



OM-TA3-2.3-A

August 2017

Processes

MIG (GMAW) Welding

Description

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

TOUGH GUN™ TA3

Robotic Air-Cooled MIG Gun



OWNER'S MANUAL

Tregaskiss
2570 North Talbot Road
Windsor, Ontario NOR 1L0
Canada

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+1-519-737-3000 (International)
Fax: 519-737-1530
For more information, visit us at Tregaskiss.com

Thank You for Choosing Tregaskiss

Thank you for selecting a Tregaskiss product. The MIG gun you have purchased has been carefully assembled and is ready to weld and factory tested prior to shipment to ensure high performance. 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. 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 Tregaskiss.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 +1-519-737-3000 (International) or fax 1-519-737-1530. 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 Tregaskiss.com.

For additional support materials such as spec sheets, troubleshooting information, how-to guides and videos, animations, online configurators and much more, please visit Tregaskiss.com. Scan this QR Code with your smart phone for immediate access to Tregaskiss.com/TechnicalSupport



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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:

- 2006/95/EC Low Voltage
- 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment

Standards:

- IEC 60974-7:2013 Arc welding equipment – Part 7: Torches

Signatory:

David A. Werba
MANAGER, PRODUCT DESIGN COMPLIANCE

March 22, 2017

Date of Declaration

SECTION 1- SAFETY PRECAUTIONS- READ BEFORE USING

1-1 Fume and Gas Hazards



FUMES AND GASES can be hazardous

Welding and cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding and cutting fumes and gases. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes and metals.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding and cutting fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld or cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld or cut on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

1-2 Arc Rays and Welding Hazards



ARC RAYS can burn eyes and skin

Arc rays from welding and cutting processes 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, cutting, 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 durable, flame resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap.



WELDING AND CUTTING can cause fire or explosion

Welding or cutting on closed containers such as tanks, drums or pipes, can cause them to blow up. Sparks can fly off from the welding or cutting arc. The flying sparks, hot work piece and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating or fire. Check and be sure the area is safe before doing any welding or cutting.

- Remove all flammables within 35 ft. (10.7 m) of the welding or cutting arc. If this is not possible, tightly cover them with approved covers.
- Do not weld or cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding and cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding or cutting on a ceiling, floor, bulkhead or partition can cause fire on the hidden side.
- Do not weld or cut 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).
- Do not weld or cut where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding or cutting area as practical to prevent welding or cutting current from traveling long, possibly unknown paths and causing electric shock, sparks and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear body protection made from durable, flame resistant material (leather, heavy cotton, wool). Body protection includes oil-free clothing such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding or cutting.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or by-pass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and 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.



ELECTRIC SHOCK can kill

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In gas metal arc welding (GMAW), the wire, wire reel, drive roll housing and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulated gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is danger of falling.
- Use AC output **ONLY** if required for the welding or cutting process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a GMAW DC constant voltage (wire) welder, 2) a DC manual (stick) welder or 3) an AC welder with reduced open circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state/provincial and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first and double-check connections.
- Keep cords dry, free of oil and greases and protected from hot metal and sparks.
- Frequently inspect power cord for damage or bare wiring. Replace cord immediately if damaged. Bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground or another electrode from a different machine.

- Do not touch electrode holders connected to two welding machines at the same time since double open circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process when not in use.

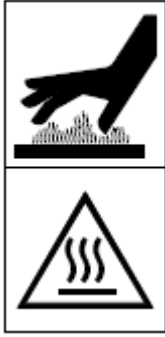


CYLINDERS CAN EXPLODE if damaged

Compressed gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

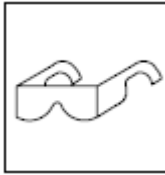
- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding, cutting or other electrical circuits.
- Never drape a welding electrode or cutting torch over a gas cylinder.
- Never allow a welding electrode or cutting torch to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only the correct compressed gas cylinders, regulators, hoses and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve. Do not stand in front of or behind the regulator when opening the valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

1-3 Additional Safety Warnings for Installation, Operation and Maintenance



HOT PARTS can burn

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns



FLYING METAL OR DIRT can injure or kill

- Welding, cutting, chipping, wire brushing and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



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.



ELECTRIC AND MAGNETIC FIELDS (EMF) can affect implanted Medical Devices

- Wearers of Pacemakers and other
- Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting or induction.



NOISE can damage hearing

- Noise from some processes or equipment can damage hearing.
- Wear approved ear protection if noise level is high.



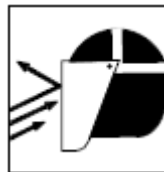
FIRE OR EXPLOSION hazard

- Do not install or place unit on, over or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated and protected to handle this unit.



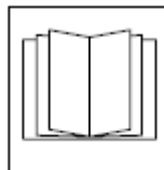
MOVING PARTS can injure

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers or guards when maintenance is finished and before reconnecting input power.
- Keep away from pinch points such as drive rolls.



FLYING SPARKS can injure

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand and body protection.
- Sparks can cause fires – keep flammables away.



READ INSTRUCTIONS

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



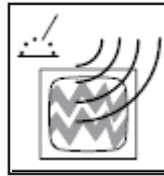
WELDING WIRE can injure

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people or any metal when threading welding wire.



