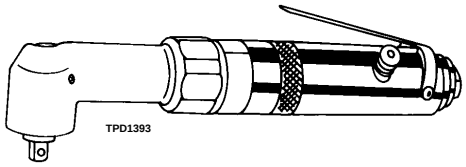

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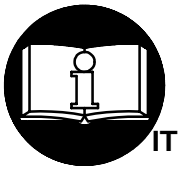
OPERATION AND MAINTENANCE MANUAL FOR SERIES 3RL REVERSIBLE ANGLE SCREWDRIVERS AND ANGLE WRENCHES

NOTICE

Series 3RL Angle Screwdrivers and Angle Wrenches are designed for running small threaded fasteners in close–quarter applications.

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



⚠ WARNING

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

PLACING TOOL IN SERVICE

- **Always operate, inspect and maintain this tool in accordance with American National Standards Institute Safety Code for Portable Air Tools (ANSI B186.1).**
- **For safety, top performance, and maximum durability of parts, operate this tool at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 1/4" (6 mm) inside diameter air supply hose.**
- **Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.**
- **Do not use damaged, frayed or deteriorated air hoses and fittings.**
- **Be sure all hoses and fittings are the correct size and are tightly secured. See Dwg. TPD905–1 for a typical piping arrangement.**
- **Always use clean, dry air at 90 psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air tool.**
- **Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.**
- **Do not remove any labels. Replace any damaged label.**

USING THE TOOL

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

NOTICE

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

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

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

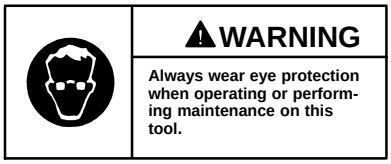
Printed in U.S.A.

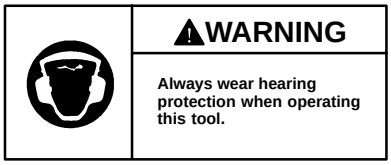
INGERSOLL-RAND®
PROFESSIONAL TOOLS

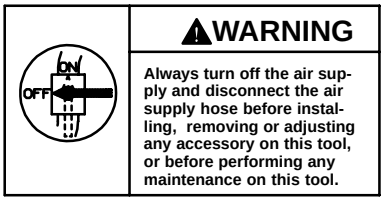
WARNING LABEL IDENTIFICATION

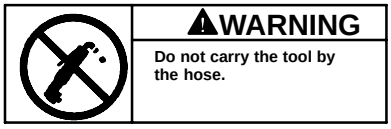
⚠ WARNING

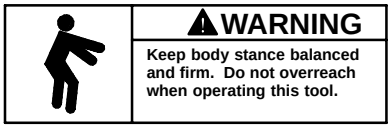
FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

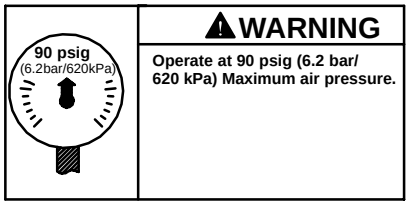












ADJUSTMENTS

CLUTCH ADJUSTMENT

⚠ WARNING

Disconnect the air supply from the tool before proceeding.

1. Rotate the Adjusting Hole Cover on the Clutch Housing Assembly to expose the adjusting hole.
2. Rotate the Spindle Assembly or Matched Gear Set until one of the radial holes in the Clutch Adjusting Nut is visible through the adjusting hole.
3. Insert the No. 5C1–416 Clutch Adjusting Key or a 3/32” (2 mm) diameter hardened steel pin or rod into the hole in the Clutch Adjusting Nut to sprag the Nut against rotation.

NOTICE

The most satisfactory adjustment is usually obtained by using the tool on the actual application, and increasing or decreasing the delivered torque until the desired setting is reached. In any event, it is recommended that the final adjustment be made by gradual progression.

4. Grasp the Tool firmly in one hand and rotate the Spindle Assembly or Matched Gear Set to shift the Clutch Adjusting Nut along the Clutch Driver. Rotating the square drive clockwise increases the compression on the Clutch Spring and raises the torque at which the clutch will disengage.

POSITIONING OF THROTTLE LEVER ON MODELS WITH AUTOMATIC SHUTOFF CLUTCH

⚠ WARNING

Disconnect the air supply from the tool before proceeding.

To change the position of the Throttle Lever in relationship to the Reverse Valve, proceed as follows:

1. Secure the tool in leather–covered or copper–covered vise jaws using the flats on the Throttle Valve Housing.
2. Remove the Inlet Bushing Assembly and Exhaust Deflector. Be careful not to lose or damage the Exhaust Deflector Seal or Throttle Valve Plunger.
3. Before proceeding, change position of the tool in the vise so that it is held by the flats on the Motor Housing. Using a 5/64” hex wrench, loosen the Throttle Valve Housing Cap Screws until they can be disengaged from the Throttle Valve Housing Adapter. It is not necessary to remove the Screws from the Throttle Valve Housing.

4. Lift the Throttle Valve Housing enough to clear the Valve Housing Alignment Pin and rotate the Throttle Valve Housing to the desired position, making sure that the notch in the Throttle Valve Housing is aligned with the Valve Housing Alignment Pin.

NOTICE

Before tightening the Throttle Valve Housing Cap Screws, make sure that the Throttle Valve Housing Seal is in the proper position on the smaller shoulder of the Motor Housing and that it has not been damaged.

5. If it is necessary to replace or reposition the Throttle Valve Housing Seal, lightly coat both the Seal and the smaller shoulder of the Motor Housing with Ingersoll–Rand No. 28 Grease. The grease will hold the Seal in position while installing the Throttle Valve Housing.
6. Tighten the Throttle Valve Housing Cap Screws to 8 to 10 in–lb (0.90 to 1.13 Nm) torque.
7. Before proceeding, change the position of the tool in the vise using the flats on the Throttle Valve Housing.

NOTICE

Before installing the Exhaust Deflector, make sure that the Exhaust Deflector Seal has not been damaged and that it is in the proper position on the smaller shoulder of the Throttle Valve Housing.

8. If it is necessary to replace or reposition the Exhaust Deflector Seal, lightly coat both the Seal and the smaller shoulder of the Throttle Valve Housing with Ingersoll–Rand No. 28 Grease. The grease will hold the Seal in position while installing the Exhaust Deflector.
9. Carefully slide the Exhaust Deflector into the proper position making sure that the slot in the Exhaust Deflector is aligned with the Exhaust Deflector Alignment Pin.
10. Hold the Exhaust Deflector firmly in position while installing the Inlet Bushing Assembly. Tighten to 15 ft–lb (20 Nm) torque. The Inlet Bushing must securely clamp the Exhaust Deflector.

PLACING TOOL IN SERVICE

LUBRICATION

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

Ingersoll–Rand No. 28

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

For 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 to 3 cc of Ingersoll–Rand No. 10 Oil into the air inlet.

After every 40,000 cycles or one month, or as experience indicates, lubricate the following components:

Angle Head

Inject 2 to 4 cc of Ingersoll–Rand No. 67 Grease into the Grease Fitting on the Angle Attachment.

Gearing

Remove the Adjustable Clutch Assembly from the Gear Case. For models with Automatic Shutoff, remove the Push Rod. Inject 2 to 4 cc of Ingersoll–Rand No. 67 Grease for the **L ratio;** 4 to 6 cc for the **M, N, O, or Q ratio**, through the center hex hole in the Spindle.

Cushion Clutch

Separate the Clutch Housing Assembly from the Gear Case. Remove the Clutch Driver Assembly and the Bevel Pinion Driver from the Clutch Housing Assembly. Using Ingersoll–Rand No. 67 Grease, lightly coat the hex bore of the Bevel Pinion Driver and the portion of the Bevel Pinion Driver that fits into the Clutch Housing Bushing. Working through the Clutch Driver, inject approximately 2 cc of grease to lubricate the Thrust Bearing and Clutch Balls.

PLACING TOOL IN SERVICE

Shutoff Clutch

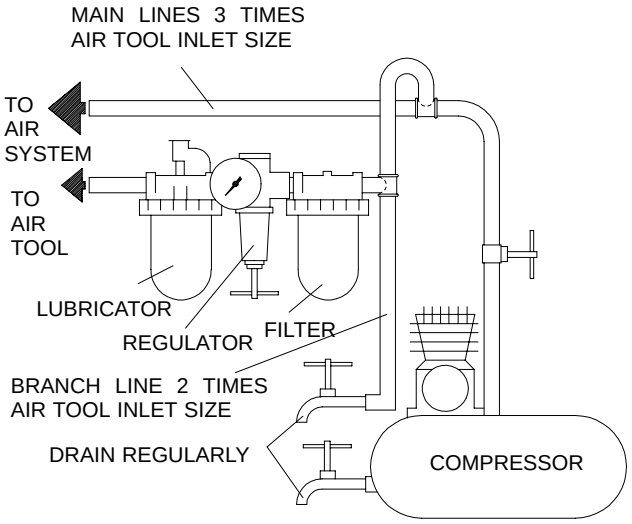
Separate the Clutch Housing Assembly from the Gear Case. Remove the Shutoff Clutch from the Clutch Housing Assembly.

NOTICE

Mark or take note of the location (setting) of the Clutch Adjusting Nut.

Relieve the Clutch Spring tension by rotating the Clutch Adjusting Nut until it lightly touches the rear Spring Seat Stop. Pull the Clutch Ball Seat down against the Clutch Spring and work some Ingersoll–Rand No. 67 Grease around the Clutch Cam Balls, the cam, Clutch Ball Seat, and the Thrust Bearings. Remove the Ball Retaining Ring. Work some grease into the hole made by removing one Bevel Pinion Bearing Ball.

Adjust the Clutch Adjusting Nut to its original setting and assemble the tool.



(Dwg. TPD905–1)

HOW TO ORDER AN ANGLE SCREWDRIVER/WRENCH

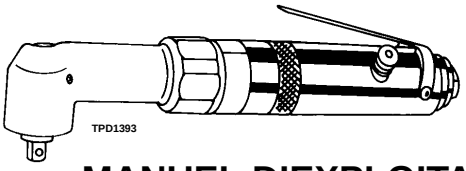
REVERSIBLE SCREWDRIVER WITH INLINE HANDLE AND ADJUSTABLE SHUTOFF CLUTCH

Model	Torque Range (Soft Draw) 90 psi pressure in–lb	Nm	Free Speed, rpm	Drive Type	Clutch Spring
3RLL2S3	5.0–19.0	0.6–2.2	1,800	1/4 Hex	L
3RLM2S3	3.5–30.0	0.4–3.4	1,100	1/4 Hex	L, M
3RLN2S3	2.0–46.0	0.2–5.3	700	1/4 Hex	L, M, H
3RLO2S3	2.0–60.0	0.2–6.8	500	1/4 Hex	L, M, H

REVERSIBLE SCREWDRIVER WITH INLINE HANDLE AND ADJUSTABLE CUSHION CLUTCH

3RLL2C3	5.0–19.0	0.6–2.2	1,800	1/4 Hex	L
3RLM2C3	3.5–30.0	0.4–3.4	1,100	1/4 Hex	L, M
3RLN2C3	2.0–46.0	0.2–5.2	700	1/4 Hex	L, M, H

Model	Torque Range (Soft Draw) 90 psi pressure in–lb	Nm	Free Speed rpm	Drive Type	Clutch Spring
REVERSIBLE WRENCH WITH INLINE HANDLE AND ADJUSTABLE SHUTOFF CLUTCH					
3RLL2S5	5.0–19.0	0.6–2.2	1,800	1/4 Sq	L
3RLM2S5	3.5–30.0	0.4–3.4	1,100	1/4 Sq	L, M
3RLQ1S5	7.0–45.0	0.8–5.1	500	1/4 Sq	H
3RLN2S5	2.0–46.0	0.8–5.1	700	1/4 Sq	L, M, H
3RLO2S5	2.0–60.0	0.2–6.8	500	1/4 Sq	L, M, H
REVERSIBLE WRENCH WITH INLINE HANDLE AND ADJUSTABLE CUSHION CLUTCH					
3RLL2C5	5.0–19.0	0.6–2.0	1,800	1/4 Sq	L
3RLM2C5	3.5–30.0	0.4–3.4	1,100	1/4 Sq	L, M
3RLN2C5	2.0–46.0	0.2–5.2	700	1/4 Sq	L, M, H
REVERSIBLE STALL WRENCH WITH INLINE HANDLE					
3RLL2D5	20	2.3	1,800	1/4 Sq	—
3RLM2D5	31	3.5	1,100	1/4 Sq	—
3RLN2D5	48	5.4	700	3/8 Sq	—



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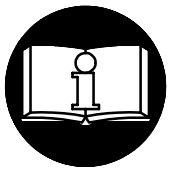
MANUEL D'EXPLOITATION ET D'ENTRETIEN DES TOURNEVIS ET DES CLÉS D'ANGLE RÉVERSIBLES DE LA SÉRIE 3RL

NOTE

Les tournevis et clés d'angle réversibles de la série 3RL sont destinés au montage des petites fixations filetées dans des espaces restreints.
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 6 mm de diamètre intérieur.**
- **Couper toujours l'alimentation d'air comprimé et débrancher le flexible d'alimentation avant d'installer, déposer ou ajuster tout accessoire sur cet outil, ou d'entreprendre une opération d'entretien quelconque sur l'outil.**
- **Ne pas utiliser des flexibles ou des raccords endommagés, effilochés ou détériorés.**
- **S'assurer que tous les flexibles et les raccords sont correctement dimensionnés et bien serrés. Voir Plan TPD905–1 pour un exemple type d'agencement des tuyauteries.**
- **Utiliser toujours de l'air sec et propre à une pression maximum de 6,2 bar. La poussière, les fumées corrosives et/ou une humidité excessive peuvent endommager le moteur d'un outil pneumatique.**
- **Ne jamais lubrifier les outils avec des liquides inflammables ou volatiles tels que le kérosène, le gasol ou le carburant d'aviation.**
- **Ne retirer aucune étiquette. Remplacer toute étiquette endommagée.**

UTILISATION DE L'OUTIL

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

NOTE

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

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

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

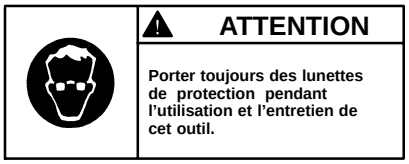
Imprimé aux É.U.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

SIGNIFICATION DES ETIQUETTES D'AVERTISSEMENT

⚠ ATTENTION

LE NON RESPECT DES AVERTISSEMENTS SUIVANTS PEUT CAUSER DES BLESSURES



⚠ ATTENTION

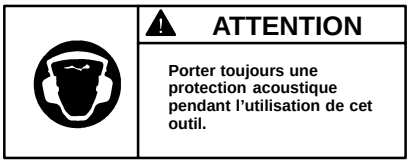
Porter toujours des lunettes de protection pendant l'utilisation et l'entretien de cet outil.

⚠ ATTENTION

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

⚠ ATTENTION

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

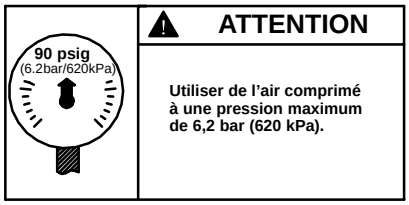


⚠ ATTENTION

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

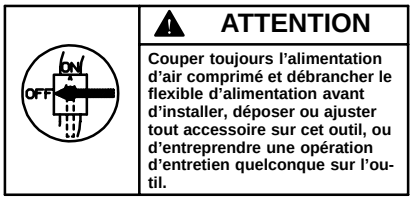
⚠ ATTENTION

Ne pas transporter l'outil par son flexible.



