NOTICE

Always press on the stamped end of the Spindle Planet Gear Bearings (47) and center the Bearing in the Gear.

7. If the Spindle Planet Gear Bearings are being replaced, use a bearing inserting tool, shown in Dwg. TPD488, and press the Bearings into the Spindle Planet Gears (46).
8. Grease the Bearings and Gears and install them on the pins of the Spindle.
9. **For M, N, P, Q, or R ratio**, install the Gear Head Spacer (55) in the Gear Case against the Spindle Planet Gears.
10. **For M, N, P, Q or R ratio**, grease the splined hub of the Gear Head (50) and insert it into the Gear Case. The splined hub must pass through the Gear Head Spacer and mesh with the teeth of the Spindle Planet Gears.

NOTICE

Always press on the stamped end of the Bearing and center the Gear Head Planet Gear Bearings (52) in the Gear.

11. **For N, P, Q or R ratio**, if the Gear Head Planet Gear Bearings (52) are being replaced, use a bearing inserting tool similar to the one used with the Spindle Planet Gear Bearings and press the Bearings into the Gear Head Planet Gears (51).
    For M ratio, push the Gear Head Planet Gear Bearing (54) into the Gear Head Planet Gear (53).
12. **For M, N, P, Q or R ratio,** grease the Bearings and Gears and install them on the pins of the Gear Head.
13. **For M, N or P ratio,** grease the Rotor Pinion (49) and install it in the center of the Gear Head Planet Gears. Make certain the teeth of the Pinion and Planet Gears mesh.
14. Using snap ring pliers, install the Gear Retainer (48) in the shallow internal groove in the Gear Case behind the Spindle Planet Gears or Gear Head Planet Gears.
15. **For 6WT or 6WRT,** install the Exhaust Deflector (64) as follows:
    a. Install the two Exhaust Deflector Seals (65) in the annular grooves on each side of the Muffler Element (63) recess on the Gear Case.

    NOTICE

    Make certain the hole through the Muffler Element aligns with the Grease Fitting (57) in the Gear Case.

    b. Wrap the Muffler Element around the Gear Case in the recess.
    c. Slip the Exhaust Deflector, largest inside diameter first, onto the front end of the Gear Case and over the Muffler Element and Exhaust Deflector Seals.
    d. Spread the ends of the Deflector Retaining Ring (66) and install it in the external groove in the Gear Case adjacent to the front of the Exhaust Deflector.
16. Thread the assembled Gear Case onto the assembled Motor Housing until it is hand tight. Make certain the gear teeth on the Spindle mesh with the gear teeth of the Rotor Pinion, Gear Head Planet Gears or Spindle Planet Gears.

NOTICE

Run the motor at free speed on low air pressure while final tightening the Gear Case. Listen while tightening to make certain the gears mesh properly.

17. Tighten the Gear Case between 30 to 35 ft–lb (41 to 47 Nm) torque.

Assembly of the Angle Attachment

1. Lubricate the Bevel Pinion (105) as instructed under **LUBRICATION** and insert it, gear end first, into the long bore of the Angle Housing (101).
2. Lubricate the Bevel Pinion Bearing (106) as instructed under **LUBRICATION** and insert it, unstamped end first, into the bore of the Angle Housing and onto the bevel pinion shaft.

3. **For 7L3D6 Angle Head,** use No. 7L3A–950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 1.35" (34.4 mm), but not less than 1.34" (34.1 mm) below the end face of the Angle Housing.
   For 6L2D6 Angle Head, use No. 7L2A–950 Bearing Inserting Tool and press the Bevel Pinion Bearing so the stamped face is a maximum of 1.65" (42.0 mm), but not less than 1.64" (41.75 mm) below the end face of the Angle Housing.

NOTICE

Check to make sure the Bearing Spacer Retainer (111) is completely seated.