COMPRESSED AIR can injure or kill

- Before working on compressed air system, turn off and lockout/tagout unit, release pressure and be sure air pressure cannot be accidentally applied.
- Relieve air pressure before disconnecting or connecting air lines.
- Check compressed air system components and all connections and hoses for damage, leaks and wear before operating unit.
- Do not direct air stream toward self or others.
- Wear protective equipment such as safety glasses, hearing protection, leather gloves, heavy shirt and trousers, high shoes, and a cap when working on compressed air system.
- Use soapy water or an ultrasonic detector to search for leaks – never use bare hands. Do not use equipment if leaks are found.



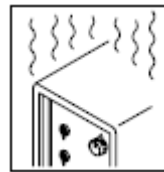
ARC WELDING AND PLASMA CUTTING can cause interference

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electro-magnetically compatible.
- To reduce possible interference, keep cables as short as possible, close together, and down low, such as on the floor.
- Locate welding or cutting operation 100 meters from any sensitive electronic equipment.
- Be sure welding machine or plasma cutter is installed and grounded according to its Owner's Manual.
- If interference still occurs, the user must take extra measures such as moving the welding or cutting machine using shielded cables, using line filters or shielding the work area.



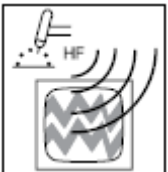
TRAPPED AIR PRESSURE AND WHIPPING HOSES can injure

- Release air pressure from tools and system before servicing, adding or changing attachments or opening compressor oil drain or oil fill cap.



OVERUSE CAN CAUSE OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter air flow to unit.



H.F. RADIATION can cause interference

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- Have the installation regularly checked and maintained.
- If notified by the FCC about interference, stop using the equipment at once.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

IMPORTANT: Be sure to follow your facility's lock out / tag out procedures.

1-4 California Proposition 65 Warnings

Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

This product contains chemicals, including lead, known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after use.*

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 while 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.

1-6 Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, is available as a free download from the American Welding Society at www.aws.org or purchased from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.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 (phone: 1-877-413-5184, website: www.global.ihs.com)

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org)

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151 (phone: 703-788-2700, website: www.cganet.com)

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Ontario, Canada L4W 5N5 (phone: 1-800-463-6727, website: www.csa-international.org)

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org)

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org)

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices – phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov)

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Road, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH)

1-7 Commercial Warranty

Product is warranted to be free from defects in material and workmanship for the period specified below after the sale by an authorized Buyer.

TOUGH GUN™ Robotic MIG Guns and Components	1 year
TOUGH GUN™ Automatic MIG Gun.....	1 year
TOUGH GUN™ Reamer	1 year
TOUGH GUN™ Reamer when factory-equipped	
with Lubricator	2 years
TOUGH GUN™ Reamer when factory-equipped	
with Lubricator and used only with Tregaskiss™	
TOUGH GARD™ Anti-Spatter Liquid	3 years
TOUGH GUN™ Robotic Peripherals	
(Clutch, Sprayer, Wire Cutter, Mounting Arms)	1 year
Low-Stress Robotic (LSR) Unicables	2 years

Tregaskiss reserves the right to repair, replace, or refund the purchase price of non-conforming product. Product found not defective will be returned to the Buyer after notification by

Customer Service.
Tregaskiss makes no other warranty of any kind, expressed or implied, including, but not limited to the warranties of merchantability or fitness for any purpose. Tregaskiss shall not be liable under any circumstances to Buyer, or to any person who shall purchase from Buyer, for damages of any kind, including, but not limited to any direct, indirect incidental or consequential damages or loss of production or loss of profits resulting from any cause whatsoever, including, but not limited to any delay, act, error or omission of Tregaskiss.

Genuine Tregaskiss™ parts must be used for safety and performance reasons or the warranty becomes invalid. Warranty shall not apply if accident, abuse, or misuse damages of a product, or if a product is modified in any way except by authorized Tregaskiss personnel.