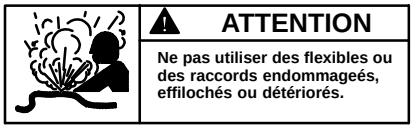
⚠ ATTENTION

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



⚠ ATTENTION

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



⚠ ATTENTION

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

RÉGLAGES

REGLAGE DU LIMITEUR

⚠ ATTENTION

Débrancher l'alimentation d'air comprimé de l'outil avant d'entreprendre les opérations suivantes.

1. Tourner le couvercle du trou de réglage sur le corps du limiteur de manière à exposer le trou de réglage.
2. Tourner la broche ou le jeu d'engrenages appairés jusqu'à ce que l'un des trous radiaux de l'écrou de réglage du limiteur soit visible à travers le trou de réglage.
3. Insérer la clé de réglage de limiteur No. 5C1–416 (une goupille ou broche en acier trempé de 2 mm de diamètre peut également être utilisée) dans le trou de l'écrou de réglage du limiteur pour l'empêcher de tourner.

NOTE

La meilleure méthode de réglage est normalement obtenue en utilisant l'outil sur l'application requise en augmentant ou en diminuant le couple fourni jusqu'à ce que le réglage désiré soit atteint. De plus, il est toujours recommandé d'obtenir le réglage final au moyen de réglages progressifs.

4. Saisir fermement l'outil dans une main et tourner la broche ou le jeu d'engrenages appairés pour déplacer l'écrou de réglage le long de l'entraîneur du limiteur. La rotation de l'entraîneur carré dans le sens des aiguilles d'une montre augmente la compression du ressort du limiteur et donc la valeur du couple de déclenchement de l'outil.

POSITIONNEMENT DU LEVIER DE COMMANDE SUR LES MODELES EQUIPES D'UN LIMITEUR D'ARRET AUTOMATIQUE

⚠ ATTENTION

Débrancher l'alimentation d'air comprimé de l'outil avant d'entreprendre les opérations suivantes.

Pour changer la position du levier de commande par rapport à l'inverseur, procéder de la façon suivante:

1. Serrer soigneusement l'outil dans un étau équipé de mordaches en cuir ou en cuivre en utilisant les plats du carter de la soupape de commande.
2. Déposer le raccord d'admission et le déflecteur d'échappement. Prendre soin de ne pas perdre ou endommager le joint du déflecteur d'échappement ou le plongeur de la soupape de commande.
3. Avant de continuer, changer la position de l'outil dans l'étau de manière le serrer sur les plats du corps du moteur. Utiliser une clé à six pans creux de 5/64" et desserrer les vis du corps de soupape de commande jusqu'à ce qu'elles soient désengagées de l'adapteur du corps de soupape de commande. Il n'est pas nécessaire de déposer les vis du corps de soupape de commande.

4. Soulever suffisamment le corps de soupape de commande pour le dégager du pion d'alignement et tourner le corps de soupape de commande à la position requise, en prenant soin d'aligner l'encoche du corps de soupape de commande par rapport au pion d'alignement.

NOTE

Avant de serrer les vis à six pans creux du corps de soupape de commande, vérifier que le joint du corps de soupape est bien positionné sur le plus petit épaulement du corps de moteur et qu'il n'a pas été endommagé.

5. Si le joint de corps de soupape de commande doit être remplacé ou repositionné, appliquer une légère couche de graisse Ingersoll–Rand No. 28 à la fois sur le joint et sur le plus petit épaulement du corps de moteur. La graisse maintiendra le joint en place pendant le montage du corps de soupape de commande.
6. Serrer les vis à six pans creux du corps de soupape de commande à un couple de 0,9 à 1.13 Nm.
7. Changer maintenant la position de l'outil dans l'étau en le serrant sur les plats du corps de soupape de commande.

NOTE

Avant de monter le déflecteur d'échappement, vérifier que le joint du déflecteur n'a pas été endommagé et qu'il est correctement positionné sur le petit épaulement du corps de soupape de commande.

8. Si le joint du déflecteur d'échappement doit être remplacé ou repositionné, appliquer une légère couche de graisse Ingersoll–Rand No. 28 à la fois sur le joint et sur le plus petit épaulement du corps de moteur. La graisse maintiendra le joint en place pendant le montage du déflecteur d'échappement.
9. Glisser soigneusement le déflecteur d'échappement à sa position correcte en vérifiant que la rainure du déflecteur est bien alignée par rapport au pion d'alignement du déflecteur d'échappement.
10. Tenir fermement le déflecteur d'échappement en position tout en montant le raccord d'admission. Serrer à un couple de 20 Nm. Le raccordd'admission doit serrer fermement le déflecteur d'échappement.

MISE EN SERVICE DE L'OUTIL

LUBRIFICATION

Ingersoll–Rand No. 10

Ingersoll–Rand No. 67

Ingersoll–Rand No. 28

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

Pour 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 injecter 2 à 3 cm^3 d'huile Ingersoll–Rand No. 10 dans le raccord d'admission de l'outil.

Tous les 40,000 cycles ou tous les mois, ou en fonction de l'expérience, lubrifier les composants suivants :

Renvoi d'angle

Injecter 2 à 4 cm^3 de graisse Ingersoll–Rand No. 67 dans le raccord de graissage du renvoi d'angle.

Pignonnerie

Déposer l'ensemble de limiteur réglable du boîtier d'engrenages. Sur les modèles équipés d'un arrêt automatique, déposer la tige poussoir. Injecter 2 à 4 cm^3 de graisse Ingersoll–Rand No. 67 pour **le rapport L**; 4 à 6 cm^3 pour **les rapports M, N, O ou Q**, dans le trou central hexagonal de la broche.

Limiteur amortisseur

Séparer le corps de limiteur du boîtier d'engrenages. Déposer l'ensemble d'entraînement du limiteur et l'entraîneur du pignon conique de l'ensemble de corps de limiteur. Utiliser de la graisse Ingersoll–Rand No. 67 et appliquer une légère couche dans l'alésage hexagonal de l'entraîneur de pignon conique et la partie de l'entraîneur qui se monte dans le fourreau du corps de limiteur. Injecter environ 2 cm^3 de graisse à travers l'entraîneur de limiteur pour graisser le roulement de butée et les billes du limiteur.

MISE EN SERVICE DE L'OUTIL

Limiteur d'arrêt

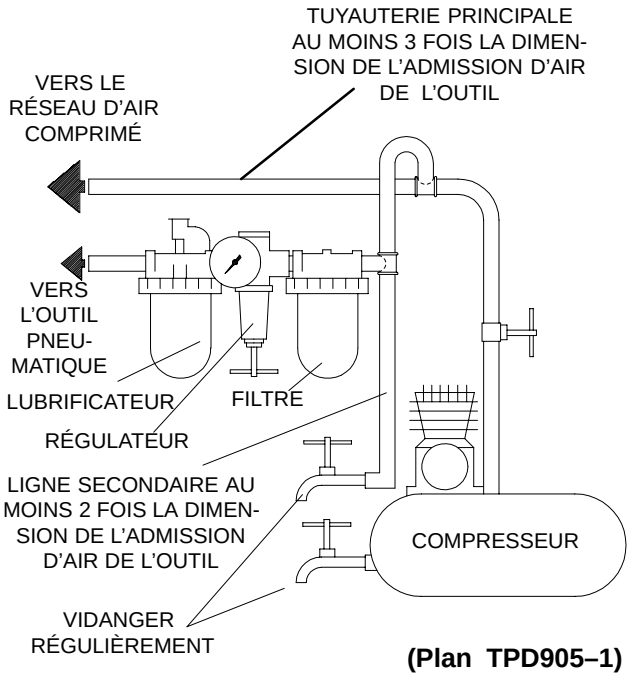
Séparer le corps de limiteur du boîtier d'engrenages. Déposer le limiteur d'arrêt de l'ensemble de corps de limiteur.

NOTE

Marquer, ou prendre note, de la position (réglage) de l'écrou de réglage de limiteur.

Libérer la tension du ressort de limiteur en tournant l'écrou de réglage de limiteur jusqu'à ce qu'il touche juste la butée arrière de siège de ressort. Tirer le siège des billes de limiteur contre la pression du ressort et injecter de la graisse Ingersoll–Rand No. 67 autour des billes de came de limiteur, de la came, du siège des billes de limiteur et des roulements de butée. Déposer la bague de retenue des billes. Enlever une bille de roulement de pignon conique et injecter de la graisse dans le trou ainsi créé.

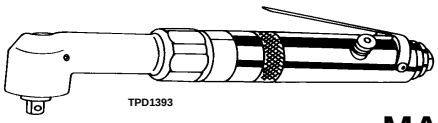
Ajuster l'écrou de réglage de limiteur à son réglage original et assembler l'outil.



(Plan TPD905–1)

SPÉCIFICATIONS

Modèle	Dispositif de couple	Plage de couple (Serrage élastique) pression 6,2 bar	Vitesse libre	entr. carré
		in–lbs (Nm)	tr/mn	in.
3RLL2S	arrêt	5,0–19,0 (0,6–2,2)	1.800	1/4
3RLM2S3	arrêt	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLN2S3	arrêt	2,0–46,0 (0,2–5,3)	700	1/4
3RLO2S3	arrêt	2,0–60,0 (0,2–6,8)	500	1/4
3RLL2C3	amortiseur	5,0–19,0 (0,6–2,2)	1.800	1/4
3RLM2C3	amortiseur	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLN2C3	amortiseur	2,0–46,0 (0,2–5,2)	700	1/4
3RLL2S5	arrêt	5,0–19,0 (0,6–2,2)	1.800	1/4
3RLM2S5	arrêt	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLQ1S5	arrêt	7,0–45,0 (0,8–5,1)	500	1/4
34LN2S5	arrêt	2,0–46,0 (0,8–5,1)	700	1/4
3RLO2S5	arrêt	2,0–60,0 (0,2–6,8)	500	1/4
3RLL2C5	amortisseur	5,0–19,0 (0,6–2,0)	1.800	1/4
3RLM2C5	amortisseur	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLN2C5	amortisseur	2,0–46,0 (0,2–5,2)	700	1/4
3RLL2D5	calage	20 (2,3)	1.800	1/4
3RLM2D5	calage	31 (3,5)	1.100	1/4
3RLN2D5	calage	48 (5,4)	700	1/4



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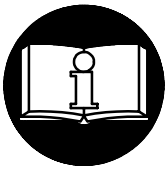
MANUAL DE USO Y MANTENIMIENTO PARA LLAVES ANGULARES Y ATORNILLADORES ANGULARES SERIE 3RL

NOTA

Las Llaves Angulares y Atornilladores Angulares Serie 3RL están diseñadas para el atornillado de pequeñas uniones roscadas en aplicaciones de acceso reducido.
Ingersoll–Rand no aceptará responsabilidad alguna por la modificación de las herramientas efectuada por el cliente para las aplicaciones que no hayan sido consultadas con Ingersoll–Rand.

⚠ AVISO



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

PARA PONER LA HERRAMIENTA EN SERVICIO

- **Utilice, examine y mantenga siempre esta herramienta conforme al código de seguridad para herramientas neumáticas portátiles de la American National Standards Institute (ANSI B186.1).**
- **Para seguridad, máximo rendimiento y vida de servicio de las piezas, use esta herramienta a una presión de aire máxima de 90 psig (6,2 bar/620 kPa) en la manguera de suministro de aire con diámetro interno de 6 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.

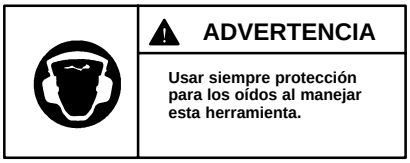
Impreso en EE. UU.

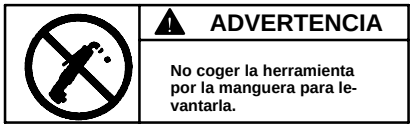
INGERSOLL-RAND®
PROFESSIONAL TOOLS

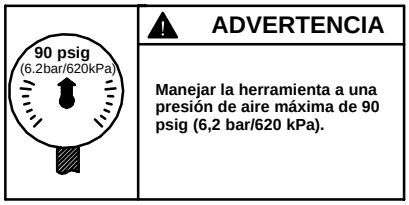
ETIQUETAS DE AVISO

⚠ AVISO

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







AJUSTES

AJUSTE DE EMBRAGUE

⚠ AVISO

Desconecte el suministro de aire comprimido de la herramienta antes de proceder.

1. Gire la Tapa de Orificio de Ajuste en el Conjunto de Caja de Embrague para exponer el orificio de ajuste.
2. Gire el Conjunto de Eje o Conjunto de Engranajes Emparejados hasta que uno de los orificios radiales en la Tuerca de Ajuste de Embrague sea visible a través del orificio de ajuste.
3. Inserte la Llave de Ajuste de Embrague Nº 5C1–416 o un perno o varilla de acero endurecido de 3/32” (2 mm) de diámetro en el orificio de Tuerca de Ajuste de Embrague para engalgar la Tuerca contra rotación.

NOTA

Normalmente se obtendrá el mejor ajuste usando la herramienta en la aplicación real e incrementando o disminuyendo el par hasta lograr el ajuste deseado. En cualquier caso, se recomienda que se haga el ajuste final por progresión gradual.

4. Sujete la herramienta firmemente en una mano y gire el Conjunto de Eje o Conjunto de Engranajes para mover la Tuerca de Ajuste de Embrague por el Accionamiento de Embrague. Girando el cuadradillo a la derecha se incrementa la compresión de Muelle de Embrague y el par en el que se liberará el Embrague.

POSICIONAMIENTO DE LA PALANCA DE ESTRANGULACIÓN EN MODELOS CON EMBRAGUE DE PARADA AUTOMÁTICA

⚠ AVISO

Desconecte el suministro de aire comprimido de la herramienta antes de proceder.

Para cambiar la posición de Palanca de estrangulación en relación a la Válvula de Inversión, proceda como sigue:

1. Sujete la herramienta en un tornillo de banco con mordazas cubiertas de cobre o cuero utilizando los planos de la Carcasa de Válvula de Estrangulación.
2. Saque el Conjunto de Casquillo de Admisión y Deflector de Escape. Tenga cuidado de no perder o dañar La Junta de Deflector de Escape o Émbolo de Válvula de Estrangulación.
3. Antes de proceder, cambie la posición de la herramienta en el tornillo de banco sujetando los planos de Carcasa de Motor. Con una llave hexagonal de 5/64”, afloje los Tornillos de Carcasa de Válvula de Estrangulación hasta que puedan sacarse del Adaptador de Carcasa de Válvula de Estrangulación. No es necesario sacar los Tornillos de la Carcasa de Válvula de Estrangulación.

4. Levante la Carcasa de la Válvula de Estrangulación lo suficiente como para librar el Pasador de Alineación de Carcasa de Válvula y gire la Carcasa de Válvula de Estrangulación y póngala en la posición deseada, asegurándose de que la ranura en la Carcasa de Válvula de Estrangulación esté alineada con el Pasador de Alineación de Carcasa de Válvula.