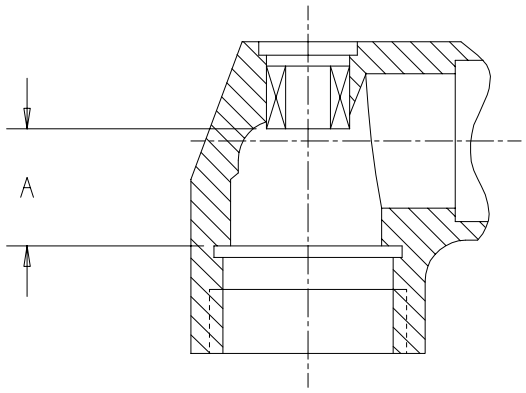
4. **For 7L3D6 Angle Head,** insert the Spacer Assembly over the splined end of the Bevel Pinion and into the Angle Housing until it is beyond the Spacer Retainer groove. Using a thin blade screwdriver, start the end of the Bearing Spacer Retainer opposite the tab end into the groove in the Angle Housing. Rotate the screwdriver around the pinion shaft to spiral the Retainer into the groove.
   For 6L2D6 Angle Head, insert the Pinion Bearing Spacer over the splined end of the Bevel Pinion and into the Angle Housing until it is beyond the Spacer Retainer groove. Using snap ring pliers, install the Bearing Spacer Retainer in the groove in the Angle Housing.
5. Lubricate the Bevel Pinion Thrust Bearing (112) as instructed under **LUBRICATION**. Install, in the order named, the Front Thrust Bearing Seat (109), Bevel Pinion Thrust Bearing and Rear Thrust Bearing Seat (107) over the splined end of the Bevel Pinion and retain the components by installing the Bearing Seat Retainer (108) on the pinion shaft.
6. If the Lower Spindle Bearing (113) has been removed, proceed as follows:
   a. **For 7L3D6 Angle Head,** using a sleeve that will contact the inner ring of the Bearing, press the Bearing onto the Spindle (118). Press on the stamped side of the Bearing with the side marked with red toward the spindle shoulder.
      For 6L2D6 Angle Head, using a sleeve that will contact the inner ring of the Bearing, press the Bearing, sealed side first, onto the Spindle (118).
   b. **For 7L3D6 Angle Head**, press the Bevel Gear (105) onto the Spindle.
      For 6L2D6 Angle Head, slide the Bevel Gear (105) onto the Spindle.
   c. **For 7L3D6 Angle Head**, spread the Bevel Gear Retainer (114) and slip it over the end of the Spindle. Slide the Retainer down the Spindle and into the groove around the Spindle to retain the Bevel Gear.
      For 6L2D6 Angle Head, apply a quality thread–locking compound to the threads of the Bevel Gear Retainer and tighten it on the Spindle to 10 ft–lb (13.5 Nm) torque.

CAUTION

Press on the stamped face of the Upper Spindle Bearing (104). Failure to do so will cause damage to the Bearing.

7. If the Upper Spindle Bearing has been removed, proceed as follows:
   For 7L3D6 Angle Head, press a new Spindle Bearing into the Angle Head from the large threaded end to the dimension shown. Install a new Angle Housing Cap (103) into the top of the Angle Head.
   See Dwg. TPD636.

Installation of the Spindle Bearing

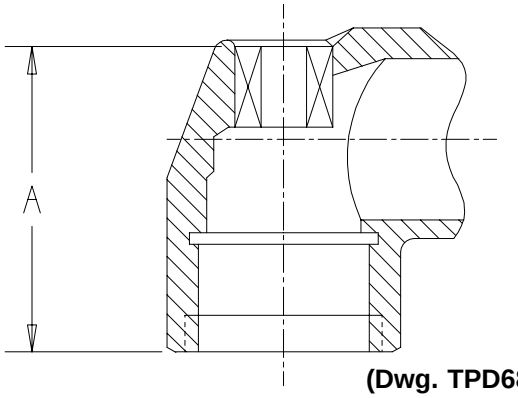


(Dwg. TPD636)

Minimum Dimension "A"	
in	**mm**
0.718	18.25
Maximum Dimension "A"	
0.728	18.50

For 6L2D6 Angle Head, press on the closed end of a new Spindle Bearing entering the Bearing into the small bore opposite the threaded end of the Angle Head to the dimension shown in Dwg. TPD680.