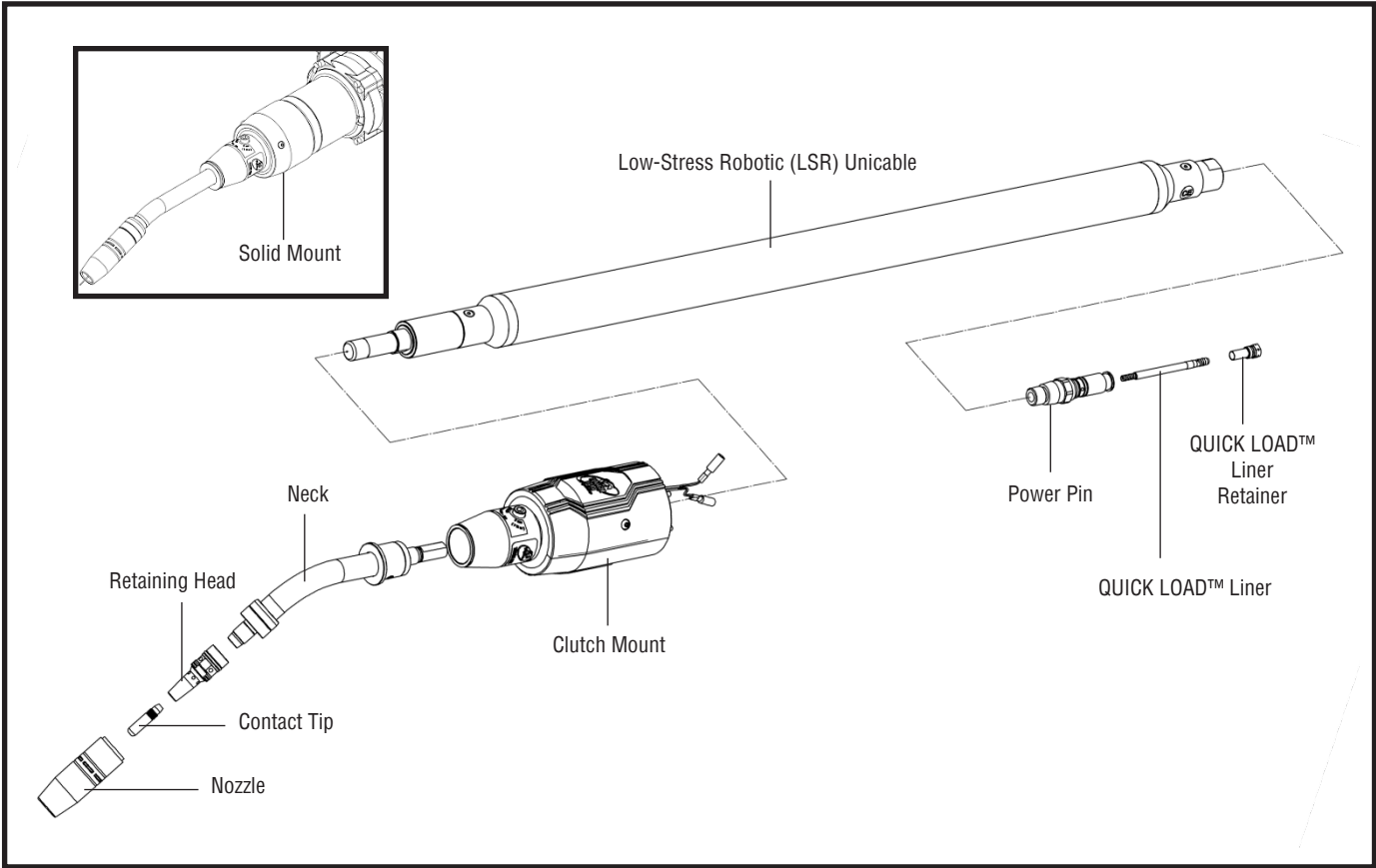
SECTION 2 - SPECIFICATIONS

2-1 System Components

Robotic MIG Gun for GMAW Welding

Duty Cycle Rating:

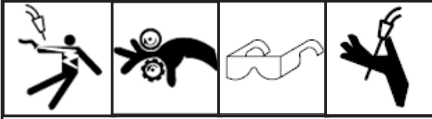
100%: 350 amps with Mixed Gases



For complete parts list, please see SECTION 6 – PARTS LIST

SECTION 3 - INSTALLATION

3-1 Installing the Gun to the Robot



1. Position the robot with the wrist and top axis as shown 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.
 - b. Unthread (1) M3 SHCS using a 2.5 mm Allen wrench and pull apart both cover halves.
 - c. Insulating disc should remain in place, located by 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 1*).
7. Using the supplied tightening pattern in *Figure 2*, 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. Re-install outer cover in reverse order of instructions in steps 3a through 3c above.

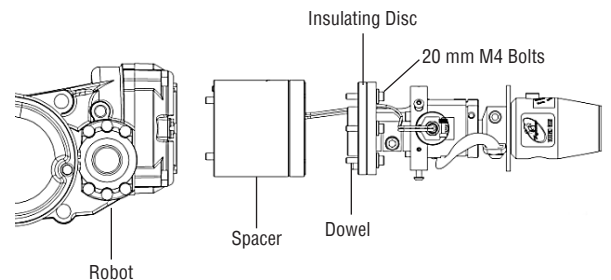
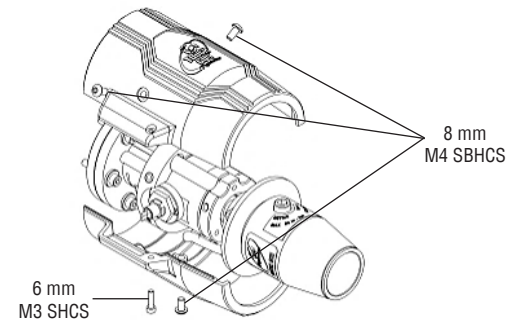
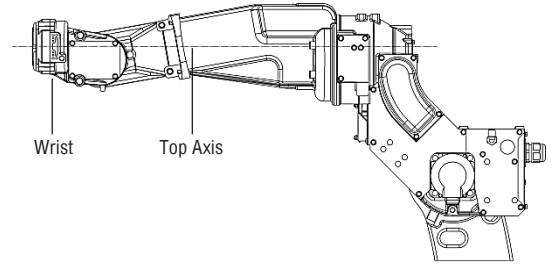
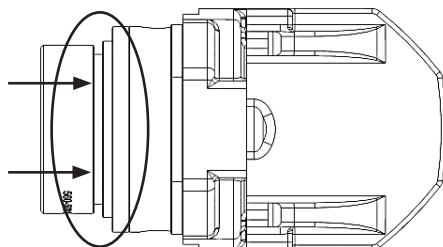
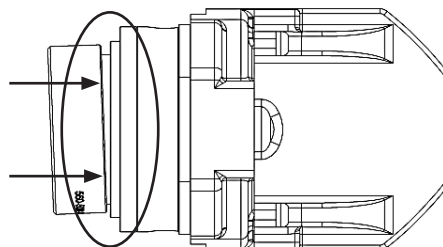