NOTA

Antes de apretar los Tornillos de Fijación de la Carcasa de la Válvula, asegúrese que la Junta de Carcasa de Válvula de Estrangulación esté en la posición correcta en el margen menor de la Carcasa de Motor y que no haya sido dañada.

5. Si es necesario cambiar o reposicionar la Junta de Carcasa de Válvula de Estrangulación, ponga una pequeña cantidad de Grasa Ingersoll–Rand Nº 28 en la Junta y en el margen menor de la Carcasa de Motor. La grasa mantendrá la Junta en posición mientras instala la Carcasa de Válvula de Estrangulación.
6. Apriete los Tornillos de Fijación de la Carcasa de Válvula de estrangulación entre 8 y 10 pulg.–lb (0,90 a 1,13 Nm) de par.
7. Antes de proceder, cambie la posición de la herramienta en el tornillo de banco usando los planos de la Carcasa de Válvula de Estrangulación.

NOTA

Antes de instalar el Deflector de Escape, asegúrese que la Junta de Deflector de Escape no haya sido dañada y esté en la posición apropriada en el margen menor de la Carcasa de Válvula de Estrangulación.

8. Si es necesario cambiar o reposicionar la Junta de Deflector de Escape, cubra con una capa pequeña de Grasa Ingersoll–Rand Nº 28 la Junta y el margen menor de la Válvula de Estrangulación. La grasa mantendrá la Junta en posición mientras instala el Deflector de Escape.
9. Deslice cuidadosamente el Deflector de Escape en la posición correcta asegurándose de que la ranura en el Deflector de Escape esté alineada con el Pasador de Alineación de Deflector de Escape.
10. Sujete el Deflector firmemente en posición mientras instala el Conjunto de Casquillo de Entrada. Apriete a 15 ft–lb (20 Nm) de par. El Casquillo de Entrada deberá fijar firmemente el Deflector de Escape.

PARA PONER LA HERRAMIENTA EN SERVICIO

LUBRICACIÓN

Ingersoll–Rand Nº 10

Ingersoll–Rand Nº 67

Ingersoll–Rand Nº 28

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

Para 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 haya puesto un lubricante de línea de aire comprimido, desconecte la manguera de aire e inyecte de 2 a 3 cc de Aceite Ingersoll–Rand Nº 10 en la admisión de aire.

Después de cada 40.000 ciclos o un mes, o según como indique la experiencia, lubrique los siguientes componentes:

Cabeza Angular

Inyecte de 2 a 4 cc de Grasa Ingersoll–Rand Nº 67 en el Engrasador de Acoplamiento Angular.

Engranajes

Saque el Conjunto de Embrague Ajustable de la Carcasa de Engranajes. Para modelos de Cierre Automático, saque la Biela. Inyecte de 2 a 4 cc de Grasa Ingersoll–Rand Nº 67 en el Engrasador para el **radio L**; 4 a 6 cc para los **radios M, N, O, o Q,** por el centro del orificio hexagonal de Eje.

Embrague Ajustable

Separe el Conjunto de Carcasa de Embrague de la Carcasa de Engranajes. Saque el Accionador de Embrague y Accionador de Piñón Cónico del Conjunto de Carcasa de Embrague. Use Grasa Ingersoll–Rand Nº 67 para cubir ligeramente el orificio hexagonal del Accionador de Piñón Cónico y la porción de Piñón Cónico que encaja en el Casquillo de Carcasa de Embrague. Trabajando por el Accionador de Embrague, inyecte aproximadamente 2 cc de grasa para lubricar los Rodamientos Axiales y Bolas de Embrague.

PARA PONER LA HERRAMIENTA EN SERVICIO

Embrague de Cierre

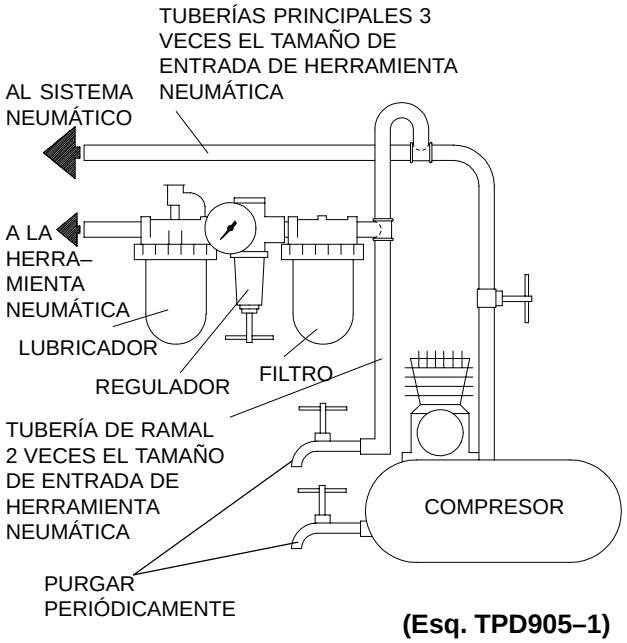
Separe el Conjunto de Carcasa de Embrague de la Carcasa de Engranajes. Saque el Embrague de Cierre del Conjunto de Carcasa de Embrague.

NOTA

Marque o tome nota de la posición (colocación) de la Tuerca de Ajuste de Embrague.

Libere la tensión de Muelle de Embrague girando la Tuerca de Ajuste de Embrague hasta que contacte ligeramente el Tope de Asiento de Muelle. Empuje el Asiento de Bolas de Embrague contra el Muelle de Embrague y ponga Grasa Ingersoll–Rand Nº 67 alrededor de las Bolas de Leva de Embrague, leva, Asiento de Bola de Embrague, y Rodamientos Axiales. Saque el Aro Retenedor de Bola. Frote un poco de grasa en el orificio logrado al remover una de las Bolas de Rodamiento de Piñón Cónico.

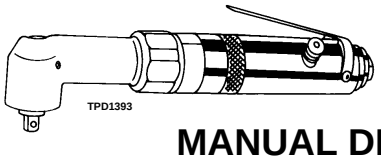
Ajuste la Tuerca de Ajuste de Embrague en su posición original y monte la herramienta.



(Esq. TPD905–1)

ESPECIFICACIONES

Modelo	Dispositivo de Par	Gama de Par (Junta blanda) de 6,2 bar de presión.	Velocidad Libre	Cuadradillo
		pulg.–lbs (Nm)	rpm	pulg.
3RLL2S3	cierre	5,0–19,0 (0,6–2,2)	1.800	1/4
3RLM2S3	cierre	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLN2S3	cierre	2,0–46,0 (0,2–5,3)	700	1/4
3RLO2S3	cierre	2,0–60,0 (0,2–6,8)	500	1/4
3RLL2C3	amortiguación	5,0–19,0 (0,6–2,2)	1.800	1/4
3RLM2C3	amortiguación	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLN2C3	amortiguación	2,0–46,0 (0,2–5,2)	700	1/4
3RLL2S5	cierre	5,0–19,0 (0,6–2,2	1.800	1/4
3RLM2S5	cierre	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLQ1S5	cierre	7,0–45,0 (0,8–5,1	500	1/4
34LN2S5	cierre	2,0–46,0 (0,8–5,1)	700	1/4
3RLO2S5	cierre	2,0–60,0 (0,2–6,8)	500	1/4
3RLL2C5	amortiguación	5,0–19,0 (0,6–2,0)	1.800	1/4
3RLM2C5	amortiguación	3,5–30,0 (0,4–3,4)	1.100	1/4
3RLN2C5	amortiguación	2,0–46,0 (0,2–5,2)	700	1/4
3RLL2D5	calado	20 (2,3)	1.800	1/4
3RLM2D5	calado	31 (3,5)	1.100	1/4
3RLN2D5	calado	48 (5,4)	700	1/4



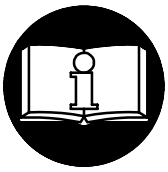
P

MANUAL DE FUNCIONAMENTO E MANUTENÇÃO PARA APARAFUSADORAS E FERRAMENTAS PNEUMÁTICAS ANGULARES REVERSÍVEIS SÉRIES 3RL

AVISO

As Aparafusadoras e Ferramentas Pneumáticas Angulares Séries 3RL são concebidas para accionar apertadores de rosca pequenos em aplicações em espaços reduzidos.

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 6 mm (1/4").**
- **Desligue sempre a alimentação de ar e desconecte a mangueira de alimentação de ar antes de instalar, remover ou ajustar qualquer acessório nesta ferramenta, ou antes de executar qualquer serviço de manutenção nesta ferramenta.**
- **Não use mangueiras de ar ou adaptadores danificados, gastos ou deteriorados.**
- **Certifique–se de que todas as mangueiras e adaptadores sejam do tamanho correcto e estejam apertados com firmeza. Veja o Desenho TPD905–1 para um arranjo típico de tubagem.**
- **Use sempre ar seco e limpo com pressão máxima de 90 psig. Pó, fumos corrosivos e/ou humidade excessiva. podem arruinar o motor de uma ferramenta pneumática.**
- **Não lubrifique as ferramentas com líquidos inflamáveis ou voláteis tais como querosene, diesel ou combustível de jactos.**
- **Não remova nenhum rótulo. Reponha qualquer rótulo danificado.**

USANDO A FERRAMENTA

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

AVISO

O uso de peças de substituição que não sejam genuinamente da Ingersoll–Rand podem resultar em riscos de segurança, diminuição do desempenho da ferramenta, aumento da necessidade de manutenção e pode invalidar todas as garantias. As reparações devem ser feitas somente por pessoal treinado autorizado. Consulte o Centro de Serviços da Ingersoll–Rand mais próximo.

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

Impresso nos E.U.A.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

IDENTIFICAÇÃO DO RÓTULO DE ADVERTÊNCIA

⚠ ADVERTÊNCIA

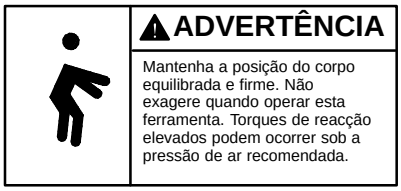
O NÃO CUMPRIMENTO DAS SEGUINTES ADVERTÊNCIAS PODE RESULTAR EM FERIMENTO.

⚠ ADVERTÊNCIA

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

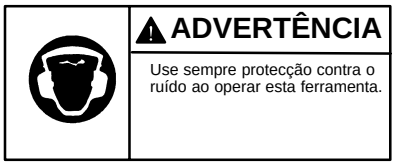
⚠ ADVERTÊNCIA

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.



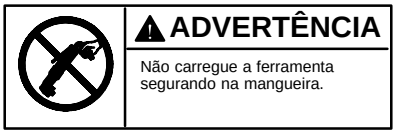
⚠ ADVERTÊNCIA

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.



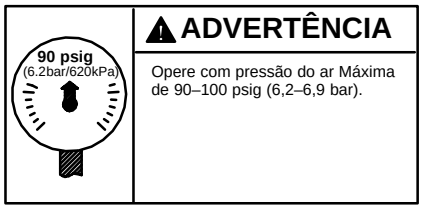
⚠ ADVERTÊNCIA

Use sempre protecção contra o ruído ao operar esta ferramenta.



⚠ ADVERTÊNCIA

Não carregue a ferramenta segurando na mangueira.

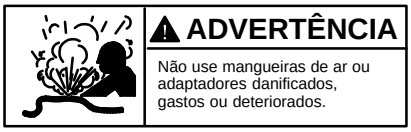


⚠ ADVERTÊNCIA

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

⚠ 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

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

AJUSTES

AJUSTE DA EMBRAIAGEM

⚠ ADVERTÊNCIA

Desligue a alimentação de ar da Ferramenta antes de prosseguir.

1. Gire a Capa de Ajuste do Furo no Corpo da Embraiagem para expor o furo de ajuste.
2. Gire o Arranjo do Fuso ou o Arranjo de Engrenagens Casadas até que um dos furos radiais na Porca de Ajuste da Embraiagem esteja visível através do furo de ajuste.
3. Insira a Chave de Ajuste No. 5C1–416 ou uma cavilha de aço endurecido de 2mm (3/32”) de diâmetro ou cilindro no furo na Porca de Ajuste para impedir que a Porca rode.

AVISO

O ajuste mais satisfatório é usualmente obtido ao utilizar a ferramenta na aplicação real e aumentado ou diminuindo o torque enviado até que o ajuste desejado seja atingido. Em qualquer situação, é recomendado que o ajuste final seja feito em progressão gradual.

4. Agarre a Ferramenta com firmeza em uma mão e rode o Suporte do Bite para transladar a Porca de Ajuste ao longo do Suporte do Bite. Ao Girar o Suporte do Bite no sentido horário mirando a frente da ferramenta a compressão na Mola da Embraiagem vai aumentar e elevar o torque o que fará com que a embraiagem se mantenha a funcionar ou desligará a Ferramenta.

POSICIONANDO A ALAVANCA REGULADORA DE PRESSÃO NOS MODELOS COM DESLIGAMENTO DA EMBRAIAGEM AUTOMÁTICO

⚠ ADVERTÊNCIA

Desligue a alimentação de ar da Ferramenta antes de prosseguir.

Para mudar a posição da Alavanca Reguladora de Pressão em relação à Válvula Reversa, proceda da seguinte maneira:

1. Segure a ferramenta nos mordentes de uma morsa revestida de couro ou cobre usando as pás no Corpo da Válvula Reguladora de Pressão.
2. Remova o Arranjo do Casquilho da Entrada e Deflector de Escape. Seja cuidadoso para não danificar o Lacre do Deflector de Escape ou o Êmbolo da Válvula Reguladora de Pressão.
3. Antes de proceder, mude a posição da ferramenta na morsa de modo que ela seja segura pelas pás do Corpo do Motor. Usando uma chave Allen de 5/64”, afrouxe os Parafusos do Tampo do Corpo da Válvula Reguladora de Pressão até que eles possam ser tirados para fora do Adaptador do Corpo da Válvula Reguladora de Pressão. Não é necessário remover os Parafusos do Corpo da Válvula Reguladora de Pressão.

4. Levante o Corpo da Válvula Reguladora de Pressão o suficiente para livrar a Cavilha de Alinhamento do Corpo da Válvula e gire o Corpo da Válvula Reguladora de Pressão para a posição desejada, certificando–se de que a ranhura no Corpo da Válvula Reguladora de Pressão esteja alinhada com a Cavilha de Alinhamento do Corpo da Válvula.

AVISO

Antes de apertar o Parafusos do Tampo do Corpo da Válvula, certifique–se de que o Lacre do Corpo da Válvula Reguladora de Pressão esteja na posição apropriada no cotovelo menor do Corpo do Motor e que o mesmo não tenha sido danificado.

5. Se for necessário recolocar ou repor o Lacre do Corpo da Válvula Reguladora de Pressão, faça um leve revestimento em ambos o Lacre e o cotovelo menor do Corpo do Motor com Graxa Ingersoll–Rand No. 28. A graxa irá segurar o Lacre na posição enquanto estiver instalando o Corpo da Válvula Reguladora de Pressão.
6. Aperte os Parafusos do Corpo da Válvula Reguladora de Pressão com um torque de 0,90 a 1,13 Nm (8 a 10 pol–lb).
7. Antes de continuar, mude a posição da ferramenta na morsa usando as pás do Corpo da Válvula Reguladora de Pressão.

AVISO

Antes de instalar o deflector de escape, certifique–se de que o lacre não tenha sido danificado e que a sua posição esteja adequada no cotovelo menor do corpo da válvula reguladora de pressão.