Installation of the Spindle Bearing



(Dwg. TPD680)

Minimum Dimension "A"	
in	mm
1.21	30.75
Maximum Dimension "A"	
1.27	31.25

8. Lubricate the Upper Spindle Bearing, Bevel Gear and Lower Spindle Bearing as instructed under **LUBRICATION** and install the Spindle in the Angle Housing.
9. Clean the threads on the Angle Housing and the Spindle Bearing Cap (120) and apply a film of Vibra–Tite®** VC3 to the threads.
10. **For 7L3D6 Angle Head,** using No. 8SA32–26 Lower Bearing Cap Wrench, install the Spindle Bearing Cap and tighten the Cap to a minimum of 25 ft–lb (34.0 Nm) torque.
    For 6L2D6 Angle Head, install Spindle Seal (120A). Using No. 141A12–26 Lower Bearing Cap Wrench, install the Spindle Bearing Cap and tighten the Cap to a minimum of 15 ft–lb (120.0 Nm) torque.
11. Slide the Coupling Nut (122), threaded end trailing, over the splined end of the Angle Housing.
12. Apply the Coupling Nut Retainer (121) to the external groove on the splined end of the Angle Housing.
13. Engage the spline on the Bevel Pinion with the matching internal spline of the Spindle (43) and thread the Coupling Nut onto the Gear Case (56). Tighten the Coupling Nut to a minimum of 25 ft–lb (34.0 Nm) torque. Check to make sure the square drive of the Angle Attachment aligns with the Throttle Lever (4).

** Registered trademark of N.D. Industries.

SHUTOFF VALVE ADJUSTMENT PROCEDURE

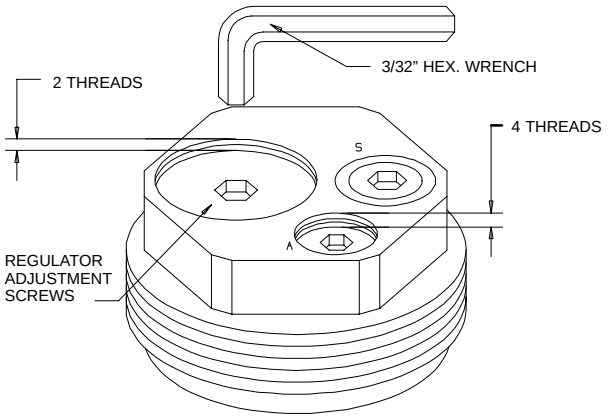
Adjustment of Shutoff Valve (for 6WT or 6WRT)

⚠ WARNING

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 exists are you to adjust the Valve. Adjust the Valve according to the procedures below.

1. Turn the Regulator Adjustment Screw until the top of the Screw is approximately two threads below the face of the Regulator Body. Set the Bleed Adjustment Screw approximately four threads below the face of the Regulator Body. See Dwg. TPD1071.

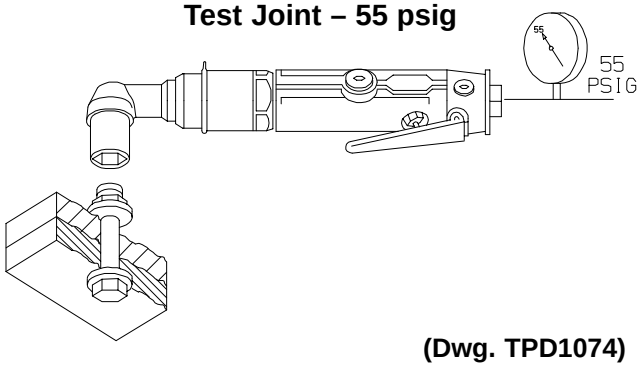
Setup of the Regulator and Bleed Adjustment Screws



(Dwg. TPD1071)

2. Cycle the tool on a test joint to test for shutoff. See Dwg. TPD1074.

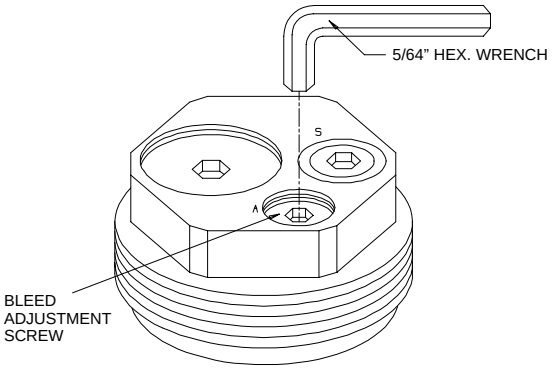
Test Joint – 55 psig



(Dwg. TPD1074)