Figure 1

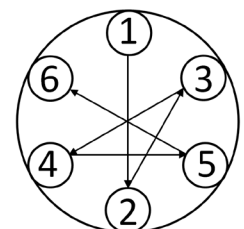


CORRECT! Spacing is uniform

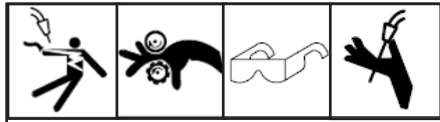


STOP! Spacing is not uniform - **DO NOT PROCEED!**

Figure 2



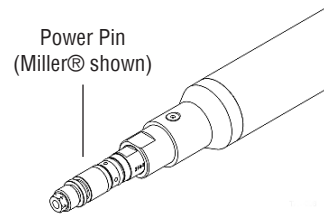
3-2 Installing the Power Pin to the Unicable



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.

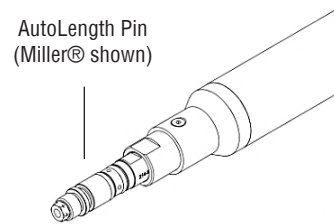
1. Thread power pin into the adaptor of the LSR Unicable.
2. Tighten the power pin into the rear block using a 1" (25 mm) wrench on the rear block and a 5/8" (16 mm) or 3/4" (19 mm) wrench on the power pin. Torque to 18 ft.-lbs.



B. AutoLength™ Pins

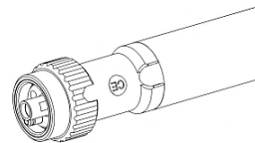
NOTE: The AutoLength Pin is designed specifically for use with QUICK LOAD Liners. *Do not attempt to use with any other type of liner.*

3. Thread AutoLength Pin into the adaptor of the LSR Unicable.
4. Tighten the AutoLength 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 AutoLength Pin. Torque to 18 ft.-lbs.

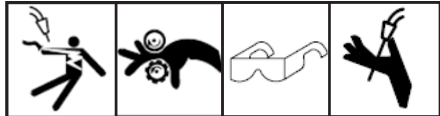


C. Euro Connections

NOTE: The Euro connection comes factory installed. No installation required.

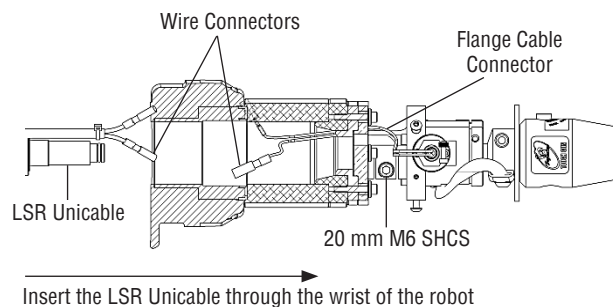
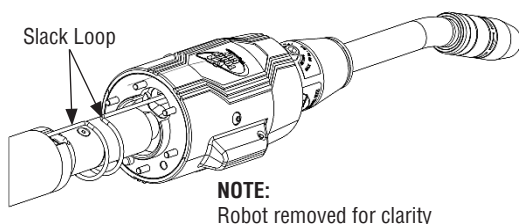


3-3 Installing the Low-Stress Robotic (LSR) Unicable



1. Insert LSR Unicable through the wrist and arm of the robot (refer to cutaway of robot shown below) and leave 6" of uncable hanging out of the wrist (not applicable to 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).

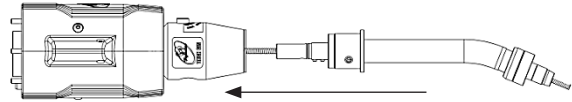
IMPORTANT: Leave a slack loop around flange for articulation.



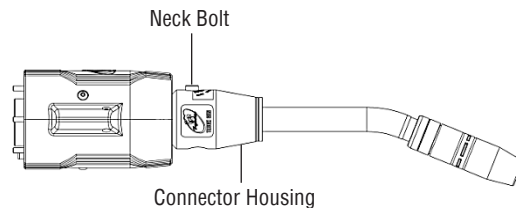
3-4 Installing the Neck



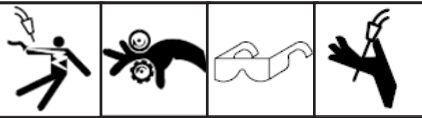
1. Align dowels on neck with keyway in connector housing and insert the neck into the connector housing until it is fully seated



