

# TOUGH GUN® TA3 Robotic Air-Cooled MIG Gun

## OWNER'S MANUAL

January 2025

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Robotic, Air-Cooled, ThruArm™ MIG  
(GMAW) Welding Gun



[bernardtregaskiss.com/TechnicalSupport](http://bernardtregaskiss.com/TechnicalSupport)  
1-855-MIGWELD (644-9353)(US & Canada)

# Thank You for Choosing Tregaskiss®

Thank you for selecting a Tregaskiss product. Before installing, compare the equipment received against the invoice to verify that the shipment is complete and undamaged. It is the responsibility of the purchaser to file all claims of damage or loss that may have occurred during transit with the carrier.

The owner's manual contains general information, instructions and maintenance to help better maintain your MIG gun or peripheral. Please read, understand and follow all safety precautions.

While every precaution has been taken to assure the accuracy of this owner's manual, Tregaskiss assumes no responsibility for errors or omissions. Tregaskiss assumes no liability for damages resulting from the use of information contained herein. The information presented in this owner's manual is accurate to the best of our knowledge at the time of printing. Please reference [bernardtregaskiss.com](http://bernardtregaskiss.com) for updated material.

For customer support and special applications, please call the Tregaskiss Customer Service Department at 1-855-MIGWELD (644-9353) (US & Canada) or email at [cs@itwmig.com](mailto:cs@itwmig.com). Our trained Customer Service Team is available between 8:00 a.m. and 5:30 p.m. EST, and will answer your product application or repair questions.

Tregaskiss manufactures premium robotic MIG (GMAW) welding guns, peripherals and consumables. For more information on other premium Tregaskiss products, contact your local Tregaskiss distributor or visit us on the web at [bernardtregaskiss.com](http://bernardtregaskiss.com).

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**Subject to Change** – The information presented in this manual is accurate to the best of our knowledge at the time of printing. Please visit [bernardtregaskiss.com](http://bernardtregaskiss.com) for the most up-to-date information.

**Additional Material** – For additional support materials such as spec sheets, troubleshooting information, how-to guides and videos, animations, online configurators and much more, please visit [bernardtregaskiss.com](http://bernardtregaskiss.com).

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# DECLARATION OF CONFORMITY

for European Community (CE marked) products



Tregaskiss, 2570 North Talbot Rd., Oldcastle, Ontario N0R 1L0 Canada declares that the product(s) identified in this declaration conform to the essential requirements and provisions of the stated Council Directive(s) and Standard(s).

Product/Apparatus Identification:

Product	Stock Number
Tregaskiss TOUGH GUN TA3 Series	TA1XXXXXXXXX (Configurable #)

Council Directives:

- 2014/35/EU Low voltage
- 2011/65/EU and amendment 2015/863 Restriction of the use of certain hazardous substances in electrical and electronic equipment

Electronic equipment standards:

- EN IEC 60974-7:2019 Arc welding equipment – Part 7: Torches
- EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Signatory:

March 22, 2017

**David A. Werba**  
MANAGER, PRODUCT DESIGN COMPLIANCE

\_\_\_\_\_  
Date of Declaration

# DECLARATION OF CONFORMITY

for United Kingdom (UKCA marked) products



Tregaskiss, 2570 North Talbot Rd., Oldcastle, Ontario NOR 1L0 Canada declares that the product(s) identified in this declaration conform to the essential requirements and provisions of the stated Council Directive(s) and Standard(s).

Product/Apparatus Identification:

Product	Stock Number
Tregaskiss TOUGH GUN TA3 Series	TA1XXXXXXXXX (Configurable #)

Council Directives:

- S.I. 2016/1101 Electrical Equipment (Safety) Regulations 2016
- S.I. 2012/3032 Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations

Standards:

- EN IEC 60974-7:2019 Arc welding equipment – Part 7: Torches
- EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Signatory:

August 18, 2021

**David A. Werba**  
MANAGER, PRODUCT DESIGN COMPLIANCE

\_\_\_\_\_  
Date of Declaration



# SECTION 1 — SAFETY PRECAUTIONS — READ BEFORE USING



Protect yourself and others from injury – read, follow, and save these important safety precautions and operating instructions.

## 1-1 Symbol Usage



**DANGER!** – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

**NOTICE** – Indicates statements not related to personal injury.

 – Indicates special instructions.



This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

## 1-2 Arc Welding Hazards



The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in section 1-4 Principal Safety Standards on page 3, and in welding power source Owner's Manual. Read and follow all Safety Standards.



Only qualified persons should install, operate, maintain, and repair this equipment. A qualified person is defined as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated ability to solve or resolve problems relating to the subject matter, the work, or the project and has received safety training to recognize and avoid the hazards involved.



During operation, keep everybody, especially children, away.

### ELECTRIC SHOCK can kill.



- Always wear dry insulating gloves.
- Insulate yourself from work and ground.
- Do not touch live electrode or electrical parts.
- Do not store or use equipment in standing water.

- Replace worn, damaged, or cracked guns or cables.
- Turn off welding power source before changing contact tip or gun parts.
- Keep all covers and handle securely in place.

### FUMES AND GASES can be hazardous.



- Keep your head out of the fumes.
- Ventilate area, or use breathing device. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.

### MOVING PARTS can injure.



- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

### WELDING can cause fire or explosion.



- Do not weld near flammable material.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Watch for fire; keep extinguisher nearby.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals.

### BUILDUP OF GAS can injure or kill.



- Shut off compressed gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

### ARC RAYS can burn eyes and skin.



Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear body protection made from leather or flame-resistant clothing (FRC). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.

### HOT PARTS can burn.

- Allow gun to cool before touching.
- Do not touch hot metal.
- Protect hot metal from contact by others.



### NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.



- Check for noise level limits exceeding those specified by OSHA.
- Use approved ear plugs or ear muffs if noise level is high.
- Warn others nearby about noise hazard.

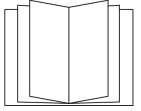
### WELDING WIRE can injure.

- Keep hands and body away from gun tip when trigger is pressed.



### READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the Manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform installation, maintenance, and service according to the Owner's Manuals, industry standards, and national, state, and local codes.





## 1-3 California Proposition 65 Warnings



**WARNING:** This product can expose you to chemicals including lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm.

For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## 1-4 Principal Safety Standards

*Safety in Welding, Cutting, and Allied Processes*, American Welding Society standard ANSI Standard Z49.1. Website: [www.aws.org](http://www.aws.org).

*Safe Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute. Website: [www.safetysupply.com](http://www.safetysupply.com).

*Safe Practices for the Preparation of Containers and Piping for Welding and Cutting*, American Welding Society Standard AWS F4.1. Website: [safetysupply.com](http://safetysupply.com).

*National Electrical Code*, NFPA Standard 70 from National Fire Protection Association. Website: [www.nfpa.org](http://www.nfpa.org).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1 from Compressed Gas Association. Website: [www.cganet.com](http://www.cganet.com).

*Safety in Welding, Cutting, and Allied Processes*, CSA Standard W117.2 from Canadian Standards Association. Website: [www.csagroup.org](http://www.csagroup.org).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B from National Fire Protection Association. Website: [www.nfpa.org](http://www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910.177 Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J. Website: [www.osha.gov](http://www.osha.gov).

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## 1-5 EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). The current from arc welding (and allied processes including spot welding, gouging, plasma arc cutting, and induction heating operations) creates an EMF field around the welding circuit. EMF fields may interfere with some medical implants, e.g. Pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, restrict access for passersby or conduct individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.

3. Do not coil or drape cables around your body.
4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source wire feeder.

### About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

# SECTION 2 — CONSIGNES DE SÉCURITÉ — LIRE AVANT UTILISATION



Pour écarter les risques de blessure pour vous-même et pour autrui — lire, appliquer et ranger en lieu sûr ces consignes relatives aux précautions de sécurité et au mode opératoire.

## 2-1 Symboles utilisés



**DANGER!** – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.



Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

**AVIS** – Indique des déclarations pas en relation avec des blessures personnelles.

 – Indique des instructions spécifiques.



Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Reportez-vous aux symboles et aux directives cidessous afin de connaître les mesures à prendre pour éviter tout danger.

## 2-2 Dangers relatifs au soudage à l'arc



Les symboles donnés ci-après sont utilisés dans tout le manuel pour attirer l'attention sur les dangers possibles et pour indiquer le type de danger dont il s'agit. Quand on voit le symbole, prendre garde et suivre les directives correspondantes pour éviter le danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les Normes de sécurité principales, et dans le Guide d'utilisation de la source de courant de soudage. Lire et suivre toutes les Normes de sécurité.



L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées. Une personne qualifiée est définie comme celle qui, par la possession d'un diplôme reconnu, d'un certificat ou d'un statut professionnel, ou qui, par une connaissance, une formation et une expérience approfondies, a démontré avec succès sa capacité à résoudre les problèmes liés à la tâche, le travail ou le projet et a reçu une formation en sécurité afin de reconnaître et d'éviter les risques inhérents.



Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.

## UN CHOC ÉLECTRIQUE peut tuer.



- Porter toujours des gants secs et isolants.
- S'isoler de la pièce et de la terre.
- Ne jamais toucher une électrode ou des pièces électriques sous tension.
- Ne stockez pas et n'utilisez pas l'équipement dans de l'eau stagnante.
- Remplacer les pistolets ou câbles de soudage qui sont endommagés, usés ou craquelés.
- Mettre la soudeuse hors tension avant de remplacer un bec contact ou des pièces de pistolet.
- S'assurer que tous les couvercles et poignées sont fermement assujettis.

## LES FUMÉES ET LES GAZ peuvent être dangereux.



- Garder la tête hors des fumées.
- Aérer la zone de travail ou porter un appareil respiratoire. Pour déterminer la bonne ventilation, il est recommandé de procéder à un prélèvement pour la composition et la quantité de fumées et de gaz auxquels est exposé le personnel.
- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyants, les consommables, les produits de refroidissement, les dégraisseurs, les flux et les métaux.

## Les PIÈCES MOBILES peuvent causer des blessures.



- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

## Le SOUDAGE peut provoquer un incendie ou une explosion.



- Ne pas souder à proximité de matériaux inflammables
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 et AWS A6.0 (voir les Normes de Sécurité).
- Prendre garde aux incendies et toujours avoir un extincteur à proximité.

- Lire et comprendre les fiches de données de sécurité et les instructions du fabricant concernant les adhésifs, les revêtements, les nettoyeurs, les consommables, les produits de refroidissement, les dégraissateurs, les flux et les métaux.

### L'ACCUMULATION DE GAZ risquent de provoquer des blessures ou même la mort.



- Fermer l'alimentation du gaz comprimé en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.

### LE RAYONNEMENT DE L'ARC peut brûler les yeux et la peau.



Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage approuvé muni de verres filtrants approprié pour protéger visage et yeux pendant le soudage (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter une protection corporelle en cuir ou des vêtements ignifuges (FRC). La protection du corps comporte des vêtements sans huile, comme des gants de cuir, une chemise solide, des pantalons sans revers, des chaussures hautes et une casquette.

### LES PIÈCES CHAUDES peuvent provoquer des brûlures.



- Laisser refroidir le pistolet avant de le toucher.
- Ne pas toucher d'objets métalliques chauds.
- Abrisser les objets métalliques contre tout contact par les personnes à proximité.

### Le BRUIT peut endommager l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.



- Vérifier si les niveaux de bruit excèdent les limites spécifiées par l'OSHA.
- Utiliser des bouche-oreilles ou des serre-tête antibruit approuvés si le niveau de bruit est élevé.

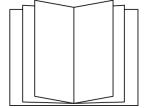
- Avertir les personnes à proximité au sujet du danger inhérent au bruit.

### LES FILS DE SOUDAGE peuvent provoquer des blessures.



- Éloigner les mains et le corps de la buse du pistolet après avoir appuyé sur la gâchette.

### LIRE LES INSTRUCTIONS.



- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de remplacement provenant du fabricant.
- Effectuer l'installation, l'entretien et toute intervention selon les manuels d'utilisateurs, les normes nationales, provinciales et de l'industrie, ainsi que les codes municipaux.

## 2-3 Proposition californienne 65 avertissements



**AVERTISSEMENT** – Ce produit peut vous exposer à des produits chimiques tels que le plomb, reconnus par l'État de Californie comme cancérigènes et sources de malformations ou d'autres troubles de la reproduction

Pour plus d'informations, consulter [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## 2-4 Principales normes de sécurité

*Safety in Welding, Cutting, and Allied Processes*, American Welding Society standard ANSI Standard Z49.1. Website: [www.aws.org](http://www.aws.org).

*Safe Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute. Website: [www.safetysite.com](http://www.safetysite.com).

*Safe Practices for the Preparation of Containers and Piping for Welding and Cutting*, American Welding Society Standard AWS F4.1 from Global Engineering Documents. Website: [www.aws.org](http://www.aws.org).

*National Electrical Code*, NFPA Standard 70 from National Fire Protection Association. Website: [www.nfpa.org](http://www.nfpa.org).

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*Safety in Welding, Cutting, and Allied Processes*, CSA Standard W117.2 from Canadian Standards Association. Website: [www.csagroup.org](http://www.csagroup.org).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B from National Fire Protection Association. Website: [www.nfpa.org](http://www.nfpa.org).

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## 2-5 Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant issu d'un soudage à l'arc (et de procédés connexes, y compris le soudage par points, le gougeage, le découpage plasma et les opérations de chauffage par induction) crée un champ électromagnétique (CEM) autour du circuit de soudage. Les champs électromagnétiques produits peuvent causer interférence à certains implants médicaux, p. ex. les stimulateurs cardiaques. Des mesures de protection pour les porteurs d'implants médicaux doivent être prises: par exemple, des restrictions d'accès pour les passants ou une évaluation individuelle des risques pour les soudeurs. Tous les soudeurs doivent appliquer les procédures suivantes pour minimiser l'exposition aux CEM provenant du circuit de soudage:


1. Rassembler les câbles en les torsadant ou en les attachant avec du ruban adhésif ou avec une housse.
2. Ne pas se tenir au milieu des câbles de soudage. Disposer les câbles d'un côté et à distance de l'opérateur.