8. Se for necessário recolocar ou repor o Lacre do Deflector ed Escape, faça um leve revestimento em ambos o Lacre e o cotovelo menor do Corpo da Válvula Reguladora de Pressão com Massa Ingersoll–Rand No. 28. A massa irá segurar o lacre na posição emquanto estiver instalando o Lacre do Deflector de Escape.
9. Deslize cuidadosamente o Deflector de Escape na posição apropriada certificando–se de que o Deflector de Escape esteja alinhado com a Cavilha de Alinhamento do Deflector de Escape.
10. Segure o Deflector de Escape firmemente na posição enquanto estiver instalando o Arranjo de Rolamentos da Entrada. Aperte com um torque de 20 Nm (15 ft–lb). O Rolamento da Entrada deve estar grampeando com firmeza o Deflector de Escape.

COLOCANDO A FERRAMENTA EM FUNCIONAMENTO

LUBRIFICAÇÃO

Ingersoll–Rand No. 10

Ingersoll–Rand No. 67
Ingersoll–Rand No. 28

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

Para 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 a 3 cc de Óleo Ingersoll–Rand No. 10 na entrada de ar.

Depois de cada 40 000 ciclos ou um mês, ou como a experiência indicar, lubrifique os componentes da seguinte maneira:

Cabeçote em Ângulo

Injecte de 2 a 4 cc de Massa Lubrificadora Ingersoll–Rand No. 67 no Adaptador de Massa Lubrificadora no Acoplamento em Ângulo.

Engrenagens

Remova o Arranjo de Embraiagem Ajustável da Caixa de Engrenagens. Para os modelos com Desligamento Automático remova o Cilindro de Impulso. Injecte de 2 a 4 cc de Massa Lubrificadora Ingersoll–Rand No. 67 para a **razão L;** de 4 a 6 cc para as **razões M, N, O ou Q,** através do furo hexagonal central no Fuso.

Embraiagem Coxim

Separe o Arranjo do Corpo da Embraiagem da Caixa de Engrenagens. Remova o Arranjo de Comando da Embraiagem e o Comando do Pinhão do Arranjo do Corpo da Embraiagem. Usando Massa Lubrificadora Ingersoll–Rand No. 67, faça um revestimento no diâmetro do hex do Comando do Pinhão e a porção do Comando do Pinhão que se ajusta no Rolamento do Corpo da Embraiagem. Trabalhando sobre o Comando da Embraiagem, injecte cerca de 2 cc de massa lubrificadora para lubrificar o Rolamento de Impulso e Esferas da Embraiagem.

Embraiagem de corte automático

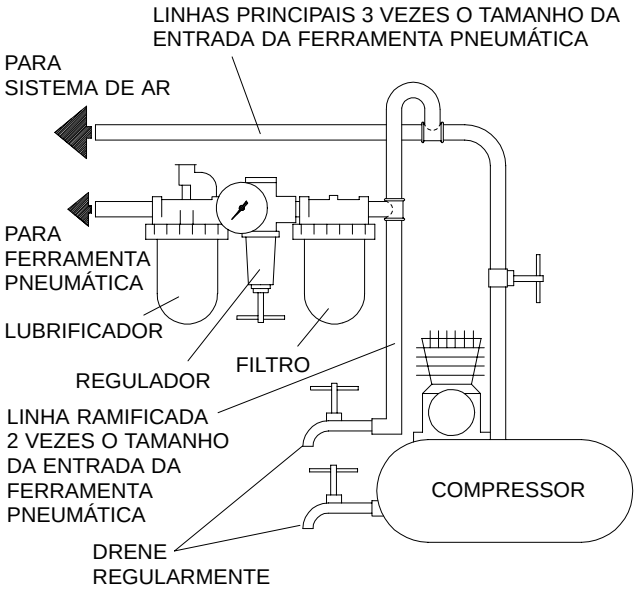
Separe o aranjo corpo da embraiagem da caixa de engrenagens.

AVISO

Faça uma marca ou tome nota da localização (ajuste) da porca de ajuste da embraiagem.

Alivie a tensão na mola da embraiagem ao girar a porca de ajuste ate a mesma encostar a traseira daparagem do assento da mola. Puxe o assento das esferas da embraiagem para baixo contra a mola da embraiagem e aplique um povco de massa lubrificadora Ingersoll–Rand no.67 ao redor das esferas do came da embraiagem, o came, o assento das esferas da embraiagem e os rolamentos de impulso. Remova o anel de retanção da esfera. Aplique um pouco de massa lubrificadora no furo feito ao se remover uma esfera do rolamento do comando do pinhão.

Ajuste a porca de ajuste da embraiagem para o seu ajuste original e monte a ferramenta.

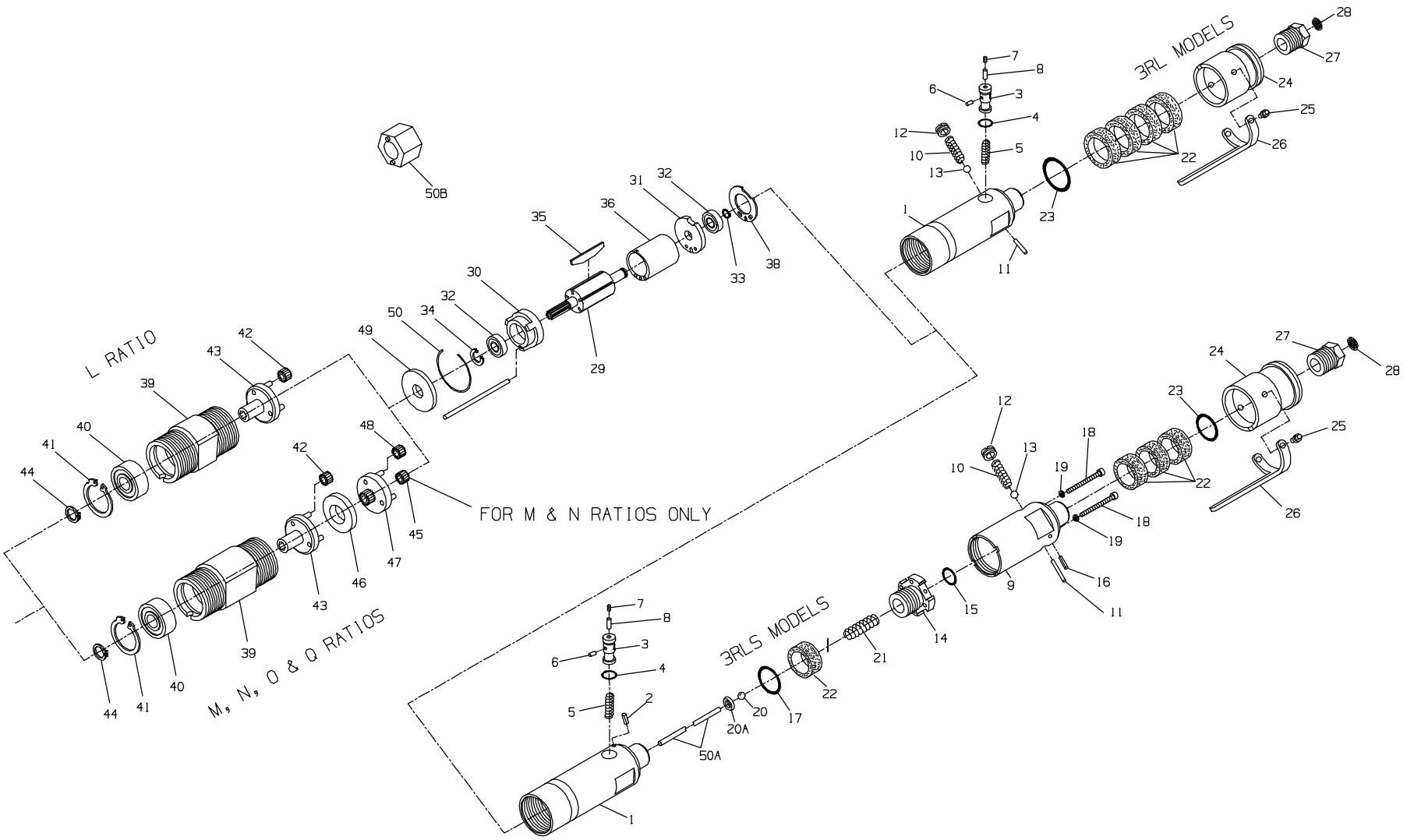


(Desenho TPD905–1)

ESPECIFICAÇÕES

Modelo	Equipamento de Torque	Intervalo de Torque (Apertos Ligeiros)	Velocidade Livre	Encabadouro Quadrado
		90 psi Nm (pés–lb)	rpm	pol.
3RLL2S3	corte automático	0,6–2,2 (5,0–19,0)	1.800	1/4
3RLM2S3	corte automático	0,4–3,4 (3,5–30,0)	1.100	1/4
3RLN2S3	corte automático	0,2–5,3 (2,0–46,0)	700	1/4
3RLO2S3	corte automático	0,2–6,8 (2,0–60,0)	500	1/4
3RLL2C3	coxim	0,6–2,2 (5,0–19,0)	1.800	1/4
3RLM2C3	coxim	0,4–3,4 (3,5–30,0)	1.100	1/4
3RLN2C3	coxim	0,2–5,2 (2,0–46,0)	700	1/4
3RLL2S5	corte automático	0,6–2,2 (5,0–19,0)	1.800	1/4
3RLM2S5	corte automático	0,4–3,4 (3,5–30,0)	1.100	1/4
3RLQ1S5	corte automático	0,8–5,1 (7,0–45,0)	500	1/4
3RLN2S5	corte automático	0,8–5,1 (2,0–46,0)	700	1/4
3RLO2S5	corte automático	0,2–6,8 (2,0–60,0)	500	1/4
3RLL2C5	desligamento	0,6–2,0 (5,0–19,0)	1.800	1/4
3RLM2C5	desligamento	0,4–3,4 (3,5–30,0)	1.100	1/4
3RLN2C5	desligamento	0,2–5,2 (2,0–46,0)	700	1/4
3RLL2D5	stall	2,3 (20)	1.800	1/4
3RLM2D5	stall	3,5 (31)	1.100	1/4
3RLN2D5	stall	5,4 (48)	700	1/4

MOTOR AND GEARING



(Dwg. TPA1233–3)

		PART NUMBER FOR ORDERING
	Motor Housing Assembly	
	for models ending in 2C3 or 2C5	3RL–AL40
	for models ending in 2C3–EU or 2C5–EU	3RL–EU–AL40
	for models ending in 2D5	3RL–A40
	for models ending in 2D5–EU	3RL–EU–A40
	for models ending in 1S5–EU 2S3–EU or 2S5–EU	3RLS–A40
	for models ending in 1S5, 2S3 or 2S5	3RLS–EU–A40
1	Motor Housing	
	for models ending in 2C3, 2C5 or 2D5	3RL–B40
	for models ending in 2C3–EU, 2C5–EU or 2D5–EU	3RLS–EU–B40
	for models ending in 1S5 2S3 or 2S5–EU	3RLS–B40
	for models ending in 1S5–EU, 2S3–EU or 2S5–EU	3RLS–EU–B40
*	Warning Label	
	for models ending in EU	EU–99
	for all other models	WARNING–7–99
2	Valve Housing Alignment Pin (for models ending in 1S5, 2S3 or 2S5)	3RL–15
3	Reverse Valve	3RL–329
4	Reverse Valve Seal	WFS182–307
• 5	Reverse Valve Spring	SPA102R–515
• 6	Valve Lock Pin	SPA102R–667
• 7	Retainer Setscrew	SPA102R–669
• 8	Lock Pin Retainer	3RL–668
9	Throttle Valve Housing (for models ending in 1S5, 2S3 or 2S5)	3RL–503
♦ • 10	Throttle Valve Spring	3RL–51
11	Throttle Valve Plunger	3RL–302
12	Throttle Valve Cap	3RL–266

		PART NUMBER FOR ORDERING
13	Throttle Valve Ball	4U–722
14	Throttle Valve Housing Adapter (for models ending in 1S5, 2S3 or 2S5)	3RL–502
• 15	Throttle Valve Housing Adapter Seal (for models ending in 1S5, 2S3 or 2S5)	PS3–67
16	Exhaust Deflector Alignment Pin (for models ending in 1S5, 2S3 or 2S5)	3RL–15
♦ 17	Throttle Valve Housing Seal (for models ending in 1S5, 2S3 or 2S5)	3RL–210
18	Throttle Valve Housing Cap Screw (4) (for models ending in 1S5, 2S3 or 2S5)	3RL–510
19	Throttle Valve Housing Cap Screw Lock Washer (4) (for models ending in 1S5, 2S3 or 2S5)	3RL–511
20	Throttle Ball (for models ending in 1S5, 2S3 or 2S5)	8U–722
20A	Throttle Ball Seat (for models ending in 1S5, 2S3 or 2S5)	3RP–303
♦ 21	Throttle Ball Spring (for models ending in 1S5, 2S3 or 2S5)	3RP–51
♦ • 22	Muffler Element (4)	3RL–311
• 23	Exhaust Deflector Seal	3RL–210
	Exhaust Deflector Assembly	
	for models ending in 2C3 or 2C5	3RL–AL23
	for models ending in 1S5, 2D5, 2S3 or 2S5	3RL–A23
24	Exhaust Deflector	3RL–23
25	Throttle Lever Pin (2)	3RL–120
26	Throttle Lever	
	for models ending in 2C3 or 2C5	3RL–L273
	for models ending in 1S5, 2D5, 2S3 or 2S5	3RL–273
• 27	Inlet Bushing Assembly	3RL–A465
♦ 28	Inlet Screen	3RL–61

* 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.

♦ Indicates Tune–up Kit part.