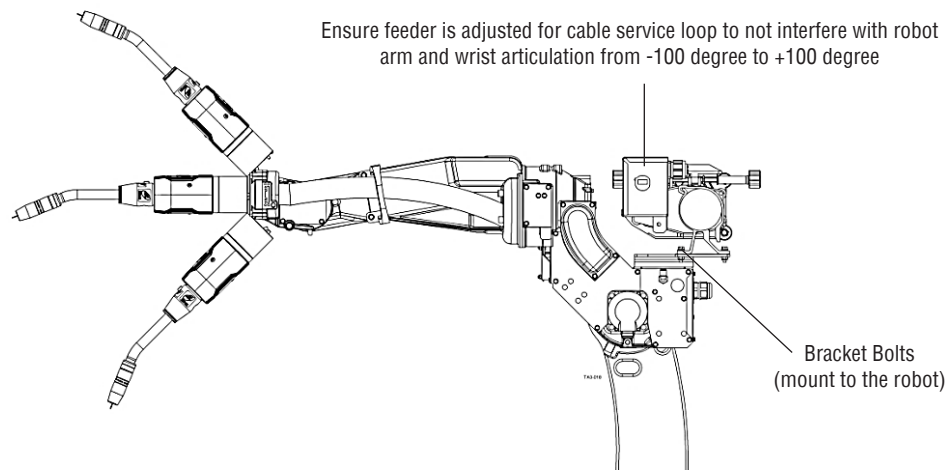
2. Tighten neck bolt clockwise with a 5 mm Allen wrench to torque specifications (60 in.-lbs. or 7 Nm).



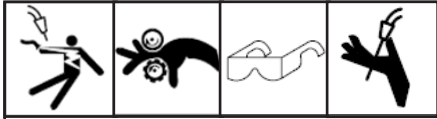
3-5 Installing the Gun to the Feeder



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 manufacturers' recommendations to ensure that feeder remains in the proper position.
6. Tighten feeder into position

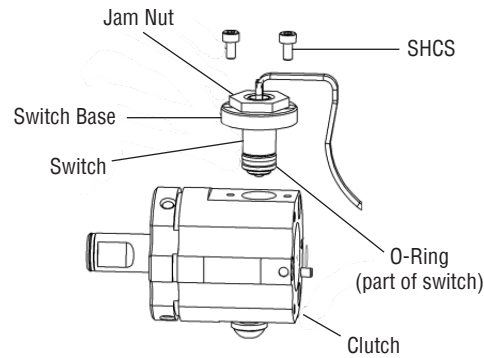


3-6 Installing / Adjusting the Clutch Limit Switch

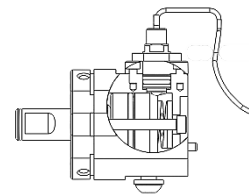


1. Feed wires of switch through center holes of switch base and jam nut as shown.
2. Thread switch base far enough down on the switch body so that the switch will not bottom out when the assembly is fastened to the clutch.
3. Position switch assembly (with o-ring) in the clutch housing.
4. Insert the 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.

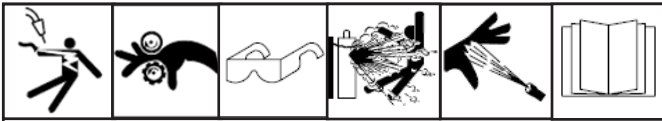


Exploded View



Finished Assembly

3-7 Connecting Wire Brake and/or Air Blast



A. Wire Brake

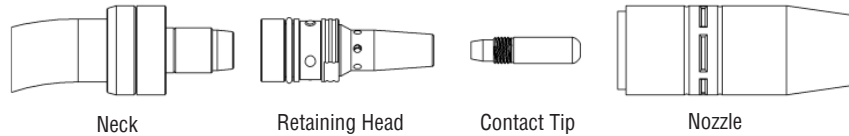
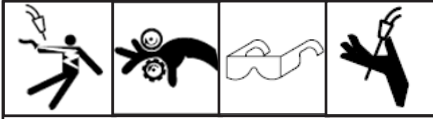
1. Route wire brake air line to designated control valve in your facility (not provided).
2. 40-60 psi air supply required for proper operation.

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 4 - REPLACEMENT

4-1 Changing Consumables



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 **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 or scoring may result.

Changing the Nozzle

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

Changing the Contact Tip

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

Changing the Retaining Head

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

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

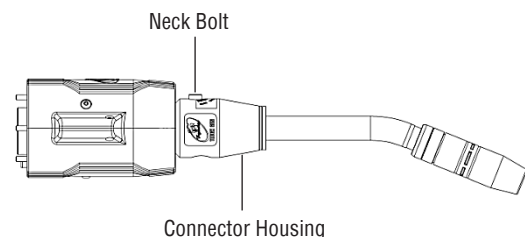
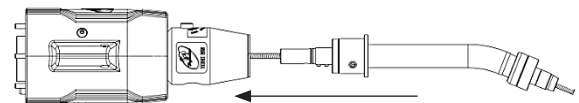
4-2 Changing the Neck



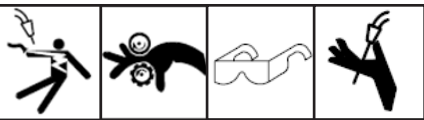
1. Insert new neck over the liner and into connector housing until neck is fully seated.
2. Tighten neck bolt clockwise with a 5 mm Allen wrench to torque specifications (60 in.-lbs. or 7 Nm).