3. Ne pas courber et ne pas entourer les câbles autour de votre corps.
4. Maintenir la tête et le torse aussi loin que possible du matériel du circuit de soudage.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.
6. Ne pas travailler à proximité d'une source de soudage, ni s'asseoir ou se pencher dessus.
7. Ne pas souder tout en portant la source de soudage ou le dévidoir.


### En ce qui concerne les implants médicaux :


Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

# SECTION 3 — PRECAUCIONES DE SEGURIDAD — LEA ANTES DE USAR

 Protéjase usted mismo y a otros contra lesiones — lea, cumpla y conserve estas importantes precauciones de seguridad e instrucciones de utilización.

## 3-1 Uso de símbolos

 **PELIGRO!** – Indica una situación peligrosa que, si no se la evita, resultará en muerte o lesión grave. Los peligros posibles se muestran en los símbolos adjuntos o se explican en el texto.

 Indica una situación peligrosa que, si no se la evita, podría resultar en muerte o lesión grave. Los peligros posibles se muestran en los símbolos adjuntos, o se explican en el texto.


**AVISO** – Indica precauciones no relacionadas a lesiones personales.


 – Indica instrucciones especiales.




Este grupo de símbolos significa ¡Advertencia!, ¡Cuidado! CHOQUE O DESCARGA ELÉCTRICA, PIEZAS QUE SE MUEVEN, y peligros de PARTES CALIENTES. Consulte los símbolos y las instrucciones relacionadas que aparecen a continuación para ver las acciones necesarias para evitar estos peligros.

## 3-2 Peligros en soldadura de arco

 Los símbolos mostrados abajo se usan en todo este manual para llamar la atención a e identificar los posibles peligros. Cuando vea el símbolo, preste atención y siga las instrucciones relacionadas para evitar el peligro. La información de seguridad dada abajo es solamente un resumen de la información más completa de seguridad que se encuentra en los estándares de seguridad, y la fuente de alimentación para soldadura del Manual del usuario. Lea y siga todas las normas de seguridad.

 Solamente personal cualificado debe instalar, utilizar, mantener y reparar este equipo. La definición de personal cualificado es cualquier persona que, debido a que posee un título, un certificado o una posición profesional reconocida, o gracias a su gran conocimiento, capacitación y experiencia, haya demostrado con éxito la capacidad para solucionar o resolver problemas relacionados con el trabajo, el proyecto o el tema en cuestión, además de haber asistido a una capacitación en seguridad para reconocer y evitar los peligros que implica el proceso.

 Durante su operación mantenga lejos a todos, especialmente a los niños.

**UNA DESCARGA ELÉCTRICA puede matarlo.**



- Siempre use guantes aislantes secos.
- Aíslese usted mismo del trabajo y la tierra.
- No toque electrodo eléctricamente vivo o partes eléctricamente vivas.
- No guarde ni use el equipo en aguas quietas.
- Reemplace antorchas o cables desgastados, dañados o rotos.
- Repare o reemplace aislamiento de la pistola o del cable que esté desgastado, dañado o agrietado.
- Apague la máquina de soldar antes de cambiar los tubos de contacto o piezas de la antorcha.
- Mantenga todas las tapas y asa bien seguras en sitio.

**HUMO y GASES pueden ser peligrosos.**



- Mantenga su cabeza fuera del humo.
- Ventile el lugar o use un aparato para respirar. El método recomendado para determinar la ventilación adecuada es tomar muestras de la composición y cantidad de humos y gases a los que está expuesto el personal.
- Lea y entienda las Hojas de datos del material (SDS) y las instrucciones del fabricante relacionadas con los adhesivos, metales, consumibles, recubrimientos, limpiadores, refrigerantes, desengrasadores, fundentes y metales.

**Las PIEZAS MÓVILES pueden provocar lesiones.**



- Aléjese de toda parte en movimiento.
- Aléjese de todo punto que pellizque, tal como rodillos impulsados.

**EL SOLDAR puede causar fuego o explosión.**



- No suelde cerca de material inflamable
- No suelde en recipientes que han contenido combustibles, ni en recipientes cerrados como tanques, tambores o tuberías, a menos que estén preparados correctamente de acuerdo con la norma AWS F4.1 y AWS A6.0 (vea las normas de seguridad).
- Siempre mire que no haya fuego y mantenga un extinguidor de fuego cerca.
- Lea y entienda las Hojas de datos del material (SDS) y las instrucciones del fabricante relacionadas con los adhesivos, metales, consumibles, recubrimientos, limpiadores, refrigerantes, desengrasadores, fundentes y metales.

## EL AMONTONAMIENTO DE GAS puede enfermarle o matarle.



- Cierre el suministro de gas comprimido cuando no lo use.
- Siempre dé ventilación a espacios cerrados o use un respirador aprobado que reemplaza el aire.

## LOS RAYOS DEL ARCO pueden quemar sus ojos y piel.



Los rayos del arco de un proceso de suelda producen un calor intenso y rayos ultravioletas fuertes que pueden quemar los ojos y la piel. Las chispas se escapan de la soldadura.

- Use una careta para soldar aprobada equipada con un filtro de protección apropiado para proteger su cara y ojos de los rayos del arco y de las chispas mientras esté soldando o mirando. (véase los estándares de seguridad ANSI Z49.1 y Z87.1).
- Use anteojos de seguridad aprobados que tengan protección lateral.
- Use pantallas de protección o barreras para proteger a otros del destello, reflejos y chispas, alerte a otros que no miren el arco.
- Use protección para el cuerpo hecha de cuero o de prendas resistentes a las llamas (FRC). Entre la protección para el cuerpo se incluye la ropa sin aceite, como guantes de cuero, una camisa gruesa, pantalones sin vuelta, calzado alto y una gorra.

## PARTES CALIENTES pueden causar quemaduras severas.



- Permita que la antorcha se enfríe antes de tocarla.
- No toque metal caliente.
- Proteja a otros del contacto con el metal caliente.

## EL RUIDO puede trastornar su oído.



Ruido proveniente de algunos procesos o equipo puede dañar el oído.

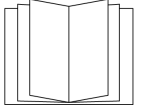
- Chequee los límites del nivel del ruido si exceden aquellos especificados por OSHA.
- Use tapas para los oídos o cubiertas para los oídos si el nivel del ruido es demasiado alto.
- Advierta a otros que estén cerca acerca del peligro del ruido.

## EL ALAMBRE de SOLDAR puede causarle heridas.




- Mantenga las manos y el cuerpo lejos del tubo de contacto de la antorcha cuando se haya presionado el gatillo.

## LEER INSTRUCCIONES.



- Lea y siga cuidadosamente las instrucciones contenidas en todas las etiquetas y en el Manual del usuario antes de instalar, utilizar o realizar tareas de mantenimiento en la unidad. Lea la información de seguridad incluida en la primera parte del manual y en cada sección.
- Utilice únicamente piezas de reemplazo legítimas del fabricante.
- Los trabajos de instalación y mantenimiento deben ser ejecutados de acuerdo con las instrucciones del manual del usuario, las normas del sector y los códigos nacionales, estatales y locales.

### 3-3 Advertencias de la Proposición 65 del estado de California

 **ADVERTENCIA:** Este producto puede exponerlo a químicos, incluso plomo, que el estado de California conoce como causantes de cáncer, defectos de nacimiento u otros daños reproductivos.

Para obtener más información, acceda a [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

### 3-4 Estándares principales de seguridad

*Safety in Welding, Cutting, and Allied Processes*, American Welding Society standard ANSI Standard Z49.1. Website: [www.aws.org](http://www.aws.org).

*Safe Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute. Website: [www.safetysupply.com](http://www.safetysupply.com).

*Safe Practices for the Preparation of Containers and Piping for Welding and Cutting*, American Welding Society Standard AWS F4.1 from Global Engineering Documents. Website: [www.aws.org](http://www.aws.org).

*National Electrical Code*, NFPA Standard 70 from National Fire Protection Association. Website: [www.nfpa.org](http://www.nfpa.org).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1 from Compressed Gas Association. Website: [www.cganet.com](http://www.cganet.com).

*Safety in Welding, Cutting, and Allied Processes*, CSA Standard W117.2 from Canadian Standards Association. Website: [www.csagroup.org](http://www.csagroup.org).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B from National Fire Protection Association. Website: [www.nfpa.org](http://www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910.177 Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J. Website: [www.osha.gov](http://www.osha.gov).

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### 3-5 Información sobre los campos electromagnéticos (EMF)

La corriente que fluye a través de un conductor genera campos eléctricos y magnéticos (EMF) localizados. La corriente del arco de soldadura (y otras técnicas afines como la soldadura por puntos, el ranurado, el corte por plasma y el calentamiento por inducción) genera un campo EMF alrededor del circuito de soldadura. Los campos EMF pueden interferir con algunos dispositivos médicos implantados como, por ejemplo, los marcapasos. Por lo tanto, se deben tomar medidas de protección para las personas que utilizan estos implantes médicos. Por ejemplo, aplique restricciones al acceso de personas que pasan por las cercanías o realice evaluaciones de riesgo individuales para los soldadores. Todos los soldadores deben seguir los procedimientos que se indican a continuación con el objeto de minimizar la exposición a los campos EMF generados por el circuito de soldadura:

1. Mantenga los cables juntos retorciéndolos entre sí o uniéndolos mediante cintas o una cubierta para cables.
2. No ubique su cuerpo entre los cables de soldadura. Disponga los cables a un lado y apártelos del operario.

3. No enrolle ni cuelgue los cables sobre su cuerpo.
4. Mantenga la cabeza y el tronco tan apartados del equipo del circuito de soldadura como le sea posible.
5. Conecte la pinza de masa en la pieza lo más cerca posible de la soldadura.
6. No trabaje cerca de la fuente de alimentación para soldadura, ni se siente o recueste sobre ella.
7. No suelde mientras transporta la fuente de alimentación o el alimentador de alambre.

#### **Acerca de los aparatos médicos implantados:**

Las personas que usen aparatos médico implantados deben consultar con su médico y el fabricante del aparato antes de llevar a cabo o acercarse a soldadura de arco, soldadura de punto, ranurar, hacer corte por plasma, u operaciones de calentamiento por inducción. Si su doctor lo permite, entonces siga los procedimientos de arriba.

# SECTION 4 — PRODUCT WARRANTY

## 4-1 Product Warranty

### Limited Warranty

Bernard and Tregaskiss' Products shall, from the date of original purchase (or, solely with respect to Low Stress Robotic Unicables packaged with any Bernard and Tregaskiss® Robotic MIG Gun, from the date the product goes into production for its intended use) and for the period set forth below, be free from defects in material and workmanship. To obtain repair or replacement of any Product, the covered Product must be delivered, transportation pre-paid by Purchaser, to the address specified by Bernard and Tregaskiss on its Returned Materials Authorization, with: (i) written proof of warranty coverage (e.g., Purchaser dated purchase order); (ii) serial number on product (if any); (iii) the Product's installed location within Purchaser's facility and usage of the Product; and (iv) written specification of any alleged defect(s). In the event the foregoing materials are not timely provided to Bernard and Tregaskiss by claimant, warranty coverage will be determined by Bernard and Tregaskiss, in its sole discretion. For the avoidance of doubt, the warranty period for any Product or part/component of any Product that is replaced or repaired by Bernard and Tregaskiss under the foregoing warranty is not extended or renewed at the time of such replacement or repair. **The Warranty against defects does not apply to: (1) consumable components or ordinary wear items; (2) products which are improperly altered, modified, stored, installed, operated, handled, used or neglected or use of the Products with equipment, components or parts not specified or supplied by Bernard and Tregaskiss or contemplated under the Product documentation; or (3) Products which have not been operated, maintained, and repaired pursuant to Product documentation provided by Tregaskiss. Purchaser shall pay Bernard and Tregaskiss for all warranty claim costs incurred by Tregaskiss (including inspection, labor, parts, testing, scrap and freight) due to warranty claims submitted by Purchaser which are not covered by Bernard and Tregaskiss' warranty.**

- Bernard® BTB Semi-Automatic Air-Cooled MIG Guns: **1 year**; *Lifetime warranty on straight handles, straight handle switches, and rear strain relief*
- Bernard® W-Gun™ and T-Gun™ Semi-Automatic Water-Cooled MIG Guns: **180 days**
- Bernard® TGX® Chassis and Bernard TGX Ready To Weld MIG Guns: **90 days**
- Tregaskiss® Robotic MIG Guns and Components: **1 year**
- Tregaskiss® Automatic MIG Guns: **1 year**
- Tregaskiss® TOUGH GUN® Reamer:
  - When factory-equipped with lubricator: **2 years** when factory-equipped with lubricator
  - When (i) factory-equipped with lubricator and (ii) used exclusively with Tregaskiss® TOUGH GARD® Anti-Spatter Liquid: **3 years** when both (i) and (ii)

- Tregaskiss® TOUGH GUN® Robotic Peripheral (Clutch, Sprayer, Wire Cutter, Arms): **1 year**
- Tregaskiss® Low-Stress Robotic Unicables (LSR+ Unicables): **6 months**

### Service Warranty

Bernard and Tregaskiss warrants the Services shall conform to any mutually agreed upon specifications or statements of work. Purchaser's sole remedy, and Bernard and Tregaskiss's sole liability, for a breach of the foregoing warranty is for Tregaskiss, at its option, to re-perform the Services or credit Purchaser's account for such Services.

### Limitation of Liability and Remedies

BERNARD AND TREGASKISS WILL NOT BE LIABLE, AND PURCHASER WAIVES ALL CLAIMS AGAINST BERNARD AND TREGASKISS FOR INDIRECT, INCIDENTAL, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, DOWN TIME, LOST PROFITS OR COMMERCIAL LOSSES, WHETHER OR NOT BASED UPON TREGASKISS' NEGLIGENCE OR BREACH OF WARRANTY OR STRICT LIABILITY IN TORT OR ANY OTHER CAUSE OF ACTION. IN NO EVENT WILL BERNARD AND TREGASKISS' LIABILITY IN CONNECTION WITH THE AGREEMENT OR SALE OF BERNARD AND TREGASKISS' PRODUCTS OR SERVICES EXCEED THE PURCHASE PRICE OF THE SPECIFIC PRODUCTS OR SERVICES AS TO WHICH THE CLAIM IS MADE.