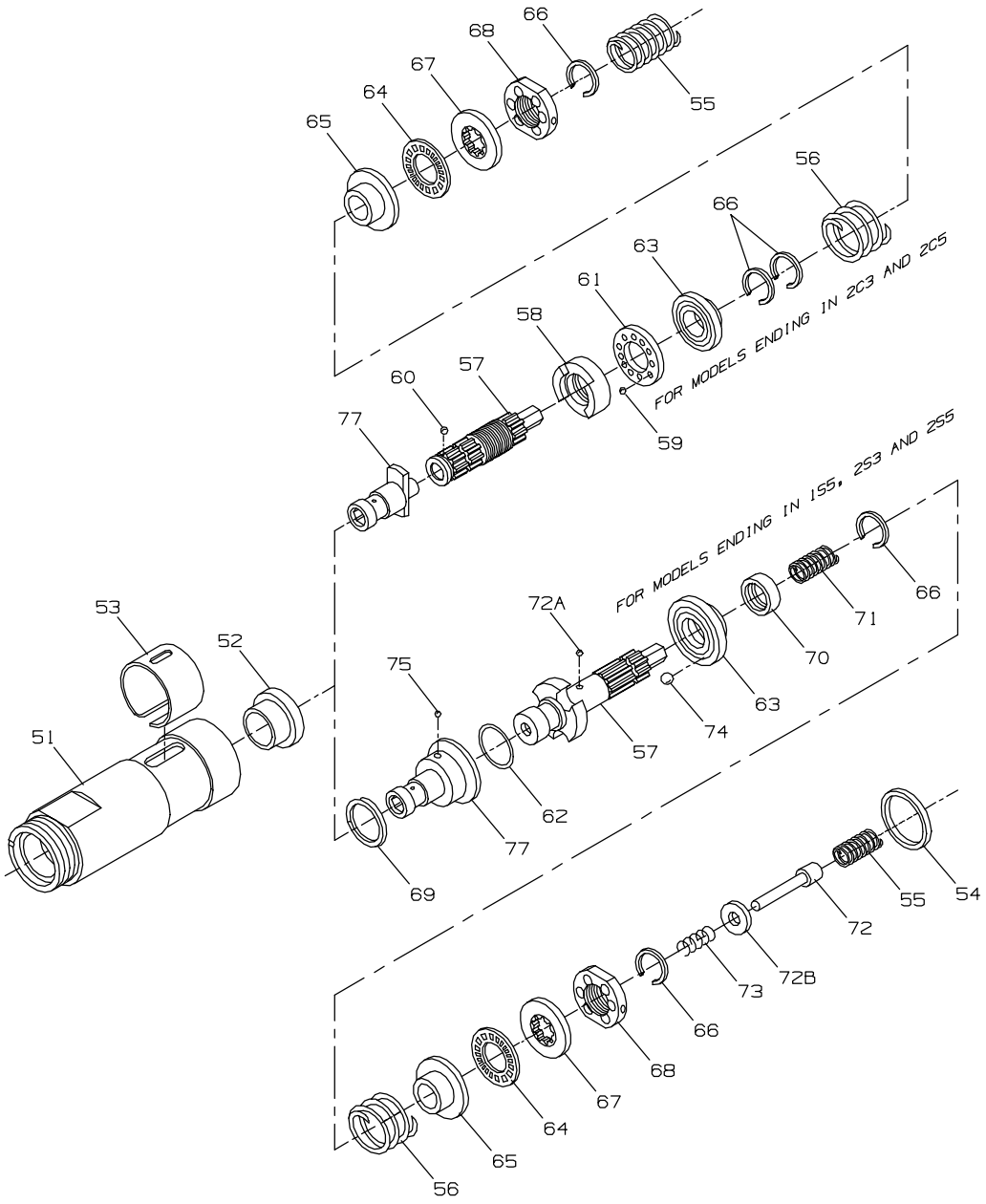
			PART NUMBER FOR ORDERING				PART NUMBER FOR ORDERING
	29	Rotor		44	Spindle Retaining Ring		3RL–6
		for models ending in 2C3,		45	Rotor Pinion (for M and N ratios)		3RLM–17
		2C5 or 2D5	3RL–53	46	Gear Head Spacer (for M, N, O and Q ratios)		3RL–80
		for models ending in 1S5,		47	Gear Head		
		2S3 or 2S5	3RP–53		for M ratio		3RLM–216
	30	Front End Plate	3RL–11		for N ratio		3RLN–216
	31	Rear End Plate	3RL–12		for O ratio		M002–216–028
♦	32	Rotor Bearing (2)	DG10–22		for Q ratio		3RLQ–216
♦	33	Rear Rotor Bearing Retainer	8SL–305	48	Gear Head Planet Gear		
♦	34	Front Rotor Bearing Retainer	3RL–13		for M and N ratios (14 teeth) (3)		3RLM–10
♦ •	35	Vane Packet (set of 5 Vanes)	3RL–42–5		for O and Q ratios (19 teeth) (3)		3RLL–10
	36	Cylinder	3RL–3	49	Motor Clamp Washer		3RL–207
	37	Cylinder Dowel	3RL–98	50	Clamp Washer Retaining Ring		3RL–208
♦ •	38	Rear End Plate Gasket	3RL–739	50A	Push Rod		3RP–435
	39	Gear Case Assembly		50B	Housing Cap Wrench		141A12–26
		for L ratio	3RLL–A37	*	Suspension Bail		7L–365
		for M, N, O and Q ratios	3RLM–A37	*	Hanger		3RA–365
	40	Spindle Bearing	R00A–510	*	Exhaust Hose		3RL–284
	41	Spindle Bearing Retainer	3RL–28	*	Tune–up Kit (includes illustrated parts 10, 17, 21, 22, 28, 32 [2], 33, 34, 35 and 38)		3RL–TK2
	42	Spindle Planet Gear		*	Inlet (1/4" NPT) (for 3RL and 3RP)		3RL–565
		for L ratio (19 teeth) (3)	3RLL–10	*	Retainer		500B–815AX
		for M and O ratios (14 teeth) (3)	3RLM–10				
		for N and Q ratios (17 teeth) (3)	3RLN–10				
	43	Spindle					
		for L ratio	3RLL–108				
		for M and O ratios	3RLM–108				
		for N and Q ratios	3RLN–108				

* 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.

♦ Indicates Tune–up Kit part.

SERIES 3RL AND 3RLS CLUTCHES



(Dwg. TPA951–4)

PART NUMBER FOR ORDERING

		For Models Ending in 2C3 or 2C5	For Models Ending in 1S5, 2S3 or 2S5
	Adjustable Cushion Clutch Assembly	3RL2C–A580	———
	Adjustable Shutoff Clutch Assembly		
	for models ending in 1S5	———	3RL2S–AH580
	for models ending in 2S3 or 2S5	———	3RL2S–A580
51	Clutch Housing Assembly	3RL2C–B580	3RL2C–B580
52	Clutch Housing Bushing	3D1–781	3D1–781

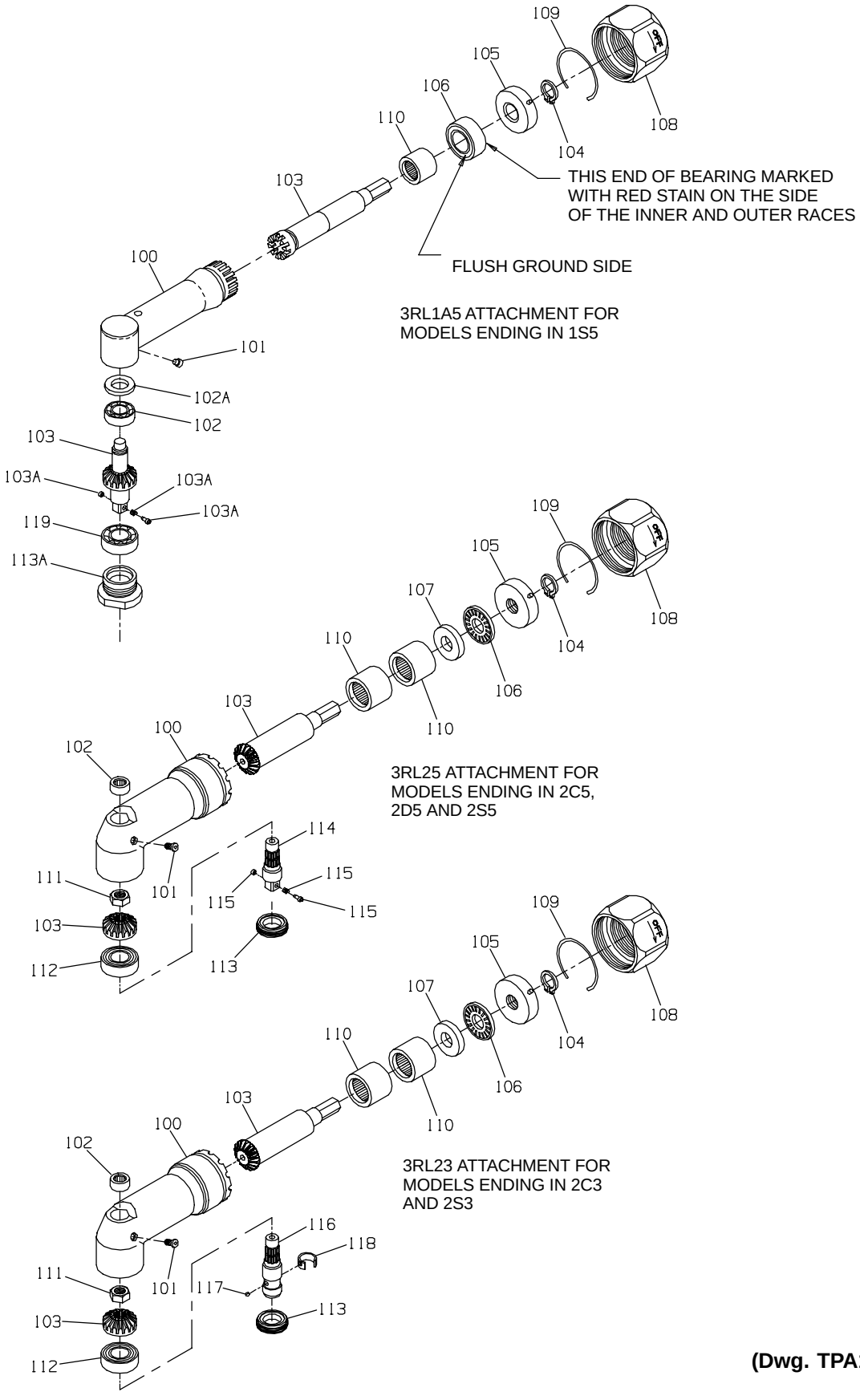
PART NUMBER FOR ORDERING

			For Models Ending in 2C3 or 2C5	For Models Ending in 1S5, 2S3 or 2S5
	53	Adjusting Hole Cover	3S3–415	3S3–415
	54	Clutch Housing Spacer	———	3RL–504
•	55	Clutch Return Spring	3S3–405	3S3–405
		Clutch Driver Assembly		
		with light Clutch Spring	3C1–A581	3RL2S–A581
		with heavy Clutch Spring (standard for models ending in 1S5 only)	———	3RL2S–AH581
	56	Clutch Spring		
		Light (Black)	3S3–L583	3S3–L583
		Medium (Yellow)	3S3–M583	3S3–M583
		Heavy (Green)	3S3–H583	3S3–H583
⊕	57	Clutch Driver	3C1–581	3S3–581
	58	Clutch Jaw	3C1–589	———
•	59	Clutch Ball (11) (.125” diameter)	AV1–255	———
•	60	Jaw Bearing Ball (10) (.125” diameter)	AV1–255	———
	61	Clutch Ball Spacer	3C1–401	———
	62	Clutch Driver Seal	———	R0BR1C–283
	63	Clutch Ball Seat	3C1–627	3S3–627
	64	Thrust Bearing	161A32–105	161A32–105
	65	Clutch Spring Seat	3C1–623	3C1–623
•	66	Spring Seat Stop (3 for models ending in 2C3 or 2C5; 2 for models ending in 1S5, 2S3 or 2S5)	3S3–701	3S3–701
	67	Adjusting Nut Lock	3S3–588	3S3–588
	68	Adjusting Nut	3S3–582	3S3–582
	69	Ball Retaining Ring	———	3S3–625
	70	Shutoff Collar	———	3S3–402
	71	Collar Return Spring	———	3S3–407
⊕	72	Shutoff Plunger	———	3S3–408
	72A	Shutoff Plunger Ball (4) (3/32” diameter)	———	R000B–263
	72B	Spacer Packet (set of 5 Spacers)	———	3RL–665–5
⊕	73	Plunger Return Spring	———	3S3–420
	74	Clutch Cam Ball (3) (1/4” diameter)	———	4U–722
•	75	Bevel Pinion Driver Bearing Ball (10) (1/8” diameter)	———	AV1–255
	77	Bevel Pinion Driver	3C3–586	3S3–586
	78	Push Rod	———	3RP–435
	*	Clutch Adjusting Key	5C1–416	5C1–416

* Not illustrated.

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

⊕ When replacing any of these parts, it is necessary to order Spacer Packet (72B) Part Number 3RL–665–5.



(Dwg. TPA1285–1)

PART NUMBER FOR ORDERING

		For Models Ending in 1S5	For Models Ending in 2C3 or 2S3	For Models Ending in 2C5, 2D5 or 2S5
	Angle Attachment	3RL1A5	3RL23	3RL25
100	Angle Housing Assembly	3RL1A–A550	3RL2–A550	3RL2–A550
101	Grease Fitting	D0F9–879	D0F9–879	D0F9–879
102	Spindle Upper Bearing	———	120A4–603	120A4–603
102	Upper Spindle Bearing	7L1A–603	———	———
102A	Shim Packet	7L1A–P448	———	———
103	Matched Gear Set (Bevel Gear and Pinion not sold separately)	3RL1A5–A591	3RL2–A552	3RL2–A552
103A	Socket Retainer Assembly (consists of Plunger, Spring and Washer)	500B–816A	———	———
104	Thrust Bearing Retainer	3RL2–705	3RL2–705	3RL2–705
105	Rear Thrust Bearing Seat	3RL1A–682	3RL2–682	3RL2–682
106	Bevel Pinion Thrust Bearing	3RL1A–514	3RL2–105	3RL2–105
107	Front Thrust Bearing Seat	———	3RL2–683	3RL2–683
108	Coupling Nut	3RL2–27	3RL2–27	3RL2–27
109	Coupling Nut Retainer	3RL2–29	3RL2–29	3RL2–29
110	Bevel Pinion Bearing (2 for 3RL23 and 3RL25; 1 for 3RL1A5)	7AH–24	H54U–511B	H54U–511B
111	Bevel Gear Retainer Nut	———	120A4–578	120A4–578
112	Lower Spindle Bearing	———	120A4–593	120A4–593
113	Angle Housing Cap	———	120A4–531	120A4–531
113A	Angle Housing Cap	7L1A–531	———	———
114	1/4” Square Drive Spindle Assembly	———	———	141A9–A607–1/4
• 115	Socket Retainer (consists of Plunger, Spring and Washer)	———	———	500B–816A
116	1/4” Hex Bit Holder Spindle Assembly (for standard bits)	———	5L2C3–B586	———
117	Bit Retaining Ball (0.125” diameter)	———	AV1–255	———
118	Bit Retaining Spring	———	102A60–241	———
119	Spindle Bearing	7L1A–593	———	———

* 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.

EQUIPMENT AVAILABLE AT EXTRA COST

		PART NUMBER FOR ORDERING
	Spindle Assembly	
114	1/4” square drive	141A9–A607–1/4
*	3/8” square drive	141A12–A607
*	1/4” hex recess (for insert bits)	5L2C4–B386
115	Socket Retainer (consists of Plunger, Spring and Washer for No. 141A9–A607–1/4 Spindle)	500B–816A
*	Socket Retaining Plunger (for No. 141A12–A607 Spindle)	5020–716
*	Socket Retaining Plunger Spring (for No. 141A12–A607 Spindle)	401–718
*	Bit Retainer (for No. 5L2C4–B386 Spindle)	5L2C4–425
116	1/4” hex recess (for standard bits)	5L2C3–B586
*	3/8–24 Thread Drill Chuck Spindle (requires 7L2A4–531 Angle Housing Cap)	7L2A4–791
117	Bit Retaining Ball (0.125” diameter for 5L2C3–B586 Spindle)	AV1–255
118	Bit Retaining Spring (for 5L2C3–B586 Spindle)	102A60–241
*	Angle Housing Cap (for use only with the 7L2A4–791 Spindle)	7L2A4–531

* Not illustrated.