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

3. Trim liner (see **Section 4-3 Changing the Liner**).
4. Install Consumables (see **Section 4-1 Changing Consumables**).



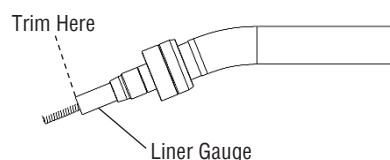
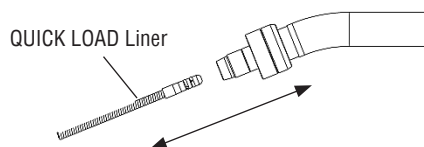
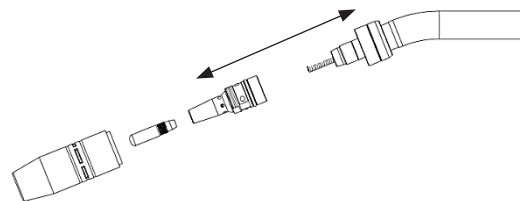
4-3 Changing the Liner



A. Changing the QUICK LOAD™ Liner

NOTE: Ensure power supply is off before proceeding.

1. Remove consumables (nozzle, contact tip and retaining head) (see **Section 4-1 Changing Consumables**).
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 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 liner.
5. Push liner back into gun and hold in place. Using liner gauge, trim liner to a 3/4" stick-out.
HELPFUL HINT: Before cutting liner, make a mark after the gauge and pull it back out past the end of the welding wire; then cut it and push the liner back into place securely. This will help with feeding the wire through the contact tip afterwards.
6. Remove any burr that may obstruct wire feed.
7. Reinstall consumables onto neck.

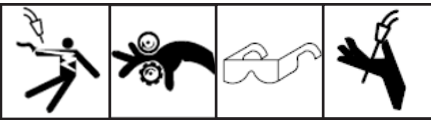


B. Changing the QUICK LOAD Liner in the AutoLength™ System

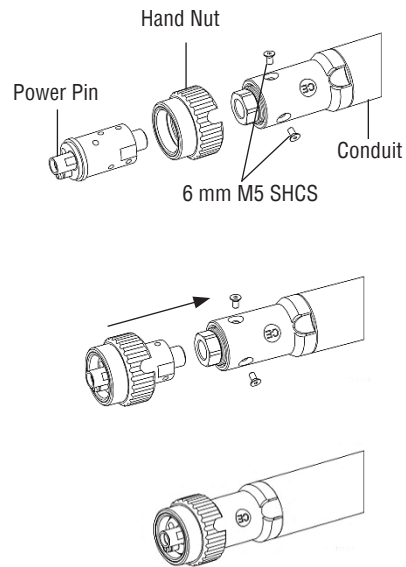
NOTE: Ensure power supply is off before proceeding.

1. Remove consumables (nozzle, contact tip and retaining head) (see **Section 4-1 Changing Consumables**).
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. Feed the liner into the gun until it engages with the retainer inside the AutoLength Pin. Place the liner gauge onto the end of the QUICK LOAD Liner and press flush with the end of the neck.
5. Push the QUICK LOAD Liner into the gun until the liner will not go forward any further. **NOTE:** Liner will be pushed in by approximately one additional inch.
6. Using the liner gauge, trim the liner with a 3/4" (19 mm) stick out. **NOTE:** After trimming, the liner will stick out of the neck by approximately 1 3/4". This is normal, as the liner will be pushed back into the neck when the consumables are installed.
7. Feed wire through the MIG gun.
8. Reinstall consumables.

4-4 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. 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.



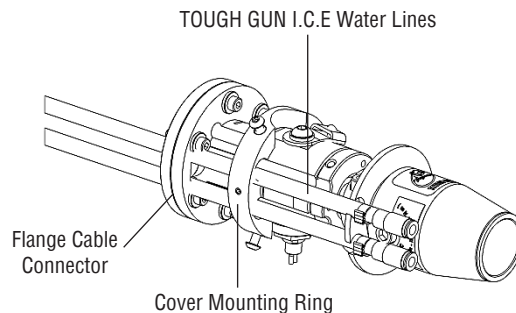
4-5 Changing TOUGH GUN I.C.E.™ Components



A. Changing the Water Lines

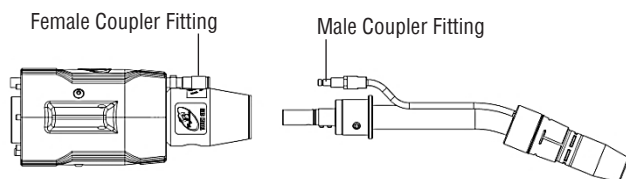
NOTE: Make sure water supply is turned off before changing water lines.

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

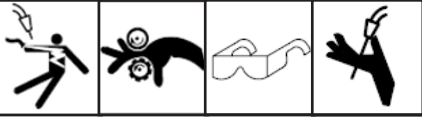


B. Installing the Neck

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 to torque specifications (60 in.-lbs. or 7 Nm).