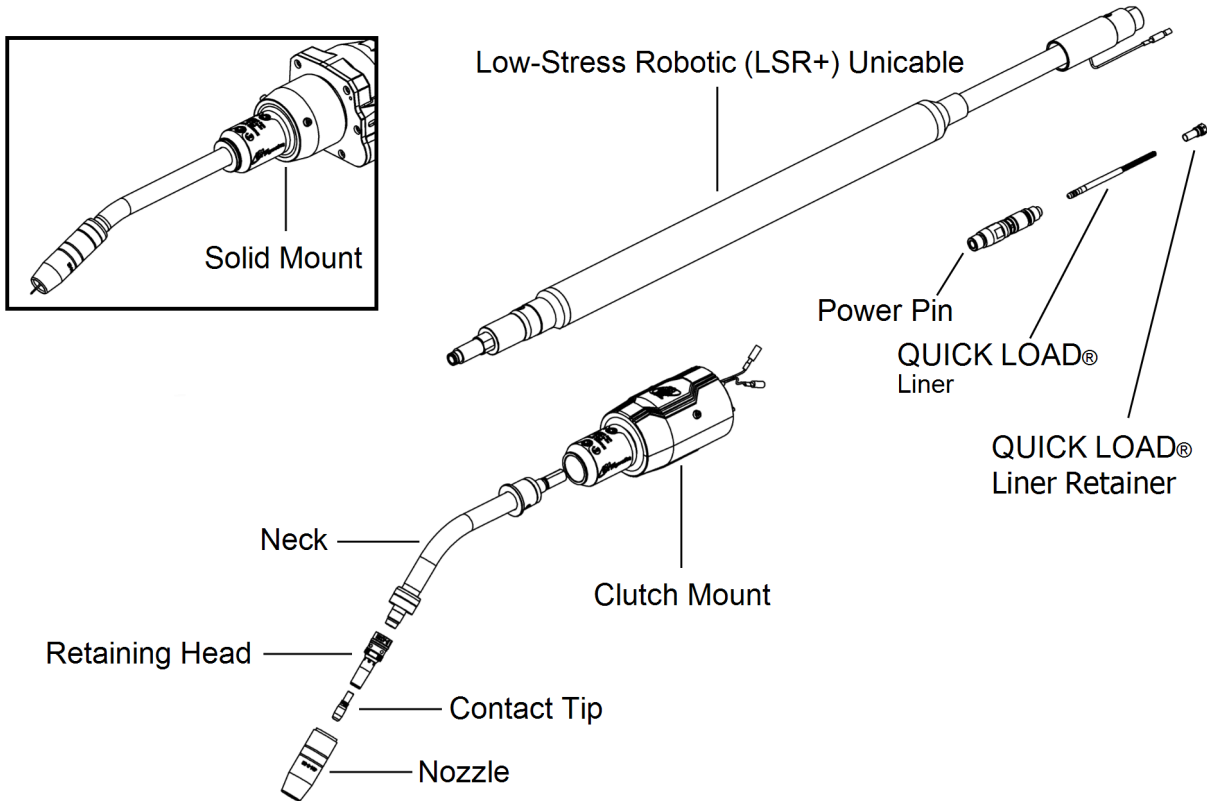
# SECTION 5 — SPECIFICATIONS

## 5-1 System Components

Robotic MIG Gun for GMAW Welding

**Duty Cycle Rating:** 100%: 350 amps with Mixed Gases

For complete parts list, please see Section 9 — Parts List on page 34.



## 5-2 Through-Arm Robotic Articulation Limits for LSR Unicables

Axis	Articulation Limits
5	+/- 90°
4+6	+/- 270°

**NOTE:** Any articulation beyond these limits is considered abuse of the cable and will accelerate LSR+ uncable wear.

# SECTION 6 — INSTALLATION

## 6-1 Installing Gun to Robot



1. Position the robot with the wrist and top axis as shown in Figure 6-A to properly complete the gun installation.
2. Loosen feeder adjustment bolts so the feeder slides freely.
3. Remove the outer cover:
  - a. Unthread (3) M4 SBHCS using a 2.5 mm Allen wrench (see Figure 6-B).
  - b. Unthread (1) M3 SHCS using a 2.5 mm Allen wrench and pull apart both cover halves (see Figure 6-B).
  - c. Insulating disc should remain in place, located by a dowel.
4. Install spacer to robot face if applicable.
5. Locate assembly onto robot mounting face using dowel pin as a guide.
6. Fully seat insulating disc on robot wrist.

**NOTE:** Do not use the fasteners to pull the face of the insulating disc to the face of the robot wrist, as damage will occur.

**IMPORTANT:** Ensure space is uniform all the way around the robot wrist before proceeding (see Figure 6-D).
7. Using the supplied tightening pattern in Figure 6-E, insert M4x20 (x6) bolts through insulating disc and mounting flange into robot face. Thread bolts clockwise using a 3 mm ball-nose Allen wrench (ball end) to 45 in-lbs (5 Nm).
8. Reinstall outer cover in reverse order of instructions in steps 3a through 3c above.

Figure 6-A

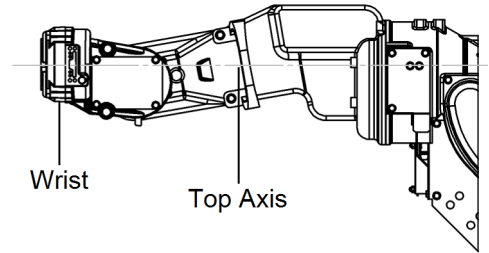


Figure 6-B

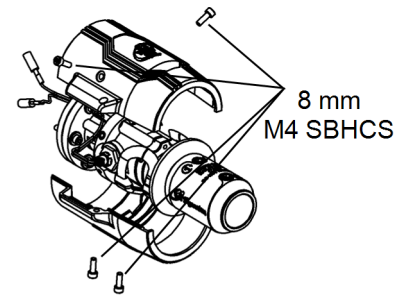


Figure 6-C

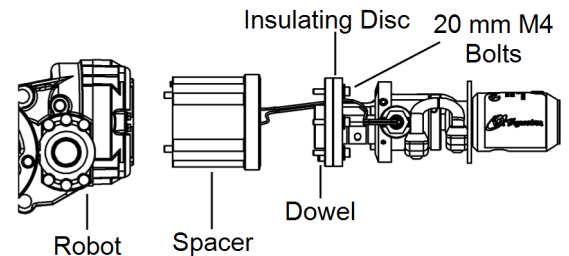


Figure 6-D

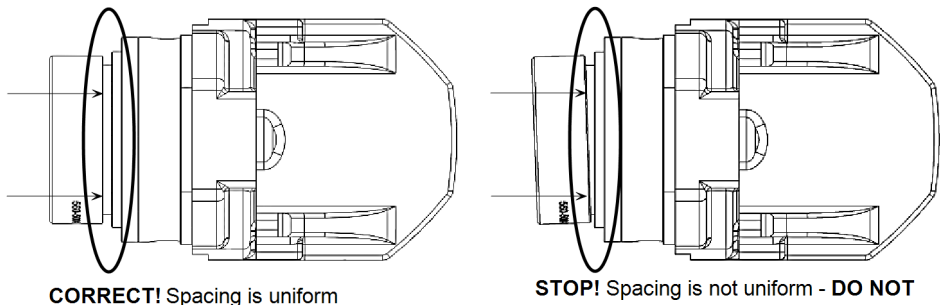
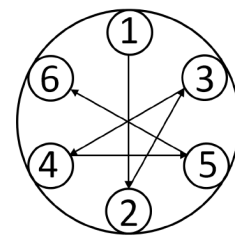


Figure 6-E



## 6-2 Installing Power Pin to Unicable

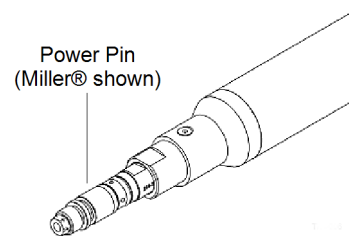


### A. Standard Power Pins

**NOTE:** Power pins incorporate a taper to seat and lock the pin to the rear handle block. Make sure the power pin is tightened in the block with a wrench to ensure the pin is secure and will not come loose.

1. Thread power pin into the adaptor of the LSR+ Unicable.
2. Tighten the power pin into the rear block using a 1" (25 mm) wrench on the rear block and a 5/8" (16 mm) or 3/4" (19 mm) wrench on the power pin.
3. Torque to 18 ft-lbs.

Figure 6-F

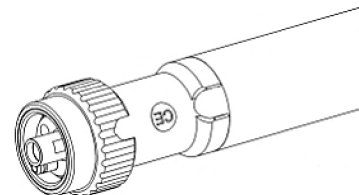


### B. Euro Connections

**NOTE:** The Euro connection comes factory-installed.

No installation required.

Figure 6-G



## 6-3 Installing LSR+ (Low-Stress Robotic) Unicable



1. Insert LSR+ Unicable through the wrist and arm of the robot (refer to Figure 6-J) and leave 6" of unicable hanging out of the wrist (not applicable to Yaskawa® Motoman® robots).
2. Insert unicable connector into flange cable connector. Ensure components are fully seated.
3. Fully insert the LSR+ Unicable into the MIG gun connector housing and secure by tightening M6x20 SHCS using a 5 mm Allen wrench to 80 in-lbs (9 Nm).
4. Connect wire connectors (non-polarity specific).

**IMPORTANT:** Leave a slack loop around flange for articulation.

Figure 6-H

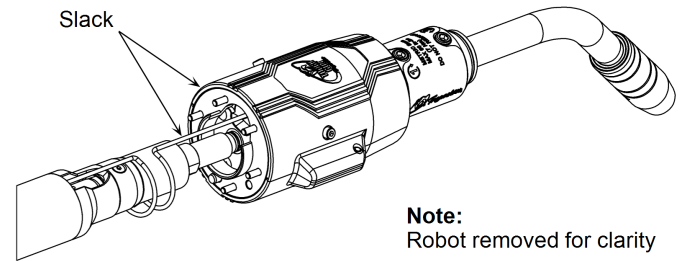
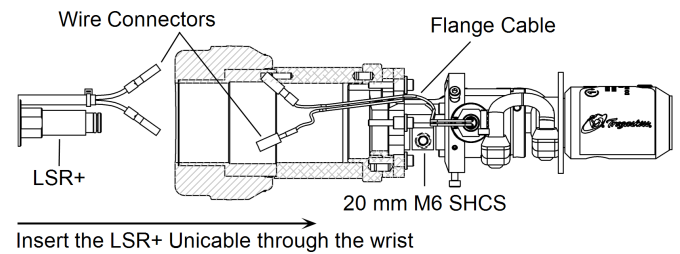


Figure 6-I



## 6-4 Installing the Neck



1. Align dowels on neck with keyway in connector housing and insert neck into the connector housing until it is fully seated.
2. Tighten set screw #1 (step 1 on sticker) clockwise with a 5 mm Allen wrench and torque to 60 in-lbs (7 Nm).
3. Tighten set screw #2 (step 2 on sticker) clockwise with a 5mm Allen wrench and torque to 60 in-lbs (7 Nm).

**NOTE:** Do not remove set screws.

Figure 6-J

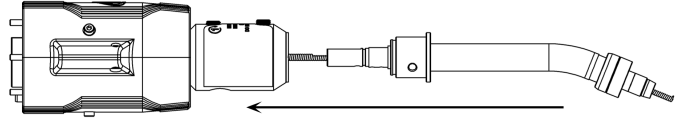
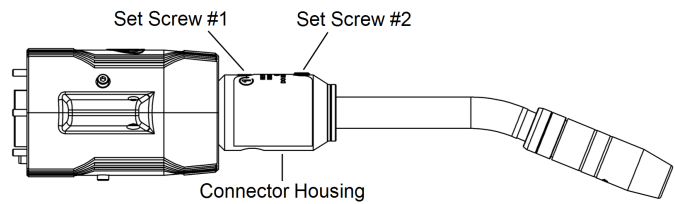


Figure 6-K

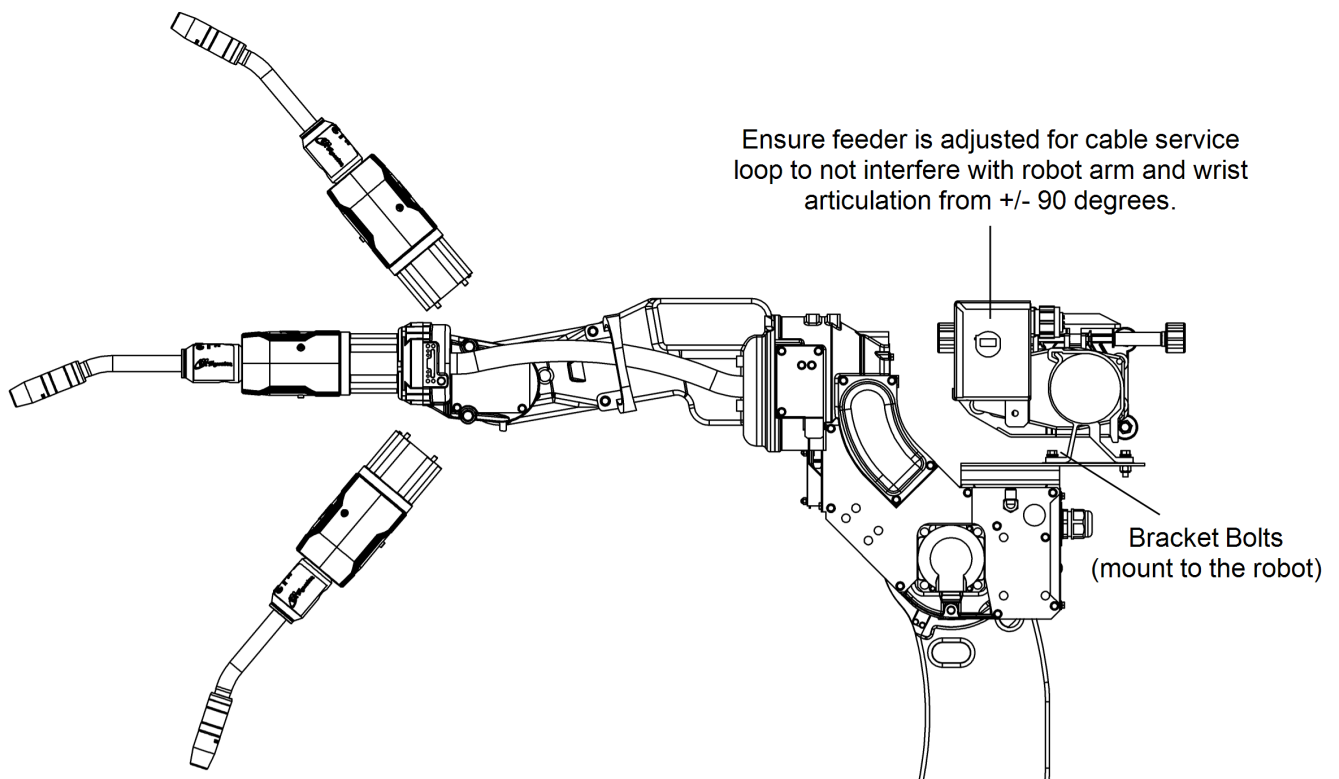


## 6-5 Installing Gun to Wire Feeder



1. Ensure that the bolts clamping the feeder to the bracket on the robot are loosened.
2. Install power pin on the rear of the unicable into the feeder.
3. Slide the feeder toward the front of the robot. This will create a necessary curve in the cable to allow for proper operation.  
**REMINDER:** The robot's top axis must be at 180 degrees during installation.
4. Articulate the wrist and allow cable to push / pull feeder into a neutral position. **NOTE:** The feeder should be pressed forward far enough that the centerline of the unicable should bow at its highest point and not interfere with the robotic casting / through-arm cover.
5. Once wrist articulation has been verified, tighten feeder bracket bolts to manufacturer's recommendations to ensure that feeder remains in the proper position.
6. Tighten feeder into position.