CLUTCH SPRING SELECTION CHART
TORQUE RANGE (Soft Draw)

MODEL	Light Clutch Spring (Black)	Medium Clutch Spring (Yellow)	Heavy Clutch Spring (Green)
3RLL2C3, 3RLL2S3, 3RLL2C5 and 3RLL2S5	5 to 19 in–lb (0.6 to 2.1 Nm)	——— ———	——— ———
3RLM2C3, 3RLM2S3, 3RLM2C5 and 3RLM2S5	3.5 to 23 in–lb (0.4 to 2.6 Nm)	4.5 to 30 in–lb (0.5 to 3.4 Nm)	——— ———
3RLN2C3, 3RLN2S3, 3RLN2C5 and 3RLN2S5	2 to 23 in–lb (0.2 to 2.6 Nm)	3.5 to 34 in–lb (0.4 to 3.8 Nm)	7 to 46 in–lb (0.8 to 5.2 Nm)
3RLO2S3 and 3RLO2S5	3.5 to 23 in–lb (0.4 to 2.6 Nm)	3.5 to 34 in–lb (0.4 to 3.8 Nm)	7 to 60 in–lb (0.8 to 6.8 Nm)

MAINTENANCE SECTION

⚠ 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 3RL–Angle Screwdrivers and Wrenches are disassembled for maintenance, repair or replacement of parts, lubricate the tool as follows:

1. Inject 2 to 4 cc of Ingersoll–Rand No. 67 Grease into the Angle Head Grease Fitting.
2. Use 4 to 6 cc of Ingersoll–Rand No. 67 Grease in the **L Ratio** gear trains.
   Use 4 to 6 cc of Ingersoll–Rand No. 67 Grease in the **M, N, O and Q Ratio** gear trains.
3. Use Ingersoll–Rand No. 67 Grease to lightly coat the hex bore of the Bevel Pinion Driver and the portion of the Bevel Pinion Driver that fits into the Clutch Housing Bushing. Inject approximately 2 cc of Ingersoll–Rand No. 67 Grease into the Thrust Bearings and the Clutch Balls.
4. Work some Ingersoll–Rand No. 67 Grease around the Clutch Cam Balls, the cam, Clutch Ball Seat, and the Thrust Bearings. Remove the Ball Retaining Ring. Work some grease into the hole made by removing one of the Bevel Pinion Bearing Balls.
5. Inject approximately 2 to 3 cc of Ingersoll–Rand No. 10 Oil into the air inlet before attaching the air hose.

DISASSEMBLY

General Instructions

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

Disassembly of the Tool

1. Each Series 3RL Angle Screwdriver and Series 3RL Angle Wrench with model number ending in C3, S3, C5 or S5 is comprised of four modules – a motor housing and motor module, a gear module, an adjustable clutch module (cushion or shutoff) and an angle attachment. Each Series 3RL Angle Wrench with model number ending in D5 (direct drive) is comprised of three modules – a motor housing and motor module, a gear module and an angle attachment. These tools can be disassembled for repairs to each module without disturbing the other modules.
2. Clamp the Clutch Housing Assembly (51) in leather–covered or copper–covered vise jaws.

NOTICE

The Coupling Nut (108) has left–hand threads.

3. Unscrew the Coupling Nut from the Clutch Housing Assembly and lift off the entire angle attachment.

NOTICE

The Adjustable Clutch Assembly has left–hand threads.

4. Unscrew and remove the Adjustable Clutch Assembly from the Gear Case (39). For models with Automatic Shutoff, remove the Push Rod (78).

NOTICE

The Gear Case has left–hand threads.

5. Unscrew and remove the Gear Case from the Motor Housing (1).

Disassembly of the Angle Attachment

For 3RL23 and 3RL25 Angle Attachments

NOTICE

The Angle Housing Cap (113) has left–hand threads.

1. Using the 141A12–26 Housing Cap Wrench, unscrew the Angle Housing Cap.
2. Withdraw the Spindle Assembly (114 or 116) from the Angle Housing Assembly (100).

NOTICE

If more than one angle head is disassembled at a time, take care not to mix the Matched Gear Sets (103) from different Angle Attachments. These gear sets are specially matched and are available only as matched sets.

3. Inspect the Lower Spindle Bearing (112) for looseness or roughness. If either of these conditions exists, remove the Bearing as follows:
   a. Insert a 1/4" Allen Wrench in the Bit Holder Spindle Assembly (116) or grasp the square drive or threaded end of the other Spindle Assembly in leather–covered or copper–covered vise jaws and unscrew the Bevel Gear Retainer Nut (111).
   b. Lift off the Bevel Gear (103) from the Spindle.
   c. Press the Spindle from the Lower Spindle Bearing.

NOTICE

Do not remove the Socket Retainer (115) unless you have a new retainer ready to install. The retainer is destroyed during removal.

4. **For 3RL25 Angle Attachment,** grasp the Spindle in leather–covered or copper–covered vise jaws and using a 1/16" (1.59 mm) punch, drive out the Socket Retainer from the Washer on non–working side of the square on the Spindle.

NOTICE

Do not remove the Upper Spindle Bearing (102) unless you have a new bearing ready to install. This type of bearing is always damaged during removal.

5. If the Upper Spindle Bearing appears rough or loose, press it from the Angle Head.
6. Using snap ring pliers, remove the Thrust Bearing Retainer (104) and slide off the Rear Thrust Bearing Seat (105), and Bevel Pinion Thrust Bearing (106) from the Pinion (103) shaft.

NOTICE

Do not remove the pinion shaft and Bevel Pinion Bearings (110) unless you have two new bearings on hand.

7. Grasp the hex of the pinion shaft in leather–covered or copper–covered vise jaws and tap the rear face of the Angle Housing Assembly with a soft hammer to pull the Bevel Pinion Bearings from the Housing. After the Angle Attachment is disassembled, check all parts for damage or wear. If the gear teeth on either piece of the Matched Gear Set are worn or chipped, replace both parts. They are furnished in a matched set and must be replaced with a matched set.
8. Using a hooked tool, reach inside the Coupling Nut (108) and pull the Coupling Nut Retainer (109) from the Nut. Slide the Coupling Nut and Retainer off the motor end of the Angle Attachment.

For 3RL1A5 Angle Attachment

NOTICE

The Angle Housing Cap (113A) has left–hand threads.

1. Unscrew Angle Housing Cap.

NOTICE

If more than one Angle Head is disassembled at a time, take care not to mix the Matched Bevel Gear Sets (103) from different Angle Attachments. These gear sets are specially matched and are available only as matched sets.

2. Withdraw Spindle (103) and remove Shims (102A) from Angle Housing.
3. Remove Spindle Bearing (119).

NOTICE

Do not remove the Socket Retainer Assembly (103A) unless you have a new Socket Retainer ready to install. The retainer is destroyed during removal.

4. Put the Spindle in leather–covered or copper–covered vise jaws and using a 1/16" (1.59 mm) punch against the Washer, drive out the Socket Retainer Assembly.
5. If the Upper Spindle Bearing (102) appears rough or loose, press it from the Spindle.
6. Using snap ring pliers, remove the Thrust Bearing Retainer (104) and slide off the Rear Thrust Bearing Seat Assembly (105) and Bevel Pinion Thrust Bearing (106).

NOTICE

Do not remove the bevel pinion shaft and Bevel Pinion Bearings unless you have a new Bearing on hand.

7. Grasp the hex of the bevel pinion shaft in leather–covered or copper–covered vise jaws and tap the rear face of the Angle Housing with a soft hammer to pull the Bevel Pinion Bearing (110). After the Angle Attachment is disassembled, check all parts for damage or wear. If the gear teeth on either piece of the Matched Bevel Gear Set are worn or chipped, replace both parts. They are furnished in a matched set and must be replaced with a matched set.
8. Using a hooked tool, reach inside the Coupling Nut (108) and pull the Coupling Nut Retainer (109) from the Nut. Slide the Coupling Nut and Retainer off the motor end of the Angle Attachment.

Disassembly of the Adjustable Cushion Clutch and Adjustable Shutoff Clutch

1. Withdraw the Clutch Driver Assembly and the Bevel Pinion Driver (77) from the Clutch Housing Assembly (51).
2. Grasping the Clutch Return Spring (55) near the Spring Seat Stop (66) to avoid elongating the Spring, pull the Clutch Return Spring from the Clutch Driver (57).
3. **For Models ending in 1S5, 2S3 or 2S5**, remove the Shutoff Plunger (72). Using a hooked tool to reach into the end of the Clutch Driver, hook the Plunger Return Spring (73) and pull it from the Driver.
4. Using a thin blade screwdriver, pry the Spring Seat Stop off the Clutch Driver.
5. Clamping on the hex end of the Clutch Driver, place the Clutch Driver vertically in leather–covered or copper–covered vise jaws and unscrew the Adjusting Nut (68) with an adjustable wrench. A bumping effect, caused by the Adjusting Nut engaging and disengaging the Adjusting Nut Lock (67), may be felt while loosening the Nut.
6. Remove the Clutch Driver from the vise and remove the Adjusting Nut, Adjusting Nut Lock, Thrust Bearing (64), Clutch Spring Seat (65), and Clutch Spring (56) from the Clutch Driver.
7. **For Models ending in 2C3 and 2C5,** using a thin blade screwdriver, pry the remaining two Spring Seat Stops (66) off the Clutch Driver.

NOTICE

Place a container under the assembly before removing the retainer nearest the Clutch Ball Seat (63). Removal of this retainer permits the Clutch Ball Seat, Clutch Ball Spacer (61), and Clutch Jaw (58) to move rearward for removal and allows the eleven Clutch Balls (59) and ten Jaw Bearing Balls (60) to fall from the assembly.

For Models ending in 1S3, 2S3 and 2S5, using a thin blade screwdriver, pry the remaining Spring Seat Stop (66) from the Clutch Driver.

NOTICE

Place a container under the assembly before removing the Spring Seat Stop. Removal of this retainer allows the three Clutch Cam Balls (74) to fall from the assembly.

Slide the Collar Return Spring (71), Shutoff Collar (70) and Clutch Ball Seat (63) off the Clutch Driver. Using a thin blade screwdriver, carefully pry off the Ball Retaining Ring (69). Dump the ten Bevel Pinion Driver Bearing Balls (75) in a container. Remove the Bevel Pinion Driver (77) from the Clutch Driver. Remove the Clutch Driver Seal (62) from the groove at the front end of the Clutch Driver.

8. If the Clutch Housing Bushing (52) is worn, press it from the Clutch Housing Assembly.

Disassembly of the Gearing

1. Using a thin blade screwdriver, work the Clamp Washer Retaining Ring (50) from the groove in the Gear Case Assembly (39) and withdraw the Motor Clamp Washer (49).
2. **For M, N, O and Q ratios,** tap the motor end of the Gear Case Assembly against the top of the workbench to remove the Gear Head (47), Gear Head Planet Gears (48), Pinion (45) (for M and N ratios) and Gear Head Spacer (46).
3. Using a pair of snap ring pliers, remove the Spindle Retaining Ring (44) from the groove in the front of the Spindle (43).
4. Lightly tap or press the Spindle and Spindle Planet Gears (42) from the Gear Case Assembly.
5. Using a pair of snap ring pliers, remove the Spindle Bearing Retainer (41) from the groove in the front of the Gear Case.
6. Using a sleeve that contacts the outer ring of the bearing, press the Spindle Bearing (40) from the front of the Gear Case.

Disassembly of the Motor

1. Grasp the splined end of the Rotor (29) and pull the motor from the Motor Housing (1).
2. Withdraw the Rear End Plate Gasket (38) from the bottom of the housing bore.
3. While grasping the Cylinder (36) in one hand, lightly tap on the splined end of the Rotor to drive the Rotor from the bore of the Front Rotor Bearing (32), thus freeing the Front End Plate (30) and Bearing.
4. Using snap ring pliers, remove the Front Rotor Bearing Retainer (34) and pull the Front Rotor Bearing from the Front End Plate.
5. Slide the Cylinder off the Rotor, and withdraw the Vanes (35) from the vane slots.
6. Remove the Rear Rotor Bearing Retainer (33) from the groove in the hub of the Rotor.
7. Support the Rear End Plate (31) as close to the rotor body as possible, and press the Rotor from the Rear Rotor Bearing.

Disassembly of the Motor Housing

1. Using a 1/16” hex wrench, remove the Retainer Set screw (7) from the Reverse Valve (3).
2. With the Reverse Valve facing downward, lightly tap the Motor Housing (1) on the workbench until the Lock Pin Retainer (8) falls out of the Reverse Valve.

3. While holding the Motor Housing horizontally with the Throttle Lever (26) downward, press the Reverse Valve slightly until the Valve Lock Pin (6) drops into the opening vacated by the Lock Pin Retainer. You may have to tap the Motor Housing lightly to jar the Lock Pin free.
4. Remove the Reverse Valve, Reverse Valve Seal (4), Reverse Valve Spring (5) and Valve Lock Pin from the Motor Housing.

⚠ WARNING

The Throttle Valve Cap (12) is under pressure from the Throttle Valve Spring (10). Care must be exercised when removing the Throttle Valve Cap.

5. Remove the Throttle Valve Cap, Throttle Valve Spring, Throttle Valve Ball (13) and Throttle Valve Plunger (11) from the Motor Housing and from the Throttle Valve Housing (9) on 3RLS Models.
6. Remove the Inlet Bushing Assembly (27) and pull the Exhaust Deflector (24) from the Motor Housing on Model 3RL and from the Throttle Valve Housing (9) on Model 3RLS.
7. If the Inlet Screen (28) requires replacement, use the eraser end of a wooden pencil to push the Inlet Screen from the Inlet Bushing Assembly.
8. The Throttle Lever is attached to the Exhaust Deflector with two Throttle Lever Pins (25) which are two–piece rivets. Lightly grasping the Deflector in leather–covered or copper–covered vise jaws, drive the pin in the center of the rivet inward with a pin punch until it is free of the rivet. Repeat the procedure on the other rivet. Squeeze the ends of the rivets together and pry them from the Deflector with a screwdriver or pull them with pliers.
9. Work the Muffler Elements (22) out of the Exhaust Deflector.
10. **For Model 3RL5,** using a 5/64" hex wrench, loosen and remove the Throttle Valve Housing Cap Screws (18) and Lock Washers (19). Remove the Throttle Valve Housing and the Throttle Valve Housing Seal (17) from the Motor Housing.
    a. Remove the Throttle Valve Housing Adapter Seal (15) from the Throttle Valve Housing Adapter (14).
    b. Unscrew and remove the Throttle Valve Housing Adapter, Throttle Ball Spring (21), Throttle Ball (20), Throttle Ball Seat (20A) and Muffler Element (22).

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. Whenever grasping a tool or part in a vise, always use leather–covered or copper–covered vise jaws. Take extra care with threaded parts and housings.
5. Always clean every part and wipe every part with a thin film of oil before installation.
6. Apply a film of O–ring lubricant to all O–rings before final assembly.

Assembly of the Motor Housing

For Model 3RLS

1. Place the Throttle Valve Housing Seal (17) on the smaller shoulder of the Motor Housing (1). To hold seal in position, lightly coat both the Seal and shoulder with Ingersoll–Rand No. 28 Grease. Install the Throttle Ball (20) Throttle Ball Seat (20A) and Throttle Ball Spring (21).
2. Place one new Muffler Element (22) on the threaded side of the Throttle Valve Housing Adapter (14) and thread the Adapter into the Motor Housing until adapter flange contacts the Housing. Center notch or depression on Adapter with Housing alignment pin by backing out Adapter 1/4 turn maximum, if necessary.
3. Place Throttle Valve Housing Adapter Seal (15) on Adapter.
4. Place Throttle Valve Housing over Adapter and on rear of Motor Housing, making sure that the notch in the Throttle Valve Housing is aligned with the alignment pin on the Motor Housing.
5. Secure the Throttle Valve Housing with the Throttle Valve Housing Cap Screws (18) and Lock Washers (19). Tighten Cap Screws to 8 to 10 in–lb (0.904 to 1.130 Nm) torque. If the Cap Screws cannot be started into the Adapter, then the Adapter is not in proper alignment. Refer to Step 2.