4-6 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 1*).
5. Unthread and remove the wire brake pushing unit to allow the wire guide to be released (see *Figure 2*).
6. Carefully slide the wire guide using the wire guide tool out of the gun body (see *Figure 3*).
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 3*). Align the hole with pushing unit pin (see *Figure 2*).
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. Reinstall consumables and neck, including the jump liner.
11. Feed wire through the gun.
12. 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.
13. Activate wire brake via robot controller and attempt to pull additional wire out from gun. **NOTE:** The wire should no longer move.

Figure 1

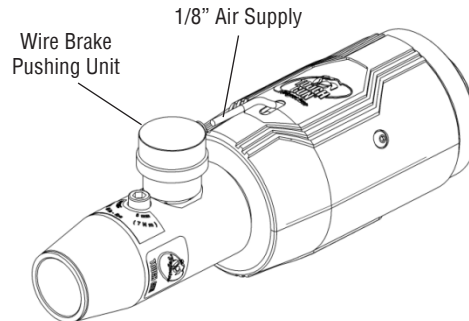


Figure 2

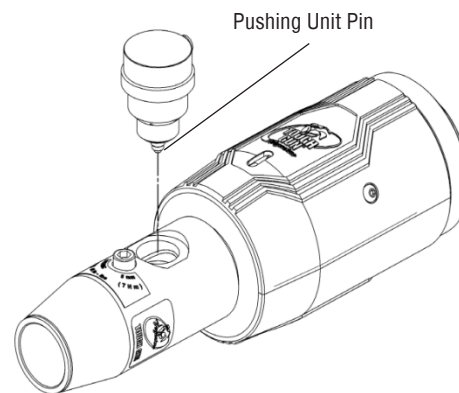
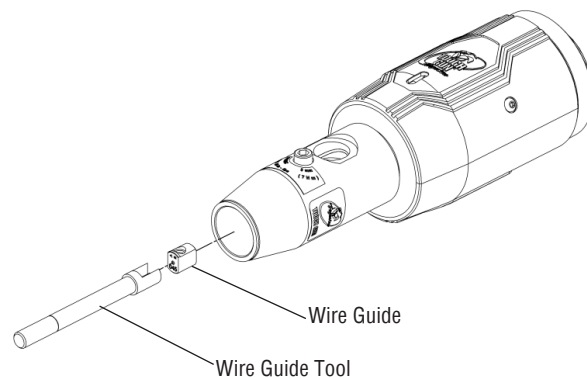
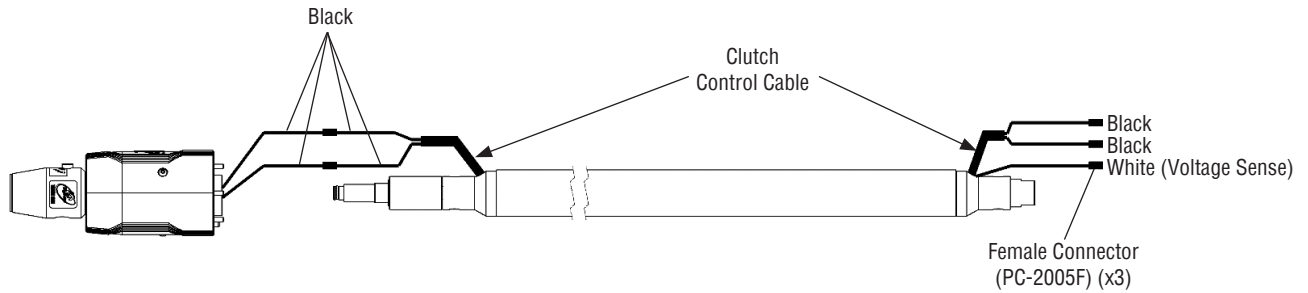


Figure 3



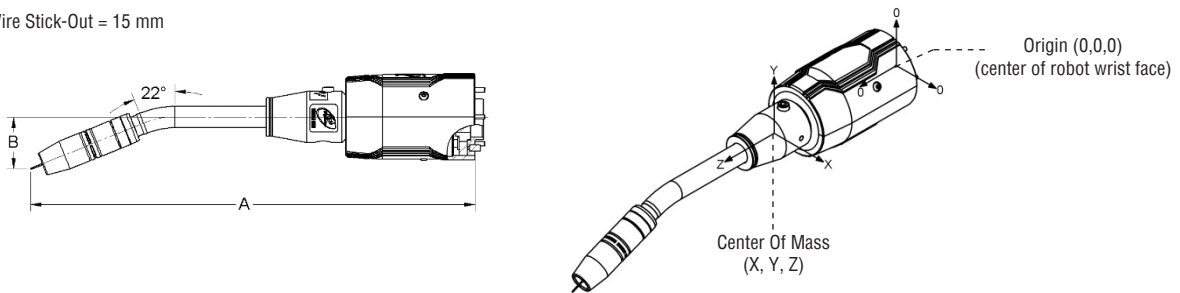
SECTION 5 - TECHNICAL DATA

5-1 Wiring Diagram



5-2 Center of Mass Coordinates - 22 Degree (Clutch)