3. If the tool fails to shut off:
   a. Turn the Bleed Adjustment Screw clockwise a little at a time, until consistent shutoff occurs. If no shutoff occurs, reset the Bleed Adjustment Screw four turns under flush. (See Figure 6). Set the Regulator Adjustment Screw 1/4 turn deeper and repeat steps 2 and 3. (See Figure 4).
   b. If tool shutoff occurs, turn the Bleed Adjustment Screw counterclockwise until the tool stalls on a test joint. When the tool stalls, rotate the Bleed Adjustment Screw clockwise, a little at a time, until consistent shutoff occurs.
   See Dwg. TPD1072.

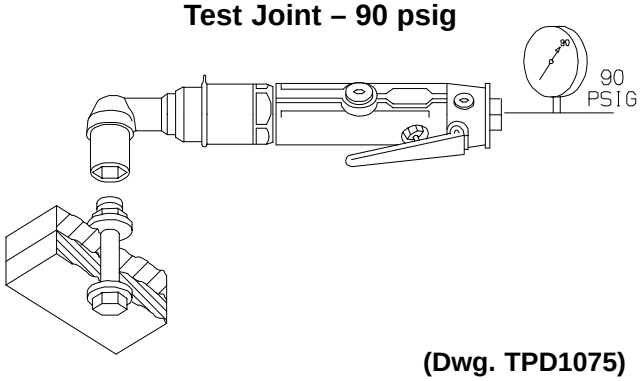
Setting the Regulator Adjustment Screw



(Dwg. TPD1072)

4. Cycle the tool on a test joint to test for shutoff.
   See Dwg. TPD1075.

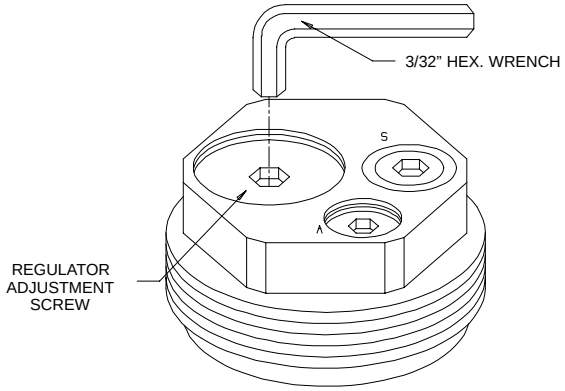
Test Joint – 90 psig



(Dwg. TPD1075)

5. If the tool fails to shut off:
   a. Turn the Regulator Adjustment Screw clockwise, a little at a time, until consistent shutoff occurs. See Dwg. TPD1073.
   b. If tool shutoff occurs, turn the Regulator Adjustment Screw counterclockwise until the tool stalls on a test joint. When the tool stalls, rotate the Regulator Adjustment Screw clockwise 1/8 of turn at a time until consistent shutoff occurs. This adjustment provides maximum torque output at shutoff.

Setting the Regulator Adjustment Screw



(Dwg. TPD1073)

6. It is possible that the tool might shut off when the throttle is depressed. This condition is a premature shutoff and can be corrected by turning the Bleed Adjustment Screw counterclockwise a little at a time until the premature shutoff condition is corrected. See Dwg. TPD1072. If the Bleed Adjustment Screw was used to correct a premature shutoff condition, retest the tool for shutoff at 55 and 90 psig.
   If necessary, repeat steps 2 through 5.

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.
Leaky Throttle Valve	Worn Throttle Valve and/or Throttle Valve Seat	Install a new Throttle Valve and/or a Throttle Valve Seat
	Dirt accumulation on Throttle Valve and/or Throttle Valve Seat	Pour about 3 cc of a clean, suitable, cleaning solution in the air inlet and operate the tool for about 30 seconds. Immediately, pour 3 cc of the recommended oil in the air inlet and operate the tool for 30 seconds to lubricate all cleaned parts.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.

NOTES