For All Models

6. Work new Muffler Elements (22) (four for Model 3RL and three for Model 3RLS) into the Exhaust Deflector (24) to a point beyond the two throttle lever pin holes.

NOTICE

Do not apply a force strong enough to distort the Exhaust Deflector.

7. Position the Throttle Lever (26) on the Exhaust Deflector with the Lever covering the timing notch at the front end of the Deflector. Insert the two Throttle Lever Pins (25) through the Lever and into the Exhaust Deflector. Using pliers, press the pins in the center of the Throttle Lever Pins flush with the head.
8. Center a new Inlet Screen (28) over the air line end of the Inlet Bushing Assembly (27) and, using the eraser end of a wooden pencil, push the Screen into the Bushing until it bottoms on the internal shoulder.
9. Place the Exhaust Deflector Seal (23) on the smaller shoulder of the Motor Housing for Model 3RL or Throttle Valve Housing for Model 3RLS. To hold the Seal in position, lightly coat the Seal and shoulder with Ingersoll–Rand No. 28 Grease. Place the Exhaust Deflector on the rear of the Housing, aligning the notch in the Deflector with the alignment pin in the Housing. Secure the Deflector to the Housing with the Inlet Bushing Assembly. Use a torque wrench and tighten the Inlet Bushing Assembly to 15 to 18 ft–lb (20 to 24 Nm) torque.
10. With the Throttle Lever downward, insert the Throttle Valve Plunger (11), Throttle Valve Ball (13) and Throttle Valve Spring (10) into the Motor Housing on Model 3RL and into the Throttle Valve Housing on Model 3RLS. Position the Throttle Valve Cap (12) on the Throttle Valve Spring. Screw the Valve Cap into the Housing until the Cap is within approximately two threads of being flush with the Housing. Apply a light, uniform coat of a thread locking compound to the remaining two threads. Tighten the Valve Cap securely and place the Housing on a workbench with the Valve Cap facing downward. Allow the compound to cure the specified length of time.
11. Install the Reverse Valve Seal (4) on the Reverse Valve (3), insert the Reverse Valve Spring (5) into the end of the Reverse Valve and start the Reverse Valve into the bushing in the Motor Housing. Align the cross hole for the Valve Lock Pin (6) in the Reverse Valve with the timing notch on the bushing. Insert the Valve Lock Pin into the cross hole and push the Reverse Valve into the bushing until the cross hole and pin are inside the bushing. With the timing notch on the bushing downward, insert a small diameter rod into the end of the Reverse Valve and apply pressure to the Lock Pin forcing it outward against the bushing. Continue pushing the Reverse Valve into the bushing until the Lock Pin is forced into the lock pin slot in the bushing. When the Lock Pin moves into the slot, ease back the Reverse Valve until the Lock Pin prevents the Reverse Valve from coming back farther. Remove the rod and insert the Lock Pin Retainer (8) into the Reverse Valve. Using a 1/16” Allen Wrench, lock the pins in position with the Retainer Setscrew (7).

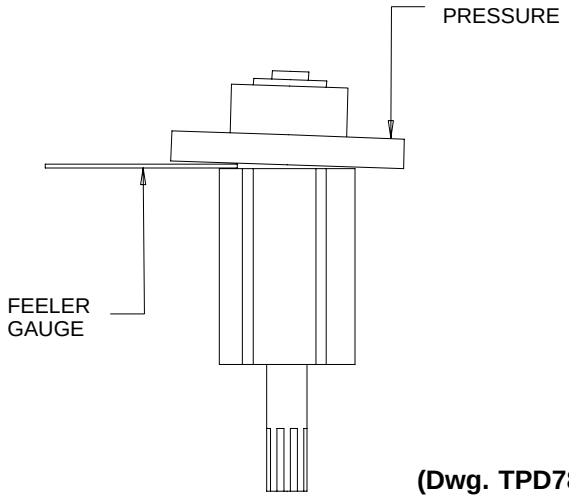
Assembly of the Motor

1. Place the Rear End Plate (31) on the short, unsplined shaft of the Rotor (29) with the counterbore away from the body of the Rotor.
2. Using a sleeve that contacts the inner ring of the Rear Rotor Bearing (32), press the Bearing onto the shaft until the Rear End Plate just contacts the rotor body.

NOTICE

The clearance between the Rear End Plate and Rotor is critical. This measurement must be made at the outside diameter of the rotor body.

3. While pressing down with your finger on the outer edge of the End Plate on the Bearing side, insert a 0.002” (0.05 mm) feeler gauge between the face of the Rotor and End Plate directly opposite the point where pressure is applied. Supporting the End Plate, lightly tap the shaft with a plastic hammer to increase the space. Press the Bearing farther onto the shaft if the space is too wide. When the proper clearance is obtained, install the Rear Rotor Bearing (33) on the shaft. (Refer to Dwg. TPD789.)



(Dwg. TPD789)

4. Place the Rotor, with the splined end up, in a block which has clearance for the Rotor Bearing and supports the Rear End Plate.
5. Wipe each Vane (35) with a light film of Ingersoll–Rand No. 10 Oil and place a Vane in each slot in the Rotor.

6. Note that the Cylinder (36) has a notch in one end. Place the Cylinder, notched end up, over the Rotor and against the Rear End Plate, aligning the dowel hole in the Cylinder with the U–shaped notch in the rim of the Rear End Plate. The notch in the end of the Cylinder should be against the Front End Plate.
7. Install the Front Rotor Bearing (32) in the Front End Plate (30) and retain it with the Front Rotor Bearing Retainer (34).
8. Using a sleeve that contacts the inner ring of the bearing, press the assembled Front End Plate, flat side first, on the splined end of the Rotor until the End Plate just contacts the Cylinder.
9. Install the Rear End Plate Gasket (38) in the Motor Housing, aligning the small notch in the Gasket with the dowel pin hole in the Housing.
10. Insert a thin, rigid wire into the dowel pin hole at the bottom of the motor recess in the Motor Housing. Grasping the assembled motor by the spline on the Rotor and with the dowel pin holes of the Front End Plate and Cylinder aligned with the U–shaped notch in the Rear End Plate, install the assembled motor in the Motor Housing. Maintain alignment between the motor and Motor Housing by passing the aligned dowel holes in the assembled motor over the wire positioned in the Motor Housing. Withdraw the wire and install the Cylinder Dowel (37), making certain the Cylinder Dowel is flush with or below the Front End Plate.

Assembly of the Gearing

1. Set the Gear Case (39) on the table of an arbor press with the notched end upward.
2. Using a sleeve that will contact the outer ring of the bearing, press the Spindle Bearing (40), open side first, into the bearing recess until it seats.
3. Install the Spindle Bearing Retainer (41) in the groove adjacent to the Bearing.
4. Work some grease into the teeth of the Spindle Planet Gears (42) and onto the planet gear shafts on the Spindle (43).
5. Slide the Spindle into the Gear Case so that the spindle shaft passes through the bore of the Spindle Bearing.
6. Install the Spindle Retaining Ring (44) in the groove on the Spindle shaft.
7. Slide the Spindle Planet Gears onto the planet gear shafts, making certain the teeth on the Gears mesh with the teeth of the Gear Case.
8. **For M, N, O and Q ratios,** coat the Gear Head Spacer (46) with grease and place it in the Gear Case against the Spindle Planet Gears.
9. **For M, N, O and Q ratios,** work some grease into the teeth of the Gear Head Planet Gears (48) and onto the planet gear shafts on the Gear Head (47).
10. **For M, N, O and Q ratios,** slide the Gear Head into the Gear Case so that the teeth on the gear head shaft mesh with the Spindle Planet Gears.
11. **For M, N, O and Q ratios,** slide the Gear Head Planet Gears onto the planet gear shafts, making certain the teeth on the Planet Gears mesh with the teeth in the Gear Case.
12. **For M and N ratios,** work some grease into the teeth of the Rotor Pinion (45) and place the Rotor Pinion in the Gear Head so that it meshes with the Gear Head Planet Gears.
13. Place the Motor Clamp Washer (49) in the Gear Case against the internal gear. Install the Clamp Washer Retaining Ring (50).

Assembly of the Adjustable Cushion Clutch

For Models ending in 2C3 and 2C5

1. Standing the Clutch Housing Assembly (51) on an arbor press table with the external thread downward, press the Clutch Housing Bushing (52) into the Clutch Housing until the shoulder of the Bushing seats.
2. Apply a coat of grease to the ten Jaw Bearing Balls (60), eleven Clutch Balls (59) and the Thrust Bearing (64).
3. Holding the Clutch Driver (57) in one hand with the external hex end down, slide the Clutch Jaw (58) onto the external hex end of the Driver. Move the Jaw along the Driver to a point near the front shoulder of the Driver where the ten Jaw Bearing Balls can be installed in the Jaw. Install the Balls and pull the Jaw toward the shoulder of the Driver to capture the Balls.
4. While maintaining pressure against the Clutch Jaw, invert the Clutch Driver and install the Clutch Ball Spacer (61) on the Driver.
5. Place the eleven Clutch Balls in the openings of the Clutch Ball Spacer and install the Clutch Ball Seat (63) with the recess on the face of the Seat toward the Clutch Balls.
6. Lock all the components in place by installing two of the Spring Seat Stops (66) in the two grooves on the Driver nearest the Clutch Jaw.
7. Position the Clutch Spring (56) on the hub of the Clutch Ball Seat and install the Clutch Spring Seat (65) on the Clutch Driver with the hub inside the Clutch Spring.
8. Install the Thrust Bearing (64) and the Adjusting Nut Lock (67) on the Clutch Driver so that the flat side of the Lock is toward the Bearing.
9. Thread the Adjusting Nut (68) onto the Clutch Driver, with the smooth face away from the Nut Lock, until the Nut passes the remaining Spring Seat Stop groove on the Clutch Driver.

10. Install the Spring Seat Stop in the groove on the Clutch Driver.
11. The Clutch Return Spring (55) has the last coil on one end slightly distorted inward. Place the Spring on the Clutch Driver with the distorted end of the Spring against the Spring Seat Stop.
12. Apply Ingersoll–Rand No. 67 Grease into the front end of the Bevel Pinion Driver (77), and onto that portion of the Bevel Pinion Driver that fits into the Clutch Housing Bushing. Inject a quantity of grease into the center hole at the front end of the Clutch Driver until the grease is forced out through the cross–hole in the Driver.
13. Insert the Bevel Pinion Driver and the Clutch Driver Assembly into the Clutch Housing.

Assembly of the Adjustable Shutoff Clutch

For Models ending in 1C5, 2S3, and 2S5

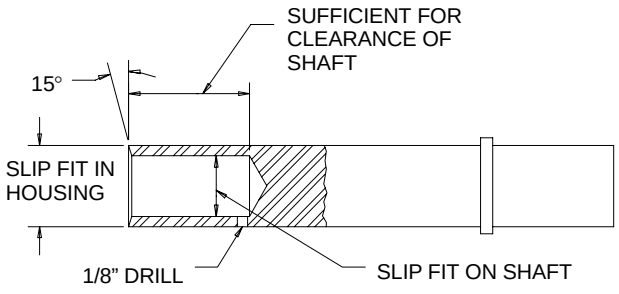
If it is necessary to replace the Shutoff Clutch Assembly, Clutch Driver (57), Shutoff Plunger (72), Plunger Return Spring (73), Bevel Pinion Driver (77) or Push Rod (78), the tool must be re–gapped. Before assembling the tool, read the section on Gapping Procedure on page 35.

1. Standing the Clutch Housing (51) on an arbor press table with the external thread downward, press the Clutch Housing Bushing (52) into the Clutch Housing until the shoulder of the Bushing seats.
2. Apply Ingersoll–Rand No. 67 Grease to the groove at the front end of the Clutch Driver (57) and install the Clutch Driver Seal (62) in the groove.
3. Put some grease into the opening in the front end of the Clutch Driver and slide the Bevel Pinion Driver (77) onto the flanged end of the Clutch Driver.
4. Apply a coat of grease to each of the ten Bevel Pinion Driver Bearing Balls (75) and insert the Balls into the hole of the Bevel Pinion Driver.
5. Install the Ball Retaining Ring (69) into the groove of the Bevel Pinion Driver to retain the Bevel Pinion Driver Bearing Balls.
6. Apply a coat of grease to the cam surface, clutch ball pockets, and shaft of the Clutch Driver.
7. Holding the Bevel Pinion Driver and Clutch Driver upward, insert each of the three Clutch Cam Balls (74) into the three sections of the Bit Holder Assembly.
8. Install the Clutch Ball Seat (63) over the end of the driver with the large circular groove toward the Clutch Cam Balls. Insert the four Shutoff Plunger Balls (72A) into the hole on the side of the Clutch Driver.
9. Install the Shutoff Collar (70), relieved end first, over the end of the Clutch Driver until it contacts the face of the Clutch Spring Seat.
10. Slide the Collar Return Spring (71), large end first, over the Clutch Driver until it contacts the Shutoff Collar and retain all components with the Spring Seat Stop (66).
11. Apply a light coat of grease to the Shutoff Plunger (72) and insert the Plunger Return Spring (73) and Shutoff Plunger into the hex of the Clutch Driver.
12. Position the Clutch Spring (56) on the hub of the Clutch Ball Seat and install the Clutch Spring Seat (65) on the Clutch Driver with the hub inside the Clutch Spring.
13. Lubricate and install the Thrust Bearing (64) and the Adjusting Nut Lock (67), with the flat side of the Lock toward the Bearing, on the Clutch Driver. Lubricate the side of the Adjusting Nut Lock that is not flat.
14. Thread the Adjusting Nut (68) onto the Clutch Driver, with the smooth face away from the Nut Lock, until the Nut passes the remaining Spring Seat Stop groove in the Clutch Driver.
15. Install the Spring Seat Stop (66) into the groove adjacent to the Adjusting Nut.
16. Insert the Clutch Return Spring (55), small end first, over the hex end of the Clutch Driver until it stops against the Spring Seat Stop (66).
17. Apply a light coat of grease to the hex end of the Clutch Driver and to the bearing surface of the Bevel Pinion Driver. Slide the assembled Clutch into the Clutch Housing (5).

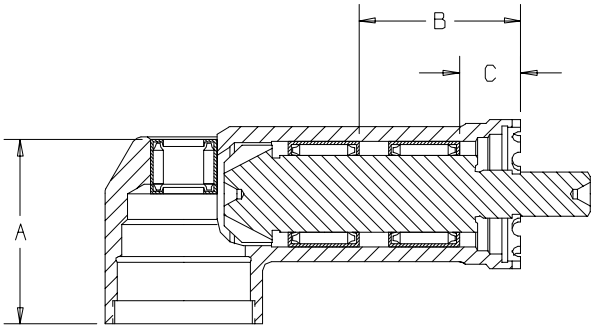
Assembly of the Angle Attachment

For 3RL23 and 3RL25

1. Apply 2 to 4 cc of Ingersoll–Rand No. 67 Grease to the gear and onto the shaft of the Bevel Pinion (103) and insert it, gear end first, into the long bore of the Angle Housing (100).
2. Coat the inside of the two Bevel Pinion Bearings (110) with a small amount of grease and insert one Bearing, unstamped end first, into the bore of the Angle Housing.
3. Using the bearing inserting tool shown in Dwg. TPD460 press the new Bearing to the “B” dimension shown in Dwg. TPD790.