Figure 6-L



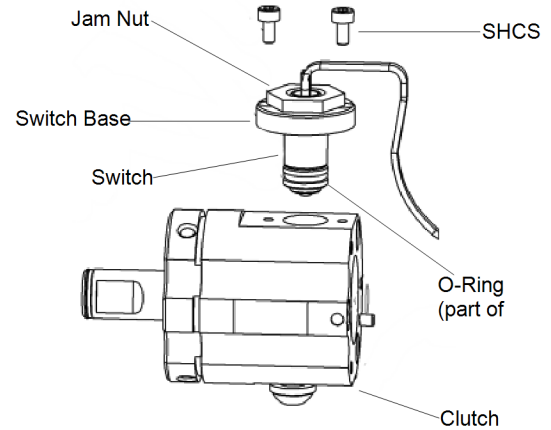
## 6-6 Installing / Adjusting the Clutch Limit Switch



1. Feed wires of switch through center holes of switch base and jam nut as shown in Figure 6-M.
2. Thread switch base far enough down on the switch body so that the switch will not bottom out when the assembly is fastened to the clutch.
3. Position switch assembly (with o-ring) in the clutch housing.
4. Insert the two M3x0.5x6 Hex SHCS into the holes in the switch base and fasten assembly to the clutch.
5. Adjust switch by rotating switch itself in the switch base to the appropriate depth. Check normally closed switch using ohmmeter to set desired level of sensitivity.
6. Once desired sensitivity is achieved, lock position of switch by torquing jam nut to 50 in-lbs (5.6 Nm) against switch base.

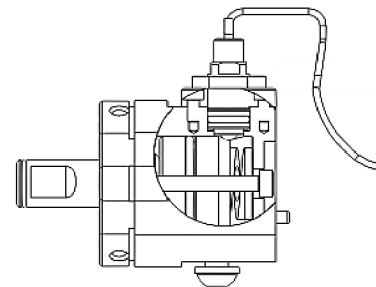
**NOTE:** Specialty tools (thin/ground down 11/16" wrench) may be required to perform these tasks.

Figure 6-M



### Exploded View

Figure 6-N



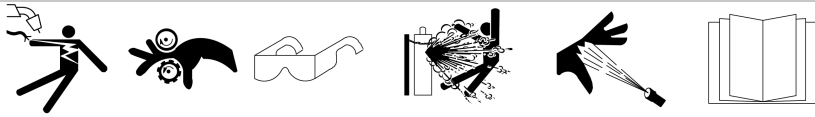
### Finished Assembly

## AS-714 Clutch Properties

1. **Force and moments:**  
Fz Axial Load: 200 lbs.  
Fx/Fy Bending Load: 160 lbs.  
Mz Torsion Load: 100 in.-lbs.
2. **Range of travel:**  
X and Y direction =  $\pm 10^\circ$   
Z direction = 0.250"
3. **Weight:** 0.65 lbs. / 0.3 kg
4. **Trip Activation Points:**  
X and Y direction =  $\pm 2^\circ$   
Z direction =  $\pm 0.012$ "  
(Rotation about Z axis 360°)

## 6-7 Connecting Wire Brake and/or Air Blast

---



### A. Wire Brake

1. Route wire brake air line to designated control valve in your facility (not provided).
2. 40-60 psi air supply required for proper operation.

### B. Air Blast

1. Route air blast air line to designated control valve in your facility (not provided).
2. 80-100 psi air supply required for proper operation.



# SECTION 7 — REPLACEMENT

## 7-1 Changing Consumables

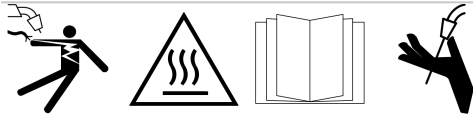
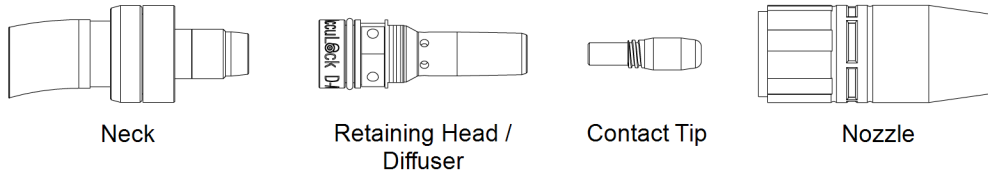


Figure 7-A



### IMPORTANT NOTES:

- Neck insulator **MUST** be in place before welding to properly insulate neck armor.
- Check all parts to ensure that connections are tight before welding.
- The retaining head / diffuser **MUST** be tightened with a 5/8" (16 mm) wrench to prevent the contact tip from overheating.
- **DO NOT** use pliers to remove or tighten the retaining head / diffuser or scoring may result.

### A. Changing the Nozzle

1. Pull slip-on nozzles off with a twisting motion.
2. When installing the nozzle, ensure that it is fully seated.

### B. Changing the Contact Tip

1. Thread the contact tip into the retaining head / diffuser.
2. Torque to 30 in-lbs (3.5 Nm)
3. The Tregaskiss Tip Tool (part #450-18 for TOUGH LOCK heavy duty tips, or part # T-ALTOOL for AccuLock tips) or a pair of weld pliers are the optimal tools for contact tip installation.

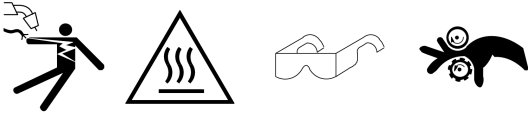
### C. Changing the Retaining Head / Diffuser

1. Thread the retaining head / diffuser onto neck with a 5/8" (16 mm) wrench.
2. Torque to 80 in-lbs (9 Nm).  
**IMPORTANT:** DO NOT use pliers to remove or tighten the heavy duty retaining head / diffuser or scoring may result.

### D. Changing the Neck Insulator

1. The neck insulator is pressed onto the neck by hand with the aluminum side towards the neck and the black insulation towards the nozzle.

## 7-2 Changing the Neck



1. Insert new neck over the liner and into connector housing until neck is fully seated.
2. Tighten set screw #1 (step 1 on sticker) clockwise with a 5 mm Allen wrench and torque to 60 in-lbs (7 Nm).
3. Tighten set screw #2 (step 2 on sticker) clockwise with a 5mm Allen wrench and torque to 60 in-lbs (7 Nm).

**NOTE:** Do not remove set screws.

**IMPORTANT:** For best results, install the neck without the consumables so that the liner can pass through easily.

3. Trim liner (see section 7-3 Changing the Liner on page 21).
4. Install front-end consumables (see section 7-1 Changing Consumables on page 19).

Figure 7-B

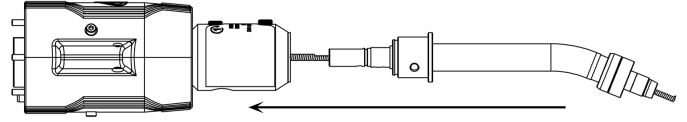
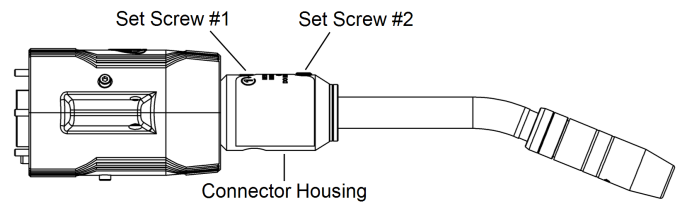
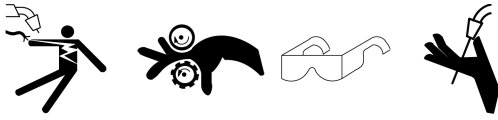


Figure 7-C



## 7-3 Changing the Liner



### A. Changing QUICK LOAD® Liner

**NOTE:** Ensure power supply is off before proceeding.

1. Remove consumables (nozzle, contact tip and retaining head / diffuser) (see 7-1 Changing Consumables on page 19).
2. Remove existing QUICK LOAD Liner by pulling it out from the neck.
3. Insert the new QUICK LOAD Liner through the neck using the welding wire as a guide. Short strokes will prevent kinking.
4. Once the liner stops feeding, give it an extra push until it bottoms out in the liner retainer in the power pin to ensure it is inserted completely. **NOTE:** Be careful not to kink the liner.
5. Push liner back into gun and hold in place. Using liner gauge, trim liner to a 1/2" stick-out. **HELPFUL HINT:** Before cutting the liner with wire inside, mark the liner using the gauge and then pull the liner out beyond the end of the welding wire; then cut the liner and push it back into place securely. This will help with feeding the wire through the contact tip afterward.
6. Remove any burr that may obstruct wire feed.
7. Reinstall front-end consumables onto neck.

Figure 7-D

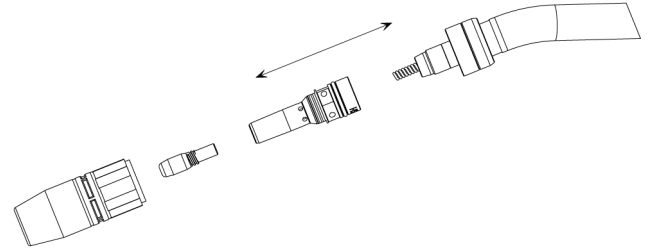


Figure 7-E

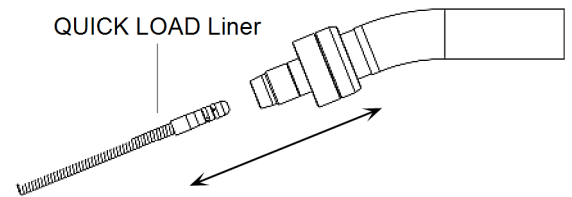
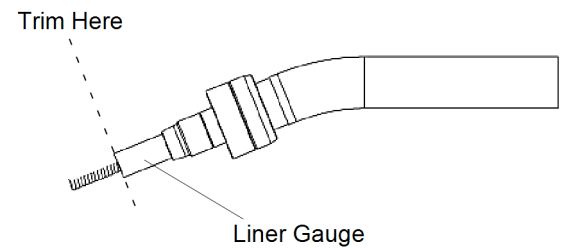
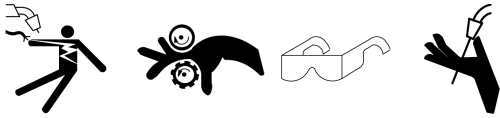


Figure 7-F



## 7-4 Changing the Euro Connection



1. Remove M5x6 mm countersunk fasteners.
2. Slide the hand nut over the Euro power pin body.
3. Torque the power pin body to the threaded end of the unicable at 18 ft-lbs (24 Nm) using 7/8" and 13/16" wrenches.  
**NOTE:** You may have to pull back on the outer conduit to achieve this.
4. Once the power pin body is in place, pull the conduit down over it. Rotate the conduit so that the holes on the power pin line up with the holes on the plastic end of the conduit.
5. Reinstall fasteners.

Figure 7-G

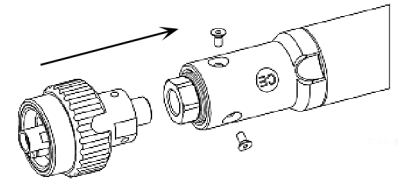
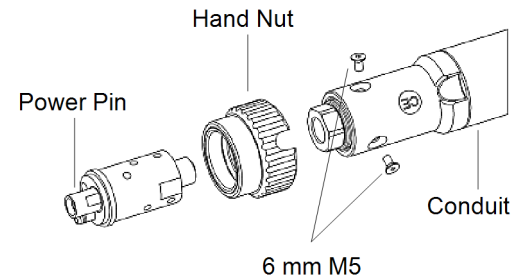
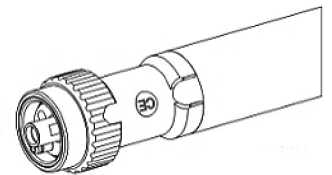


Figure 7-H



## 7-5 Changing TOUGH GUN I.C.E.™ Components

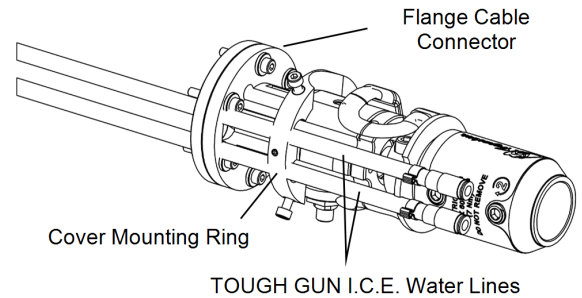


### A. Changing the Water Lines

**NOTE:** Make sure water supply is turned off before changing the water lines.

1. Remove the outer cover.
2. Pull the water lines through the flange cable connector and cover mounting ring.
3. Replace the outer cover.

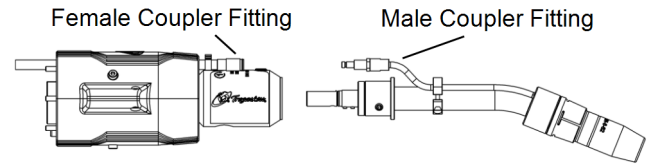
Figure 7-I



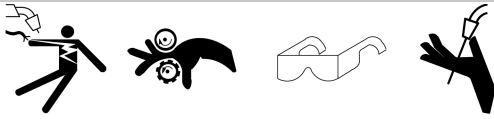
### B. Installing the Neck

1. Align dowels on neck with keyway in connector housing and insert neck into the connector housing until it is fully seated.
2. Connect neck male coupler fitting to water line female coupler fitting.
3. Tighten neck bolt clockwise with a 5 mm Allen wrench and torque to 60 in-lbs (7 Nm).

Figure 7-J



## 7-6 Replacing the Wire Brake



1. Remove power pin from feeder.
2. Trim and remove excess wire.
3. Remove front-end consumables and neck, including jump liner.
4. Shut off and disconnect 1/8" air supply at the wire brake pushing unit (see Figure 7-K).
5. Unthread and remove the wire brake pushing unit to allow the wire guide to be released (see Figure 7-L).
6. Carefully slide the wire guide using the wire guide tool out of the gun body (see Figure 7-M).
7. Inspect for wear and swap for proper wire size as required.  
**NOTE:** 0.035"-0.045" with one guide, 0.052"-1/16" with another.
8. Reinstall appropriate wire guide using the wire guide tool with the flats oriented (see Figure 7-M). Align the hole with pushing unit pin (see Figure 7-L).
9. Reinstall the wire brake pushing unit by threading it in until it stops, and then reconnect the air lines and turn on the air pressure.
10. Reinstall power pin to feeder.
11. Reinstall consumables and neck, including the jump liner.
12. Feed wire through the gun.
13. Disconnect drive rolls to allow wire to be pulled through the gun. Pull 6'-8' out of the gun. **NOTE:** The wire should pull through the gun easily. If the wire binds, double check the wire guide to ensure it's the proper size.
14. Activate the wire brake via the robot controller and attempt to pull additional wire out from gun. **NOTE:** The wire should no longer move.

Figure 7-K

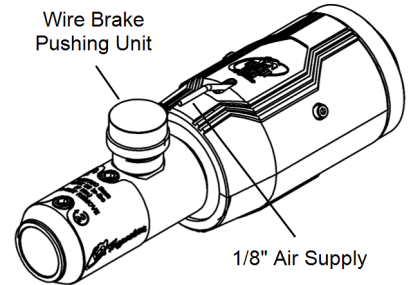


Figure 7-L

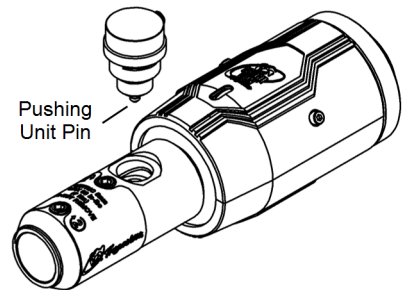
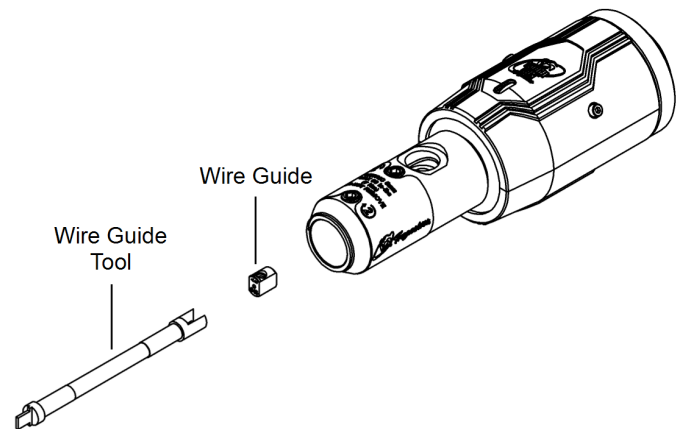
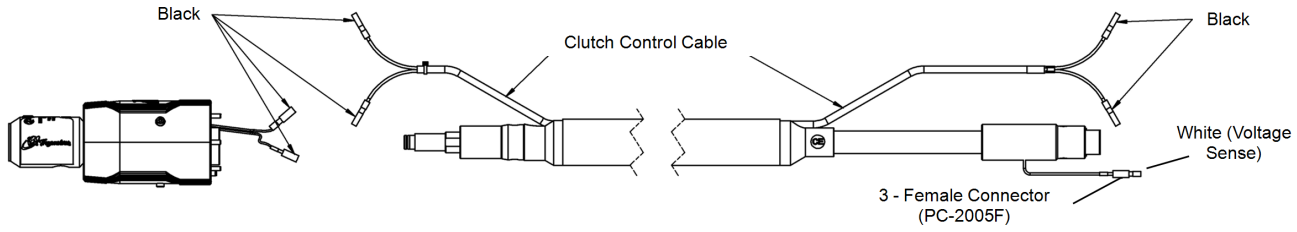


Figure 7-M

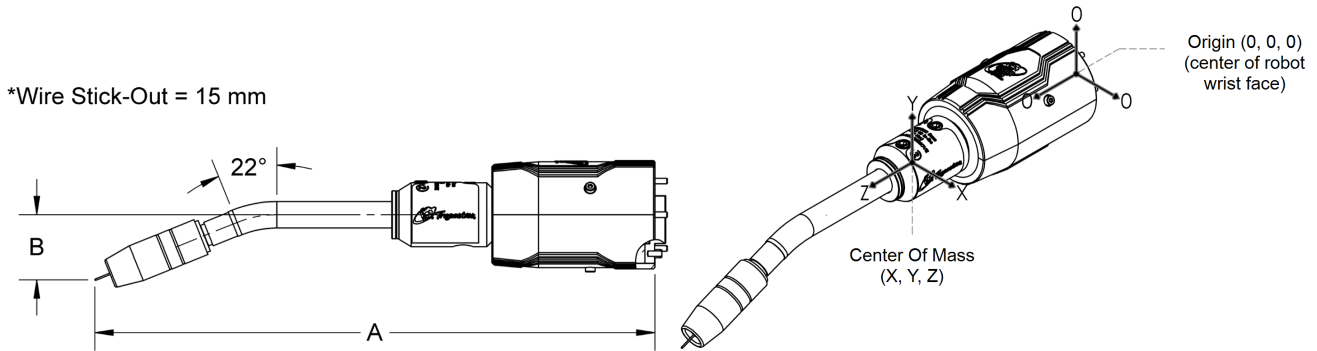


# SECTION 8 — TECHNICAL DATA

## 8-1 Wiring Diagram



## 8-2 Center of Mass Coordinates - 22 Degree (Clutch)



Clutch - 22 Degree						
405-22QC	A	B	X	Y	Z	Weight
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic® (TB1800WGIII)	402.32 mm	46.89 mm	-0.491 mm	-3.884 mm	128.506 mm	1.799 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU® (Smart5 Arc6)	411.85 mm	46.89 mm	-0.452 mm	-3.720 mm	131.320 mm	1.894 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	470.27 mm	46.89 mm	-0.391 mm	-3.117 mm	164.862 mm	2.238 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	507.50 mm	46.89 mm	-0.349 mm	-2.930 mm	181.802 mm	2.512 kg
Kawasaki (BA006N)	487.71 mm	46.89 mm	-0.369 mm	-3.007 mm	168.125 mm	2.435 kg
KUKA (KR16 arc HW)	414.31 mm	46.89 mm	-0.460 mm	-3.699 mm	132.164 mm	1.906 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	516.00 mm	47.00 mm	-0.842 mm	-2.604 mm	174.600 mm	2.573 kg
405-22QCL	A	B	X	Y	Z	Weight
Yaskawa® Motoman®, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	460.11 mm	46.89 mm	-0.471 mm	-3.729 mm	143.499 mm	1.873 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	469.63 mm	46.89 mm	-0.435 mm	-3.579 mm	145.845 mm	1.968 kg

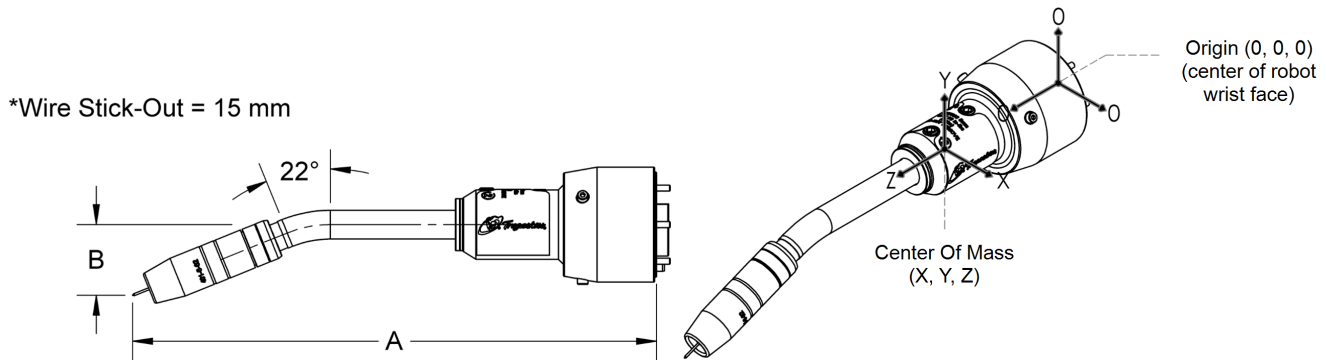
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	528.05 mm	46.89 mm	-0.379 mm	-3.016 mm	178.025 mm	2.313 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	565.28mm	46.89 mm	-0.339 mm	-2.845 mm	194.154 mm	2.586 kg
Kawasaki (BA006N)	545.50 mm	46.89 mm	-0.358 mm	-2.918 mm	180.651 mm	2.509 kg
KUKA (KR16 arc HW)	472.09 mm	46.89 mm	-0.443 mm	-3.559 mm	146.629 mm	1.980 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	574.00 mm	47.00 mm	-0.832 mm	-2.530 mm	196.789 mm	2.648 kg
<b>405-22QCL1</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	515.46 mm	46.89 mm	-0.454 mm	-3.592 mm	158.866 mm	1.945 kg
OTC Daihen® (All B4, All B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	524.98 mm	46.89 mm	-0.420 mm	-3.454 mm	160.749 mm	2.040 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	583.40 mm	46.89 mm	-0.367 mm	-2.926 mm	191.560 mm	2.384 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	620.63 mm	46.89 mm	-0.330 mm	-2.769 mm	206.862 mm	2.658 kg
Kawasaki (BA006N)	600.84 mm	46.89 mm	-0.348 mm	-2.837 mm	193.542 mm	2.581 kg
KUKA (KR16 arc HW)	527.44 mm	46.89 mm	-0.427 mm	-3.436 mm	161.475 mm	2.052 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	629.00 mm	47.00 mm	-0.823 mm	-2.464 mm	209.328 mm	2.791 kg

<b>Clutch with Wire Brake - 22 Degree</b>						
<b>405-22QC</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	439.15 mm	46.89 mm	-0.410 mm	-2.347 mm	143.733 mm	2.140 kg
OTC Daihen® (All B4, All B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	448.68 mm	46.89 mm	-0.384 mm	-2.280 mm	147.023 mm	2.232 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	507.10 mm	46.89 mm	-0.340 mm	-1.948 mm	181.732 mm	2.577 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	544.33 mm	46.89 mm	-0.308 mm	-1.896 mm	199.524 mm	2.850 kg
Kawasaki (BA006N)	524.54 mm	46.89 mm	-0.324 mm	-1.935 mm	185.430 mm	2.773 kg
KUKA (KR16 arc HW)	451.14 mm	46.89 mm	-0.391 mm	-2.269 mm	147.901 mm	2.244 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	553.00 mm	47.00 mm	-0.802 mm	-1.629 mm	202.393 mm	2.912 kg
<b>405-22QCL</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	496.94 mm	46.89 mm	-0.396 mm	-2.267 mm	157.144 mm	2.214 kg
OTC Daihen® (All B4, All B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	506.46 mm	46.89 mm	-0.372 mm	-2.206 mm	160.097 mm	2.307 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	564.88 mm	46.89 mm	-0.331 mm	-1.893 mm	181.880 mm	2.651 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	602.11 mm	46.89 mm	-0.300 mm	-1.847 mm	200.151 mm	2.925 kg
Kawasaki (BA006N)	582.33 mm	46.89 mm	-0.316 mm	-1.884 mm	196.977 mm	2.848 kg
KUKA (KR16 arc HW)	508.92 mm	46.89 mm	-0.378 mm	-2.196 mm	160.931 mm	2.319 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	611.00 mm	47.00 mm	-0.795 mm	-1.588 mm	213.673 mm	2.986 kg
<b>405-22QCL1</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>



Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	552.29 mm	46.89 mm	-0.383 mm	-2.917 mm	170.942 mm	2.285 kg
OTC Daihen® (All B4, All B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	561.81 mm	46.89 mm	-0.361 mm	-2.140 mm	173.555 mm	2.378 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	620.23 mm	46.89 mm	-0.322 mm	-1.844 mm	180.540 mm	2.722 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	657.46 mm	46.89 mm	-0.293 mm	-1.803 mm	199.385 mm	2.996 kg
Kawasaki (BA006N)	637.67 mm	46.89 mm	-0.308 mm	-1.838 mm	208.873 mm	2.919 kg
KUKA (KR16 arc HW)	564.27 mm	46.89 mm	-0.367 mm	-2.130 mm	174.346 mm	2.390 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	666.00 mm	47.00 mm	-0.788 mm	-1.551 mm	225.289 mm	3.057 kg

### 8-3 Center of Mass Coordinates - 22 Degree (Solid Mount)



Solid Mount - 22 Degree						
405-22QC	A	B	X	Y	Z	Weight
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	346.96 mm	46.89 mm	0.003 mm	-4.197 mm	101.325 mm	1.549 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	356.48 mm	46.89 mm	0.004 mm	-3.915 mm	103.827 mm	1.658 kg
ABB (IRB2600ID, IRB1660ID)	359.15 mm	46.89 mm	0.003 mm	-3.713 mm	101.467 mm	1.743 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	414.90 mm	46.89 mm	-0.019 mm	-4.199 mm	101.307 mm	1.548 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	452.39 mm	46.89 mm	0.003 mm	-3.047 mm	157.711 mm	2.259 kg
Kawasaki (BA006N)	431.55 mm	46.89 mm	-0.007 mm	-3.137 mm	134.722 mm	2.183 kg
Kawasaki (BA013N)			-0.007 mm	-2.996 mm	151.416 mm	2.333 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	459.00 mm	47.00 mm	0.001 mm	-2.681 mm	160.423 mm	2.321 kg
405-22QCL	A	B	X	Y	Z	Weight
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	404.74 mm	46.89 mm	0.003 mm	-4.404 mm	117.319 mm	1.623 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	414.27 mm	46.89 mm	0.003 mm	-3.746 mm	119.119 mm	1.732 kg
ABB (IRB2600ID, IRB1660ID)	416.94 mm	46.89 mm	0.003 mm	-3.569 mm	116.249 mm	1.817 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	472.69 mm	46.89 mm	-0.018 mm	-4.006 mm	117.308 mm	1.623 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	510.17 mm	46.89 mm	0.0032 mm	-2.949 mm	170.399 mm	2.334 kg
Kawasaki (BA006N)	489.34 mm	46.89 mm	-0.007 mm	-3.033 mm	156.616 mm	2.25 kg

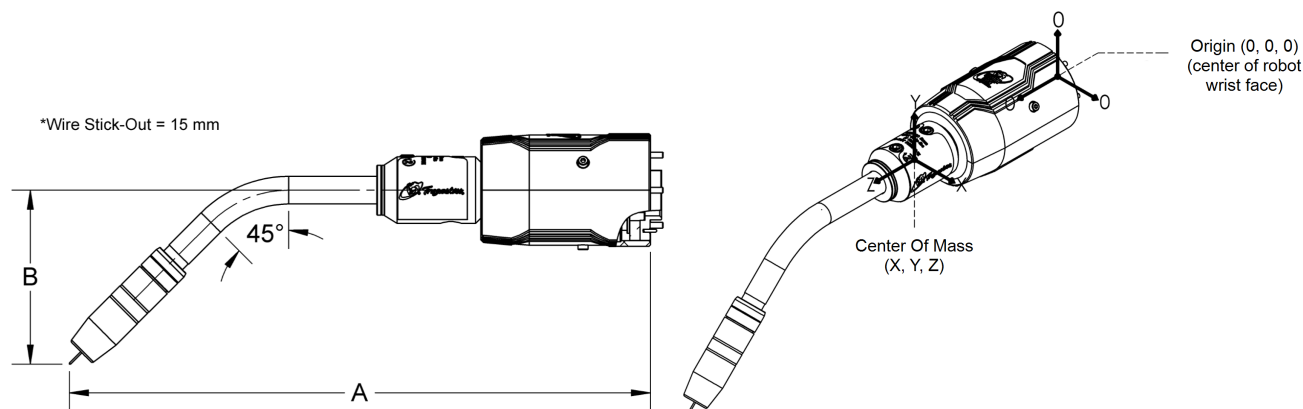
Kawasaki (BA013N)			-0.007 mm	2.903 mm	163.914 mm	2.407 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	517.00 mm	47.00 mm	0.001 mm	-2.597 mm	172.916 mm	2.395 kg
<b>405-22QCL1</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	460.09 mm	46.89 mm	0.003 mm	-3.835 mm	133.709 mm	1.695 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	469.62 mm	46.89 mm	0.003 mm	-3.598 mm	134.827 mm	1.830 kg
ABB (IRB2600ID, IRB1660ID)	472.28 mm	46.89 mm	0.003 mm	-3.426 mm	131.459 mm	1.888 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	528.04 mm	46.89 mm	-0.018 mm	-3.837 mm	133.704 mm	1.694 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	565.52 mm	46.89 mm	0.003 mm	-2.862 mm	183.499 mm	2.405 kg
Kawasaki (BA006N)	544.68 mm	46.89 mm	-0.007 mm	-2.940 mm	169.932 mm	2.328 kg
Kawasaki (BA013N)			-0.007 mm	-2.819 mm	176.816 mm	2.478 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	572.00 mm	47.00 mm	0.001 mm	-2.522 mm	185.817 mm	2.466 kg

### Solid Mount with Wire Brake - 22 Degree

<b>405-22QC</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	382.77 mm	46.89 mm	0.002 mm	-2.412 mm	113.123 mm	1.886 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	392.30 mm	46.89 mm	0.003 mm	-2.276 mm	116.168 mm	1.994 kg
ABB (IRB2600ID, IRB1660ID)	394.96 mm	46.89 mm	0.003 mm	-2.173 mm	114.117 mm	2.080 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	450.72 mm	46.89 mm	-0.016 mm	-2.414 mm	113.111 mm	1.885 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	488.20 mm	46.89 mm	0.002 mm	-1.900 mm	172.643 mm	2.596 kg
Kawasaki (BA006N)	467.37 mm	46.89 mm	-0.007 mm	-1.943 mm	158.192 mm	2.519 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	495.00 mm	47.00 mm	0.001 mm	-1.607 mm	175.540 mm	2.658 kg
<b>405-22QCL</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	440.56 mm	46.89 mm	0.002 mm	-2.320 mm	127.279 mm	1.960 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	450.08 mm	46.89 mm	0.003 mm	-2.193 mm	129.814 mm	2.069 kg
ABB (IRB2600ID, IRB1660ID)	452.75 mm	46.89 mm	0.003 mm	-2.098 mm	127.387 mm	2.154 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	508.50 mm	46.89 mm	-0.015 mm	-2.321 mm	127.273 mm	1.960 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	545.99 mm	46.89 mm	0.002 mm	-1.846 mm	184.311 mm	2.671 kg
Kawasaki (BA006N)	525.15 mm	46.89 mm	-0.006 mm	-1.887 mm	170.024 mm	2.594 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	553.00 mm	47.00 mm	0.001 mm	1.563 mm	187.055 mm	2.732 kg
<b>405-22QCL1</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	495.90 mm	46.89 mm	0.002 mm	-2.239 mm	141.859 mm	2.031 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	505.43 mm	46.89 mm	0.003 mm	-2.120 mm	143.886 mm	2.140 kg
ABB (IRB2600ID, IRB1660ID)	508.10 mm	46.89 mm	0.002 mm	-2.030 mm	141.085 mm	2.225 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	563.85 mm	46.89 mm	-0.015 mm	-2.240 mm	141.857 mm	2.031 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	601.33 mm	46.89 mm	0.002 mm	-1.798 mm	196.371 mm	2.742 kg
Kawasaki (BA006N)	580.50 mm	46.89 mm	-0.006 mm	-1.836 mm	182.257 mm	2.665 kg

KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	608.00 mm	47.00 mm	-1.523 mm	-1.523 mm	198.957 mm	2.803 kg
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## 8-4 Center of Mass Coordinates - 45 Degree (Clutch)



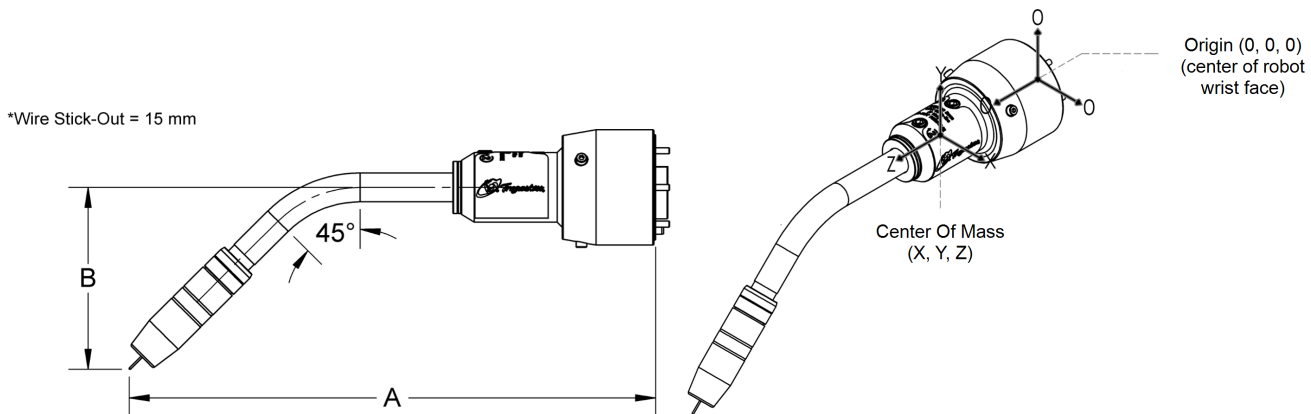
Clutch - 45 Degree						
405-45QC	A	B	X	Y	Z	Weight
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	354.61 mm	100.35 mm	-0.493 mm	-8.486 mm	121.771 mm	1.778 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	364.13 mm	100.35 mm	-0.458 mm	-8.102 mm	124.938 mm	1.870 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	422.55 mm	100.35 mm	-0.396 mm	-6.811 mm	159.208 mm	2.215 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	459.78mm	100.35 mm	-0.352 mm	-6.216 mm	176.578 mm	2.488 kg
Kawasaki (BA006N)	439.99 mm	100.35 mm	-0.373 mm	-6.399 mm	162.802 mm	2.411 kg
KUKA (KR16 arc HW)	366.58 mm	100.35 mm	-0.466 mm	-8.052 mm	125.812 mm	1.883 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	496.00 mm	100.00 mm	-0.845 mm	-5.808 mm	179.461 mm	2.550 kg
405-45QCL	A	B	X	Y	Z	Weight
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	401.69 mm	120.24 mm	-0.477 mm	-11.216 mm	133.639 mm	1.837 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	411.22 mm	120.24 mm	-0.444 mm	-10.714 mm	136.433 mm	1.930 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	469.64 mm	120.24 mm	-0.385 mm	-9.061 mm	169.594 mm	2.274 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	506.86 mm	120.24 mm	-0.344 mm	-8.238 mm	186.311 mm	2.548 kg
Kawasaki (BA006N)	487.08 mm	120.24 mm	-0.364 mm	-8.480 mm	172.674 mm	2.471 kg
KUKA (KR16 arc HW)	413.67 mm	120.24 mm	-0.451 mm	-10.649 mm	137.259 mm	1.942 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	516.00 mm	120.00 mm	-0.837 mm	-7.792 mm	189.063 mm	2.609 kg
405-45QCL1	A	B	X	Y	Z	Weight
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	457.04 mm	120.24 mm	-0.456 mm	-10.815 mm	149.761 mm	1.921 kg

OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	466.56 mm	120.24 mm	-0.426 mm	-10.352 mm	152.093 mm	2.013 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	524.98 mm	120.24 mm	-0.372 mm	-8.811 mm	183.858 mm	2.357 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	562.21 mm	120.24 mm	-0.333 mm	-8.040 mm	199.740 mm	2.631 kg
Kawasaki (BA006N)	542.42 mm	120.24 mm	-0.352 mm	-8.268 mm	186.281 mm	2.554 kg
KUKA (KR16 arc HW)	469.02 mm	120.24 mm	-0.433 mm	-10.292 mm	152.859 mm	2.025 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	571.00 mm	120.00 mm	-0.826 mm	-7.612 mm	202.322 mm	2.692 kg
<b>405-45QCL2</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	507.03 mm	120.24 mm	-0.441 mm	-10.465 mm	164.196 mm	1.985 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	516.55 mm	120.24 mm	-0.412 mm	-10.031 mm	166.108 mm	2.077 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	574.97 mm	120.24 mm	-0.362 mm	-8.577 mm	196.590 mm	2.422 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	612.20 mm	120.24 mm	-0.325 mm	-7.848 mm	211.68 mm	2.695 kg
Kawasaki (BA006N)	592.41 mm	120.24 mm	-0.343 mm	-8.064 mm	198.405 mm	2.618 kg
KUKA (KR16 arc HW)	519.00 mm	120.24 mm	-0.419 mm	-9.975 mm	166.820 mm	2.090 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	621.00 mm	120.00 mm	-0.819 mm	-7.434 mm	214.112 mm	2.757 kg

<b>Clutch with Wire Brake - 45 Degree</b>						
<b>405-45QC</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	391.44 mm	100.35 mm	-0.414 mm	-6.204 mm	137.927 mm	2.116 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	400.96 mm	100.35 mm	-0.388 mm	-5.975 mm	141.393 mm	2.209 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	459.38 mm	100.35 mm	-0.343 mm	-5.142 mm	176.644 mm	2.553 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	496.26 mm	100.35mm	-0.310 mm	-4.780 mm	194.766 mm	2.827 kg
Kawasaki (BA006N)	476.82 mm	100.35 mm	-0.327 mm	-4.900 mm	180.595 mm	2.750 kg
KUKA (KR16 arc HW)	403.41 mm	100.35 mm	-0.395 mm	-5.944 mm	142.294 mm	2.221 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	505.00 mm	100.00 mm	-0.805 mm	-4.450 mm	197.702 mm	2.888 kg
<b>405-45QCL</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	438.52 mm	120.24 mm	-0.403 mm	-0.014 mm	148.514 mm	2.176 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	448.05 mm	120.24 mm	-0.378 mm	-8.253 mm	151.707 mm	2.268 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	506.47 mm	120.24 mm	-0.335 mm	-7.139 mm	186.125 mm	2.612 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	543.35 mm	120.24 mm	-0.304 mm	-6.595 mm	203.742 mm	2.886 kg
Kawasaki (BA006N)	523.91 mm	120.24 mm	-0.320 mm	-6.762 mm	189.680 mm	2.809 kg
KUKA (KR16 arc HW)	450.50 mm	120.24 mm	-0.384 mm	-8.211 mm	152.572 mm	2.280 kg

KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	553.00 mm	120.00 mm	-0.798 mm	-6.234 mm	206.576 mm	2.947 kg
<b>405-45QCCL1</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	493.87 mm	120.24 mm	-0.388 mm	-8.329 mm	163.028 mm	2.259 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	503.39 mm	120.24 mm	-0.365 mm	-8.030 mm	165.875 mm	2.351 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	561.81 mm	120.24 mm	-0.325 mm	-6.979 mm	199.224 mm	2.696 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	598.69 mm	120.24 mm	-0.295 mm	-6.465 mm	216.183 mm	2.969 kg
Kawasaki (BA006N)	579.23 mm	120.24 mm	-0.311 mm	-6.624 mm	202.265 mm	2.892 kg
KUKA (KR16 arc HW)	505.85 mm	120.24 mm	-0.371 mm	-7.991 mm	166.695 mm	2.364 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	608.00 mm	120.00 mm	-0.790 mm	-6.116 mm	218.883 mm	3.031 kg
<b>405-45QCCL2</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, OTC Daihen® (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	543.86 mm	120.24 mm	-0.377 mm	-8.098 mm	176.013 mm	2.323 kg
OTC Daihen® (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	553.38 mm	120.24 mm	-0.355 mm	-7.816 mm	178.540 mm	2.416 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	611.80 mm	120.24 mm	-0.318 mm	-6.817 mm	210.895 mm	2.760 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	648.68 mm	120.24 mm	-0.289 mm	-6.328 mm	227.231 mm	3.034 kg
Kawasaki (BA006N)	629.24 mm	120.24 mm	-0.304 mm	-6.480 mm	213.455 mm	2.957 kg
KUKA (KR16 arc HW)	555.83 mm	120.24 mm	-0.361 mm	-7.779 mm	179.319 mm	2.428 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	658.00 mm	120.00 mm	-0.784 mm	-5.959 mm	229.805 mm	3.095 kg

## 8-5 Center of Mass Coordinates - 45 Degree (Solid Mount)



Solid Mount - 45 Degree						
<b>405-45QC</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	299.24 mm	100.35 mm	0.003 mm	-9.577 mm	94.044 mm	1.526 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	308.77 mm	100.35 mm	0.004 mm	-8.933 mm	96.928 mm	1.634 kg
ABB (IRB2600ID, IRB1660ID)	311.43 mm	100.35 mm	0.003 mm	-8.480 mm	94.841 mm	1.719 kg

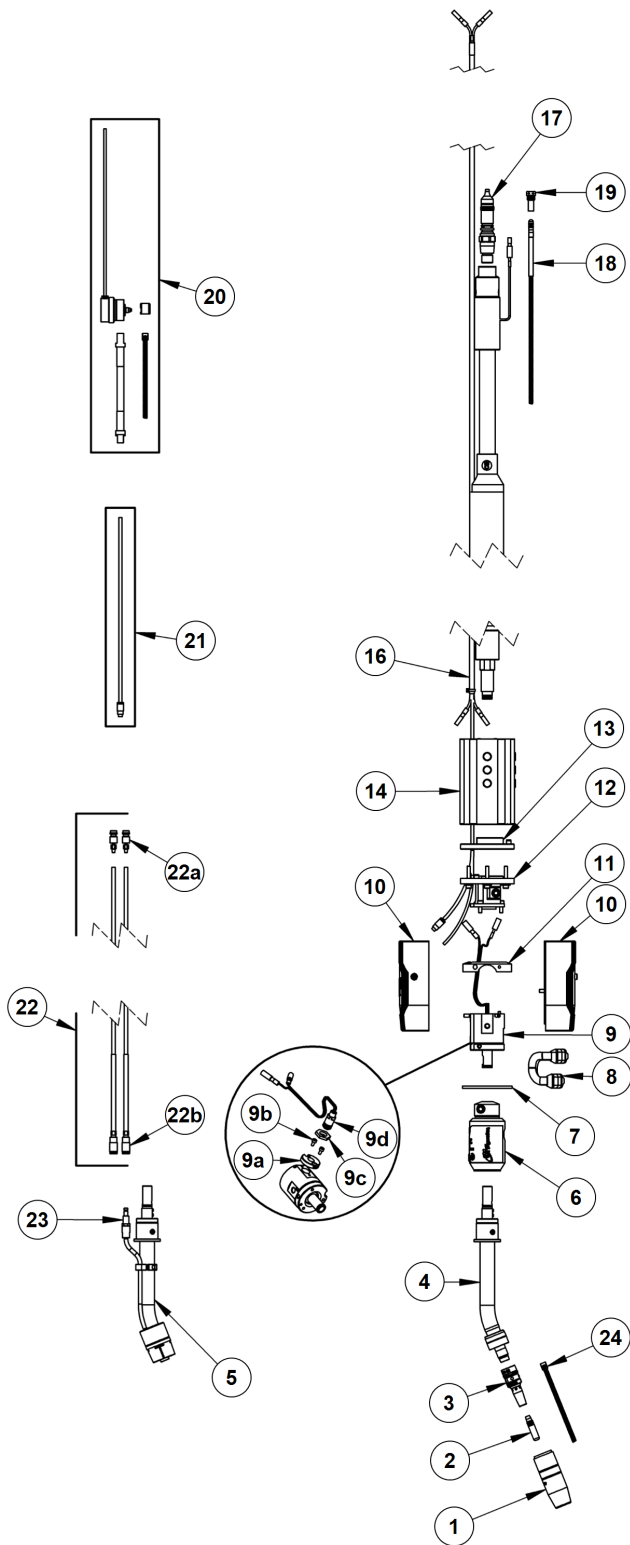
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	367.19 mm	100.35 mm	0.002 mm	-7.443 mm	133.726 mm	1.962 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	404.67 mm	100.35 mm	0.003 mm	-6.705 mm	152.227 mm	2.236 kg
Kawasaki (BA006N)	383.83 mm	100.35 mm	-0.007 mm	-6.927 mm	138.117 mm	2.159 kg
Kawasaki (BA013N)			-0.007 mm	-6.640 mm	145.988 mm	2.309 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	412.00 mm	100.00 mm	0.001 mm	-6.238 mm	155.043 mm	2.297 kg
<b>405-45QCL</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	346.33 mm	120.24 mm	0.003 mm	-12.701 mm	106.750 mm	1.585 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	355.85 mm	120.24 mm	0.003 mm	-11.880 mm	109.052 mm	1.694 kg
ABB (IRB2600ID, IRB1660ID)	358.52 mm	120.24 mm	0.003 mm	-11.301 mm	106.544 mm	1.779 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	414.27 mm	120.24 mm	0.002 mm	-9.956 mm	144.519 mm	2.022 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	451.76 mm	120.24 mm	0.003 mm	-8.937 mm	162.224 mm	2.295 kg
Kawasaki (BA006N)	430.92 mm	120.24 mm	-0.007 mm	-9.230 mm	148.280 mm	2.218 kg
Kawasaki (BA013N)			-0.007 mm	-8.850 mm	155.836 mm	2.369 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	459.00 mm	120.00 mm	0.001 mm	-8.424 mm	164.883 mm	2.357 kg
<b>405-45QCL1</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	401.67 mm	120.24 mm	0.003 mm	-12.166 mm	123.872 mm	1.668 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	411.20 mm	120.24 mm	0.003 mm	-11.416 mm	125.465 mm	1.777 kg
ABB (IRB2600ID, IRB1660ID)	413.87 mm	120.24 mm	0.003 mm	-10.884 mm	122.439 mm	1.862 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	469.62 mm	120.24 mm	0.002 mm	-9.640 mm	159.281 mm	2.105 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	507.10 mm	120.24 mm	0.003 mm	-8.693 mm	175.979 mm	2.379 kg
Kawasaki (BA006N)	486.26 mm	120.24 mm	-0.007 mm	-8.967 mm	162.245 mm	2.302 kg
Kawasaki (BA013N)			-0.007 mm	-8.617 mm	169.379 mm	2.452 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	514.00 mm	120.00 mm	0.001 mm	-8.204 mm	178.437 mm	2.440 kg
<b>405-45QCL2</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	451.66 mm	120.24 mm	0.003 mm	-11.714 mm	139.300 mm	1.733 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	461.19 mm	120.24 mm	0.003 mm	-11.016 mm	140.260 mm	1.841 kg
ABB (IRB2600ID, IRB1660ID)	463.85 mm	120.24 mm	0.003 mm	-10.520 mm	136.771 mm	1.926 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	519.61 mm	120.24 mm	0.002 mm	-9.354 mm	172.568 mm	2.169 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	557.09 mm	120.24 mm	0.003 mm	-8.464 mm	188.325 mm	2.443 kg
Kawasaki (BA006N)	536.25 mm	120.24 mm	-0.007 mm	-8.723 mm	174.799 mm	2.366 kg
Kawasaki (BA013N)			-0.006 mm	-6.914 mm	186.846 mm	2.703 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	564.00 mm	120.00 mm	0.001 mm	-7.993 mm	190.595 mm	2.504 kg

<b>Solid Mount with Wire Brake - 45 Degree</b>						
<b>405-45QC</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	335.06 mm	100.35 mm	0.002 mm	-6.797 mm	106.855 mm	1.862 kg

ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	344.58 mm	100.35 mm	0.003 mm	-6.417 mm	110.168 mm	1.971 kg
ABB (IRB2600ID, IRB1660ID)	347.25 mm	100.35 mm	0.003 mm	-6.142 mm	108.312 mm	2.056 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	403.00 mm	100.35 mm	0.002 mm	-5.505 mm	148.244 mm	2.299 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	440.14 mm	100.35 mm	0.002 mm	-5.069 mm	167.686 mm	2.573 kg
Kawasaki (BA006N)	419.65 mm	100.35 mm	-0.007 mm	-5.210 mm	153.143 mm	2.496 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	447.00 mm	100.00 mm	0.001 mm	-4.700 mm	170.663 mm	2.6345 kg
<b>405-45QCL</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	382.14 mm	120.24 mm	0.002 mm	-9.460 mm	118.046 mm	1.922 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	391.67 mm	120.24 mm	0.003 mm	-8.948 mm	120.942 mm	2.030 kg
ABB (IRB2600ID, IRB1660ID)	394.33 mm	120.24 mm	0.003 mm	-8.579 mm	118.779 mm	2.115 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	450.09 mm	120.24 mm	0.002 mm	-7.707 mm	158.032 mm	2.358 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	487.22 mm	120.24 mm	0.002 mm	-7.052 mm	176.863 mm	2.632 kg
Kawasaki (BA006N)	466.73 mm	120.24 mm	-0.006 mm	-7.250 mm	162.450 mm	2.555 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	494.00 mm	120.00 mm	0.001 mm	-6.646 mm	179.718 mm	2.693 kg
<b>405-45QCL1</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	437.49 mm	120.24 mm	0.002 mm	-9.149 mm	133.308 mm	2.005 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	447.01 mm	120.24 mm	0.003 mm	-8.673 mm	135.681 mm	2.114 kg
ABB (IRB2600ID, IRB1660ID)	449.68 mm	120.24 mm	0.003 mm	-8.329 mm	133.131 mm	2.199 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	505.43 mm	120.24 mm	0.002 mm	-7.512 mm	171.517 mm	2.442 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	542.57 mm	120.24 mm	0.002 mm	-6.896 mm	189.561 mm	2.715 kg
Kawasaki (BA006N)	522.08 mm	120.24 mm	-0.006 mm	-7.083 mm	175.315 mm	2.638 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	550.00 mm	120.00 mm	0.001 mm	-6.506 mm	192.256 mm	2.777 kg
<b>405-45QCL2</b>	<b>A</b>	<b>B</b>	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>Weight</b>
Yaskawa® Motoman®, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	487.47 mm	120.24 mm	0.002 mm	-8.864 mm	147.046 mm	2.069 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	497.00 mm	120.24 mm	0.003 mm	-8.417 mm	148.944 mm	2.178 kg
ABB (IRB2600ID, IRB1660ID)	499.67 mm	120.24 mm	0.002 mm	-8.092 mm	146.044 mm	2.263 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	555.42 mm	120.24 mm	0.002 mm	-7.319 mm	183.625 mm	2.506 kg
Yaskawa® Motoman® (MA1440, MA2010, MA3120, MH24, AR Series)	592.55 mm	120.24 mm	0.002 mm	-6.736 mm	200.926 mm	2.780 kg
Kawasaki (BA006N)	572.06 mm	120.24 mm	-0.006 mm	-6.914 mm	186.846 mm	2.703 kg
KUKA (KR6 R11820HW, KR8 R1420HW, KR8 1620HW, KR8 R2100HW)	600.00 mm	120.00 mm	0.001 mm	-6.358 mm	203.471 mm	2.841 kg