(Dwg. TPD460)



(Dwg. TPD790)

Distance	Minimum Dimension		Maximum Dimension	
	in	mm	in	mm
A	1.181	30.0	1.201	30.5
B	1.102	28.0	1.122	28.5
C	0.334	8.5	0.354	9.0

4. Repeat the process with the second Bevel Pinion Bearing, pressing it to the “C” dimension shown in Dwg. TPD790.
5. Coat the inside of the new Upper Spindle Bearing (102) with a small amount of grease and coat the outside with a small amount of thread locking compound.
6. Install the Front Thrust Bearing Seat (107) on the Bevel Pinion with the beveled side of the seat toward the Pinion Bearings.
7. Grease the Bevel Pinion Thrust Bearing (106) and install it against the Seat.
8. Install the Rear Thrust Bearing Seat (105) with the flat face against the Thrust Bearing and the radial pin captured by an angle housing notch.
9. Install the Thrust Bearing Retainer (104) in the groove on the Pinion to lock the components in position. Make certain the Retainer is completely seated in the groove.
10. The Socket Retainer (115) for the Square Drive Spindle (114) consists of a plunger, spring and washer. The hole through the square on the working end of the Spindle has an internal shoulder and the hole is deeper on one side of the square than it is on the opposite side. Place the spring into the deeper hole and insert the plunger into the spring until the plunger is flush with the face of the square. Holding the plunger side of the square against a steel block, place the washer, chamfered side away from the plunger, onto the plunger. With a rivet tool, rivet the washer to the plunger.
11. Work some grease into the Lower Spindle Bearing (112) and on the Bevel Gear.
12. Using a sleeve that will contact only the inner ring of the Bearing, press the Lower Spindle Bearing, sealed side first, onto the Spindle.
13. Slide the Bevel Gear of the Matched Gear Set (103) onto the Spindle.
14. Apply a thread locking compound to the threads on the Bevel Gear Retainer Nut (111) and Spindle. Allow the compound to cure for the proper length of time and then thread the Bevel Gear Retainer Nut onto the Spindle and tighten it to 10.3 ft–lb (14 Nm) torque.
15. Install the assembled Spindle in the Angle Housing, making certain the teeth of the Matched Gear Set mesh and the Spindle turns freely.
16. Clean the threads of the Angle Housing and the Angle Housing Cap (113). Apply a uniform coat of Vibra–Tite®** VC3 No. 205 to the threads of the Angle Housing Cap and allow the compound to cure between ten and twenty minutes. Install the Angle Housing Cap and tighten the Cap to a minimum of 15 to 18 ft–lb (20 to 24 Nm) torque.
17. Slide the Coupling Nut Retainer (109) and Coupling Nut (108), threaded end trailing, over the notched end of the Angle Housing.
18. Compress the Retainer and work it into the internal groove in the nonthreaded end of the Nut.

For 3RL1A5

1. Work a light coat of Ingersoll–Rand No. 67 Grease into the gear teeth of the Bevel Pinion (103) and insert it, gear end first, into the long bore of the Angle Housing (100).
2. Work 0.5 to 1 cc of grease into the Bevel Pinion Bearing (110) and insert it, unstamped end first, into the bore of the Angle Housing, after the Bevel Pinion.
3. Support the Angle Housing on an angled support as shown in Dwg. TPD790. Use a bearing inserting tool and press the Bevel Pinion Bearing so the face is a maximum of 1.32” (33.50 mm) but not less than 1.30” (33.00 mm) below the end face of the Angle Head. Refer to Dwg. TPD790.
4. Lubricate the Bevel Pinion Thrust Bearing (106) with 0.5 to 1 cc of grease. Install the Bearing on the rear of the bevel pinion shaft with red–stained end of Bearing toward the rear of the Angle Head. Secure Bearing on shaft with Thrust Bearing Retainer (104).

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5. The Socket Retainer (103A) consists of a Plunger, Spring and Washer. The hole through the square on the working end of the Spindle has an internal shoulder and the hole is deeper on one side of the square than it is on the opposite side. Place the Spring into the deeper hole and insert the Plunger into the Spring until the Plunger is flush with the face of the square. Holding the Plunger side of the square against a steel block, place the Washer, chamfered side away from the Plunger, onto the Plunger. With a rivet tool, rivet the Washer to the Plunger.

NOTICE

Do not get any thread locking compound in the bearing; damage to the Bearing could result. Do not get any grease on the inside diameter of the Bearing; grease will prevent the compound from working.

6. Apply a small drop of a thread locking compound to the small outside diameter of the upper spindle bearing shaft on the Spindle (103).
7. Apply 2 to 4 cc of grease to the Upper Spindle Bearing (102) and a light coat of grease to the gear teeth on the Spindle. Press the Upper Spindle Bearing onto the Spindle and allow the compound to dry completely.

NOTICE

Make sure that the Bevel Pinion is pulled outward toward the Bevel Pinion Bearing before inserting the Spindle into the Angle Head.

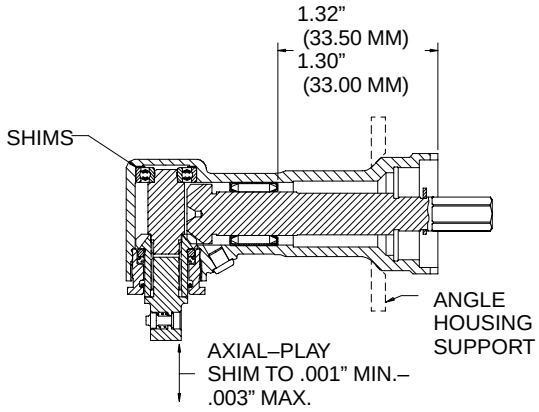
8. Insert the Spindle into the Angle Head until the Upper Spindle Bearing seats into the recess of the Angle Head.
9. Install the Spindle Bearing (119) in the Cap.
10. Install the Angle Housing Cap finger–tight.

NOTICE

Spindle must turn freely.

11. With the Bevel Gear on the Spindle out of mesh with the Bevel Pinion, measure the axial play of the Spindle (use 0.25 lb loads). Subtract 0.002" (0.051 mm) from the reading for required shim thickness. Refer to Dwg. TPB853.

3RL1A5 Angle Attachment



(Dwg. TPB853)

12. Unscrew and remove the Angle Housing Cap. While pulling the Bevel Pinion outward toward the Bevel Pinion Bearing, remove the Spindle from the Angle Head.
13. Insert the required number of shims as determined from Step 11 in the upper bearing recess of the Angle Head.
14. Reassemble and test the Angle Head as indicated in Steps 8, 10 and 11.
15. Once proper shimming has been achieved, remove the Angle Housing Cap, clean the threads on the Angle Head and the Angle Housing Cap, and apply a film of Vibra–Tite® VC3 to the threads.
16. Install the Angle Housing Cap and tighten to 35 in–lb (3.9 Nm) torque.
17. Install the Rear Thrust Bearing Seat (105) on the Bevel Pinion shaft with the flat face against the Thrust Bearing.
18. Slide the Coupling Nut Retainer (109) and the Coupling Nut (108), threaded end trailing, over the notched end of the Angle Housing.
19. Compress the Coupling Nut Retainer, and work it into the internal groove in the nonthreaded end of the Coupling Nut.

Assembly of the Tool

NOTICE

The Gear Case Assembly has left–hand threads.

1. Apply some Ingersoll–Rand No. 67 Grease to the spline of the rotor shaft and screw the Gear Case Assembly into the Motor Housing Assembly. Tighten the Gear Case to 15 to 18 ft–lb (20 to 25 Nm) torque.

2. **For Model 3RLS,** insert the Push Rod (78) into the gearing and motor through the hole in the center of the Spindle.

NOTICE

The Clutch Housing (51) has left–hand threads.

3. Screw the Clutch Housing into the Gear Case, making certain that the hex on the Clutch Driver is properly inserted in the Spindle. Tighten the Housing to 18.4 to 22.1 ft–lb (25 to 30 Nm) torque.

NOTICE

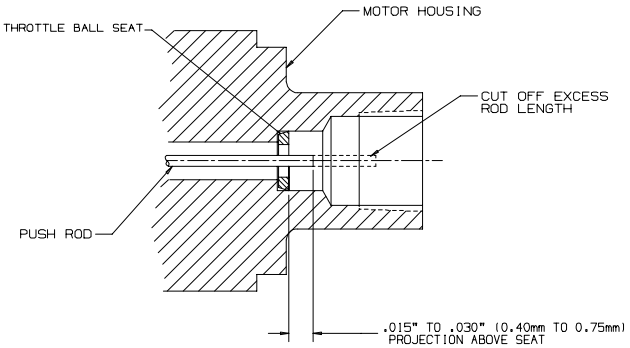
The Coupling Nut (108) has left–hand threads.

4. Aligning the pin in the Rear Thrust Bearing Seat (105) with the notch in the Clutch Housing, screw the Coupling Nut (108) onto the Clutch Housing. Tighten the Nut to 18.4 to 22.1 ft–lb (25 to 30 Nm) torque.
5. If the Clutch Assembly has been disassembled, adjust the clutch according to the instructions in the section **CLUTCH ADJUSTMENT** on page 2.

GAPPING PROCEDURE FOR INSTALLATION OF NEW PUSH ROD

1. Remove the Inlet Bushing Assembly (27) and pull the Exhaust Deflector (24) from the Motor Housing (1) on Model 3RL and from the Throttle Valve Housing (9) on Model 3RLS.
2. Follow the steps for Disassembly of the Motor Housing – For Model 3RLS.
3. Remove the Plunger Return Spring (73) and tighten the Clutch Housing Assembly (51) to 18.4 to 22.1 ft–lb (25 to 30 Nm) torque. Adjust the clutch to ten clicks from maximum output.
4. Insert the Push Rod (78). Apply pressure to secure Push Rod against the Shutoff Plunger Balls (72A).
5. Trim the Push Rod so that it projects 0.015” to 0.030” (0.40 to 0.75 mm) above the Throttle Ball seat. Refer to Dwg. TPD1100–1.

Gapping Procedure for Installation of New Push Pad



(Dwg. TPD1100–1)

6. Remove Clutch Housing and install Plunger Return Spring. Tighten Clutch Housing Assembly to 18.4 to 22.1 ft–lb (25 to 30 Nm) torque.
7. After gap has been set, follow procedure for **Assembly of Motor Housing.**

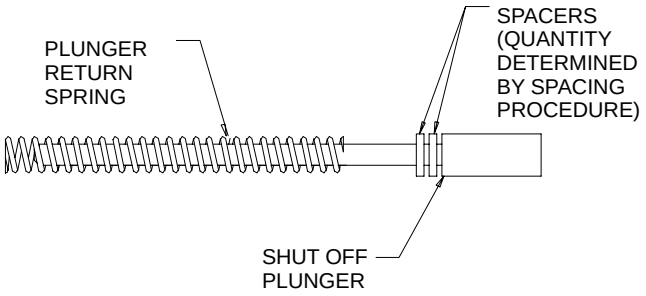
SPACING PROCEDURE

NOTICE

Before proceeding with SPACING PROCEDURE, the tool must have gap set according to GAPPING PROCEDURE. The clutch should be adjusted ten clicks down from maximum and the tool should be completely assembled without Spacers (72B).

1. Connect tool to a regulated 90 psig (6.2 bar/620 kPa) air supply. Run tool on a soft joint 8 to 16 in–lb (0.90 to 1.81 Nm) torque.
   a. If the tool runs down the joint, shuts off and reverses off the joint, it is functioning properly. Proceed to Step 2.
   b. If the tool runs down the joint, shuts off but won’t run in either forward or reverse, then the tool did not reset. Loosen Clutch Housing Assembly (51), remove the Plunger (72) and add one Spacer (72B). See Dwg. TPD1101. Insert the Plunger into the Clutch Driver (57) and tighten the Clutch Housing Assembly to 18.4 to 22.1 ft–lb (25 to 30 Nm) torque. Repeat testing. Add Spacers as necessary until tool functions as described.

Installation of Spacers



(Dwg. TPD1101)

   c. If tool does not shut off or if it ratchets, repeat assembly procedure from beginning.
2. After the tool has been properly spaced, adjust clutch. Refer to **CLUTCH ADJUSTMENT** on page 2.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Low power or low free speed	Low air pressure	Check the air line pressure at the Inlet of the tool. It 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.
	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.
	Clogged muffler	Clean the Muffler Elements in a clean, suitable, cleaning solution. If they cannot be cleaned, replace them.
	Air leakage to exhaust caused by missing or damaged Housing Adapter Seal	Replace Housing Adapter Seal.
	Air leakage to atmosphere caused by missing or damaged Throttle Valve Housing Seal or Exhaust Deflector Seal	Replace Housing Adapter Seal.
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.
Inconsistent disengagement of Adjustable Clutch	Improper lubrication.	Remove Adjustable Clutch mechanism and check. Lubricate per instructions.
	Worn or damaged parts.	Remove Adjustable Clutch mechanism and examine parts.
	Worn Clutch Spring (using Heavy Clutch Spring on light torque application.)	Change to Medium or Light Clutch Spring.
Clutch ratchets	Excessive Gap	Reset gap. See **GAPPING PROCEDURE.**
	Low air pressure at the inlet	Check air supply. For top performance, the air pressure must be 90 psig (6.2 bar/620 kPa) at the inlet.
	Weak Throttle Ball Spring	Replace Throttle Ball Spring.
	Excessive load on Plunger Return Spring	Remove Spacers as necessary. Refer to **SPACING PROCEDURE.**
	Worn or defective Clutch Assembly	Repair of replace Clutch Assembly.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Motor stalls before Adjustable Clutch ratchets	Improper Clutch Adjustment or improper tool ratio for application	Check Clutch Adjustment and review tool performance vs. requirements.
Tool stalls before shutoff	Low air pressure at inlet	Check air supply. For top performance, the air pressure must be 90 psig (6.2 bar/620 kPa) at the inlet.
	Inadequate air motor performance	See **LOSS OF POWER** section**.**
	Improper clutch adjustment	Check **Clutch Adjustment.**
	Improper gear ratio for application.	Review tool performance requirements in relationship to the application.
Tool shuts off while free speeding	Marginal reset	See **NO RESET** section.
No reset	Inadequate load on Plunger Return Spring	Add Spacers (72B) as necessary. Refer to **SPACING PROCEDURE.**
	Clutch Driver hole full of grease	Clean grease from Clutch Driver hole.
	Plugged bleed hole in Throttle Valve Housing Adapter	Clean 0.025” (0.635 mm) hole or replace Throttle Valve Housing Adapter.
Angle Head gets hot	Excessive grease	Clean and inspect the Angle Attachment and gearing parts. Lubricate as instructed.
	Inadequate grease	Inject 2 to 4 cc of grease into the Grease Fitting.
	Worn or damaged parts	Clean and inspect the Angle Head and Gearing. If the Bevel Gear and /or the Bevel Pinion is worn or broken, replace **both** parts as they should be replaced only as a matched set.

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.