# SECTION 9 — PARTS LIST

## 9-1 Clutch System

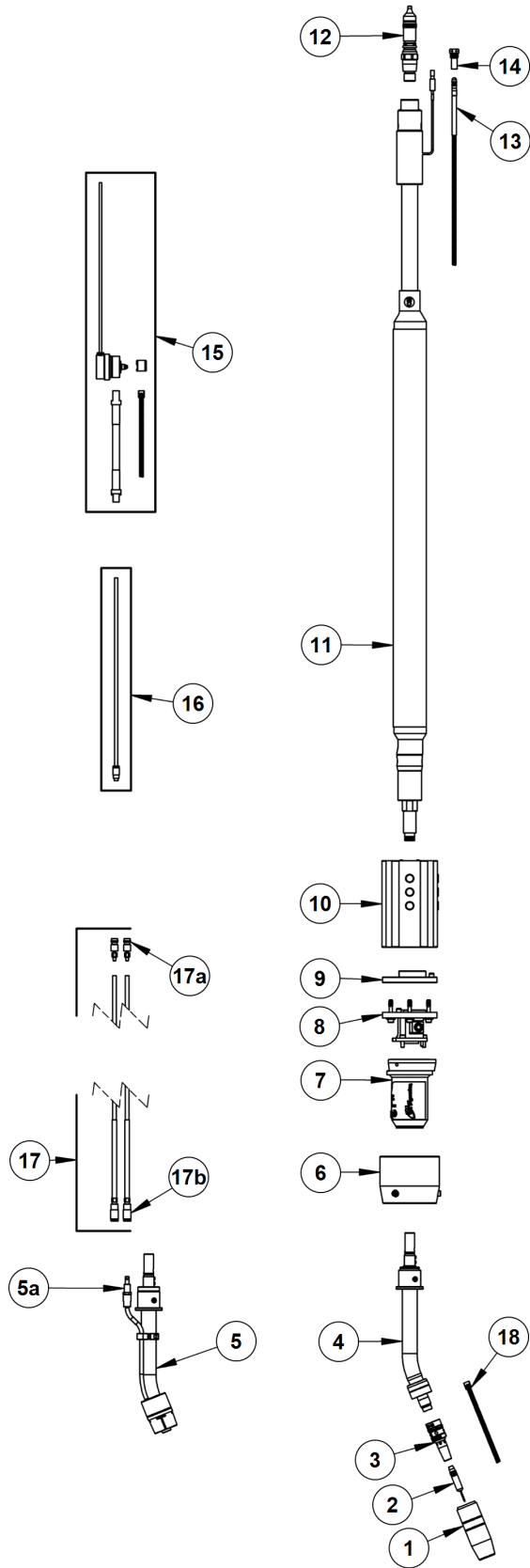


ITEM	PART #	DESCRIPTION
1	See SP-TA3	Nozzle
2	See SP-TA3	Contact tip
3	See SP-TA3	Retaining head / diffuser
4	See SP-TA3	Neck, air-cooled
5	See SP-TA3	Neck, TOUGH GUN I.C.E.™
6	580-2	Connector housing
	580-7-045	Connector housing (for guns equipped with wire brake; 0.045" wire)
	580-7-116	Connector housing (for guns equipped with wire brake; 1/16" wire)
7	580-2-3	Rubber washer
8	580-4	Shunt cable
9	AS-714	Clutch
9a	AS-714-7-2	Switch base
9b	Not Sellable	M3x0.5-6LG SHCS
9c	AS-714-7-3	Hex nut
9d	AS-714-9	Clutch switch
10	580-5A	Outer cover kit
	580-5B	Outer cover kit for guns equipped with TOUGH GUN I.C.E. Technology
	580-5C	Outer cover kit for guns equipped with wire brake
	580-5D	Outer cover kit for guns equipped with TOUGH GUN I.C.E. and wire brake
11	AS-114-3	Mounting ring
12	580-19	Cable connector kit, Yaskawa® Motoman®
	580-20	Cable connector kit, KUKA®
	580-21	Cable connector kit, Panasonic® TB1800WGIII
13	See SP-TA3	Insulating disc
14	See SP-TA3	Spacer
15	See SP-TA3	LSR+ Unicable
16	AS-714-19	Control cable, 60 inch
	AS-714-24	Control cable, 82 inch
	AS-714-26	Control cable, 120 inch
17	See SP-TA3	Power pin
18	See SP-TA3	Liner
19	See SP-TA3	Liner retainer
20	WB-045*	Wire brake kit option for 0.045" wire
	WB-116*	Wire brake kit option for 1/16" wire
21	580-A	Air blast kit option
22	580-30	TOUGH GUN I.C.E. water lines
22a	580-30-2	Brass quick connect male fitting
	580-30-5	Clamp (TOUGH GUN I.C.E. component)
22b	580-30-6	Nickel plated quick connect female — double shut-off
	580-30-4	Clamp (TOUGH GUN I.C.E. component)
23	590-8	Water line fittings (TOUGH GUN I.C.E. components)
24	See SP-TA8	Jump liner for wire brake

\*580-7-045 or 580-7-116 (see Item 6 above) required if retrofitting wire brake



## 9-2 Solid Mount System



ITEM	PART #	DESCRIPTION
1	See SP-TA3	Nozzle
2	See SP-TA3	Contact tip
3	See SP-TA3	Retaining head / diffuser
4	See SP-TA3	Neck, air-cooled
5	See SP-TA3	Neck, TOUGH GUN I.C.E. (only available for select FANUC®, ABB® and Panasonic® models)
5a	590-8	Water line fittings (TOUGH GUN I.C.E. components)
6	580-300-5	Outer cover kit
	1580-300-5-1	Outer cover kit, TOUGH GUN I.C.E.
7	580-2S	Connector housing
	580-2SW	Connector housing (for guns equipped with wire brake)
8	580-19	Cable connector kit, Yaskawa® Motoman®
	580-20	Cable connector kit, KUKA®
	580-21	Cable connector kit, Panasonic® TB1800WGIII
9	See SP-TA3	Insulating disc
10	See SP-TA3	Spacer
11	See SP-TA3	LSR+ Unicable
12	See SP-TA3	Power pin
13	See SP-TA3	Liner
14	See SP-TA3	Liner retainer
15	WB-045*	Wire brake kit option for 0.045" wire
	WB-116*	Wire brake kit option for 1/16" wire
16	580-A	Air blast kit option
17	580-30	TOUGH GUN I.C.E. water lines
17a	580-30-2	Brass quick connect male fitting
	580-30-5	Clamp (TOUGH GUN I.C.E. component)
17b	580-30-6	Nickel plated quick connect female — double shut-off
	580-30-4	Clamp (TOUGH GUN I.C.E. component)
18	See SP-TA3	Jump liner for wire brake

\*580-2SW (see Item 7 above) is required if retrofitting wire brake

## SECTION 10 — TROUBLESHOOTING

### 10-1 Troubleshooting Table

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
1. Electrode does not feed.	<ol style="list-style-type: none"> <li>1. Feeder relay.</li> <li>2. Broken control lead.</li> <li>3. Poor adaptor connection.</li> <li>4. Improper / worn drive roll.</li> <li>5. Drive roll tension misadjusted.</li> <li>6. Burn back to contact tip.</li> <li>7. Wrong size liner.</li> <li>8. Buildup inside of liner.</li> </ol>	<ol style="list-style-type: none"> <li>1. Consult feeder manufacturer.</li> <li>2. <b>a.</b> Test and connect spare control lead. <b>b.</b> Install new cable.</li> <li>3. Test and replace leads and/or contact pins.</li> <li>4. Replace drive roll.</li> <li>5. Adjust tension at feeder.</li> <li>6. See '<b>Contact tip burn back</b>'.</li> <li>7. Replace with correct size.</li> <li>8. Replace liner or clean out with compressed air, check condition of electrode.</li> </ol>
2. Contact tip burn back.	<ol style="list-style-type: none"> <li>1. Improper voltage and/or wire feed speed.</li> <li>2. Erratic wire feeding.</li> <li>3. Improper tip stickout.</li> <li>4. Improper electrode stickout.</li> <li>5. Faulty ground.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust parameters.</li> <li>2. See '<b>Erratic wire feeding</b>'.</li> <li>3. Adjust nozzle / tip relationship.</li> <li>4. Adjust wire stickout.</li> <li>5. Replace cables and/or connections.</li> </ol>
3. Tip disengages from the gas diffuser.	<ol style="list-style-type: none"> <li>1. Worn retaining head / diffuser.</li> <li>2. Improper tip installation.</li> <li>3. Extreme heat or duty cycle.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace tip and/or gas diffuser / retaining head / diffuser.</li> <li>2. Install as per section 7-1 Changing Consumables on page 19.</li> <li>3. Replace with heavy duty consumables. See appropriate Spec Sheet for details.</li> </ol>
4. Short contact tip life.	<ol style="list-style-type: none"> <li>1. Contact tip size</li> <li>2. Electrode eroding contact tip.</li> <li>3. Exceeding duty cycle.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace with proper size.</li> <li>2. Inspect and/or change drive rolls.</li> <li>3. Replace with properly rated Tregaskiss MIG Gun.</li> </ol>
5. Erratic arc.	<ol style="list-style-type: none"> <li>1. Worn contact tip.</li> <li>2. Buildup inside of liner.</li> <li>3. Wrong tip size.</li> <li>4. Not enough bend in neck.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace contact tip.</li> <li>2. Replace liner, check condition of electrode.</li> <li>3. Replace with correct tip size.</li> <li>4. Replace with 45° neck.</li> </ol>
6. Erratic wire feeding.	<ol style="list-style-type: none"> <li>1. Buildup inside of liner.</li> <li>2. Wrong size liner.</li> <li>3. Improper drive roll size.</li> <li>4. Worn drive roll.</li> <li>5. Improper guide tube relationship.</li> <li>6. Improper wire guide diameter.</li> <li>7. Gaps at liner junctions.</li> <li>8. Feeder malfunction.</li> <li>9. Worn contact tip.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace liner, check condition of electrode.</li> <li>2. Replace with new liner of proper size.</li> <li>3. Replace with proper size drive roll.</li> <li>4. <b>a.</b> Replace with new drive roll. <b>b.</b> Repair worn drive roll.</li> <li>5. <b>a.</b> Adjust / replace guide as close to drive rolls as possible. <b>b.</b> Eliminate all gaps in electrode path.</li> <li>6. Replace with proper guide diameter.</li> <li>7. <b>a.</b> Replace with new liner trimmed as per section 7-3 Changing the Liner on page 21. <b>b.</b> Replace guide tube / liner trimming as close to mating component as possible.</li> <li>8. Consult feeder manufacturer.</li> <li>9. Inspect and replace.*</li> </ol>
7. Extreme spatter.	<ol style="list-style-type: none"> <li>1. Improper machine parameters.</li> <li>2. Improper tip installation.</li> <li>3. Improper shielding gas coverage.</li> <li>4. Contaminated wire or workpiece.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust parameters.</li> <li>2. Adjust nozzle / tip relationship.</li> <li>3. <b>a.</b> Verify shielding gas coverage. <b>b.</b> Verify gas mixture.</li> <li>4. Clean wire and workpiece.</li> </ol>

8. Porosity in weld.	<ol style="list-style-type: none"> <li>1. Insulator worn.</li> <li>2. Gas diffuser damaged</li> <li>3. Extreme heat or duty cycle.</li> <li>4. Solenoid faulty.</li> <li>5. No gas.</li> <li>6. Flow improperly set.</li> <li>7. Gas ports plugged.</li> <li>8. Ruptured gas hose.</li> <li>9. Control circuit loss.</li> <li>10. Worn, cut or missing o-rings.</li> <li>11. Loose fittings.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace nozzle / insulator.</li> <li>2. Replace gas diffuser or o-rings.</li> <li>3. Replace with heavy duty consumables.</li> <li>4. Replace solenoid.</li> <li>5. <ol style="list-style-type: none"> <li>a. Install full tanks.</li> <li>b. Check supply.</li> <li>c. Check for hose leaks.</li> </ol> </li> <li>6. Adjust flow.</li> <li>7. <ol style="list-style-type: none"> <li>a. Clean or replace gas diffuser.</li> <li>b. Clean nozzle.</li> </ol> </li> <li>8. Repair or replace cable or line.</li> <li>9. See 'Electrode does not feed'.</li> <li>10. Replace o-rings.</li> <li>11. Tighten gun and cable connections to specified torque. See Section 7 — Replacement on page 19.</li> </ol>
9. Gun running hot.	<ol style="list-style-type: none"> <li>1. Exceeding duty cycle.</li> <li>2. Loose or poor power connection.</li> </ol>	<ol style="list-style-type: none"> <li>1. <ol style="list-style-type: none"> <li>a. Replace with properly rated Tregaskiss MIG Gun.</li> <li>b. Decrease parameters to within gun rating.</li> </ol> </li> <li>2. <ol style="list-style-type: none"> <li>a. Clean, tighten or replace cable grounding connection.</li> <li>b. Tighten gun and cable connections to specified torque. See Section 7 — Replacement on page 19.</li> </ol> </li> </ol>
10. Liner is discolored.	<ol style="list-style-type: none"> <li>1. Short circuit to electrode.</li> <li>2. Broken copper stranding in power cable.</li> </ol>	<ol style="list-style-type: none"> <li>1. Isolate electrode reel from feeder and drive block. Consult feeder manufacturer's manual.</li> <li>2. Replace unicable.</li> </ol>
11. Sporadic feeding of aluminum electrode.	<ol style="list-style-type: none"> <li>1. Tip galling.</li> <li>2. Synthetic liner melting.</li> <li>3. Wire deformed by feeder rolls.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect and replace the contact tip.*</li> <li>2. <ol style="list-style-type: none"> <li>a. Replace liner.</li> <li>b. Replace with composite liner.</li> <li>c. Replace the neck and jump liner.</li> </ol> </li> <li>3. Adjust drive rolls as per feeder manufacturer's manual.</li> </ol>

*\*In some cases with aluminum and mild steels, it may be necessary to use a contact tip with either a larger or smaller bore size.*

# NOTES

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# ADDITIONAL SUPPORT MATERIALS

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For additional support materials such as Spec Sheets, troubleshooting information, how-to guides and videos, animations, online configurators and much more, please visit [bernardtregaskiss.com](http://bernardtregaskiss.com). Scan the QR Code with your smart phone for immediate access to [bernardtregaskiss.com/TechnicalSupport](http://bernardtregaskiss.com/TechnicalSupport).



Scan to view the TOUGH GUN® TA3 MIG Gun Owner's Manual



Scan to view the TOUGH GUN® TA3 MIG Gun Spec Sheet



Scan to view the AccuLock™ R (Robotic) Consumables Spec Sheet



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