*Wire Stick-Out = 15 mm



Clutch - 22 Degree

405-22QC	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	402.32 mm	46.89 mm	-0.692 mm	-4.564 mm	126.288 mm	1.758 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	411.85 mm	46.89 mm	-0.644 mm	-4.307 mm	128.337 mm	1.863 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	470.27 mm	46.89 mm	-0.573 mm	-3.763 mm	166.186 mm	2.126 kg
Motoman (MA1440, MA2010, MA3120, MH24)	507.50 mm	46.89 mm	-0.500 mm	-3.179 mm	181.804 mm	2.431 kg
Kawasaki (BA006N)	487.71 mm	46.89 mm	-0.559 mm	-3.753 mm	174.717 mm	2.199 kg
KUKA (KR16 arc HW)	414.31 mm	46.89 mm	-0.645 mm	-4.259 mm	128.799 mm	1.865 kg
405-22QCL	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	460.11 mm	46.89 mm	-0.669 mm	-4.405 mm	140.520 mm	1.817 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	469.63 mm	46.89 mm	-0.624 mm	-4.165 mm	142.025 mm	1.922 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	528.05 mm	46.89 mm	-0.557 mm	-3.650 mm	178.782 mm	2.185 kg
Motoman (MA1440, MA2010, MA3120, MH24)	565.28mm	46.89 mm	-0.488 mm	-3.096 mm	193.370 mm	2.490 kg
Kawasaki (BA006N)	545.50 mm	46.89 mm	-0.542 mm	-3.637 mm	187.803 mm	2.269 kg
KUKA (KR16 arc HW)	472.09 mm	46.89 mm	-0.622 mm	-4.105 mm	143.150 mm	1.935 kg

Clutch - 22 Degree (Continued)

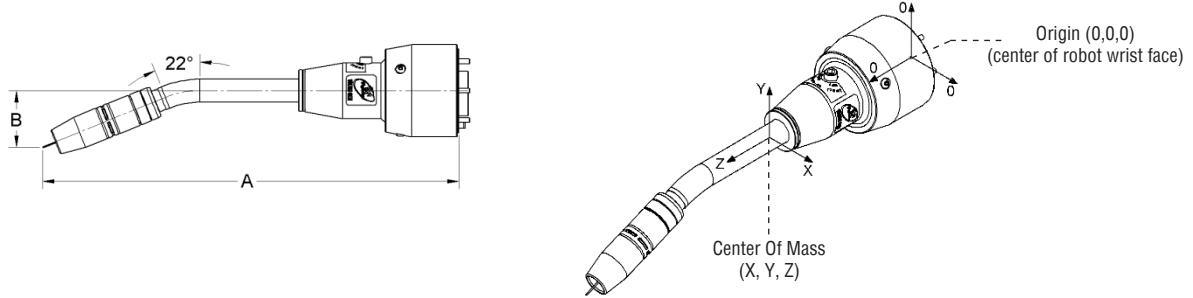
405-22QCL1	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	515.46 mm	46.89 mm	-0.646 mm	-4.248 mm	155.801 mm	1.884 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	524.98 mm	46.89 mm	-0.603 mm	-4.025 mm	156.772 mm	1.989 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	583.40 mm	46.89 mm	-0.540 mm	-3.541 mm	192.450 mm	2.252 kg
Motoman (MA1440, MA2010, MA3120, MH24)	620.63 mm	46.89 mm	-0.476 mm	-3.015 mm	205.999 mm	2.557 kg
Kawasaki (BA006N)	600.84 mm	46.89 mm	-0.526 mm	-3.533 mm	201.226 mm	2.336 kg
KUKA (KR16 arc HW)	527.44 mm	46.89 mm	-0.601 mm	-3.968 mm	157.850 mm	2.002 kg

Clutch with Wire Brake - 22 Degree

405-22QC	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	439.15 mm	46.89 mm	-0.619 mm	-2.155 mm	139.523 mm	2.155 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	448.68 mm	46.89 mm	-0.583 mm	-2.064 mm	142.285 mm	2.259 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	507.10 mm	46.89 mm	-0.528 mm	-1.828 mm	181.903 mm	2.523 kg
Motoman (MA1440, MA2010, MA3120, MH24)	544.33 mm	46.89 mm	-0.471 mm	-1.537 mm	198.857 mm	2.828 kg
Kawasaki (BA006N)	524.54 mm	46.89 mm	-0.518 mm	-1.877 mm	191.197 mm	2.596 kg
KUKA (KR16 arc HW)	451.14 mm	46.89 mm	-0.583 mm	-2.018 mm	142.892 mm	2.262 kg
405-22QCL	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	496.94 mm	46.89 mm	-0.602 mm	-2.088mm	151.835 mm	2.214 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	506.46 mm	46.89 mm	-0.568 mm	-2.003 mm	154.215 mm	2.319 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	564.88 mm	46.89 mm	-0.516 mm	-1.779 mm	193.047 mm	2.582 kg
Motoman (MA1440, MA2010, MA3120, MH24)	602.11 mm	46.89 mm	-0.462 mm	-1.499 mm	209.239 mm	2.887 kg
Kawasaki (BA006N)	582.33 mm	46.89 mm	-0.505 mm	-1.828 mm	202.868 mm	2.666 kg
KUKA (KR16 arc HW)	508.92 mm	46.89 mm	-0.566 mm	-1.957 mm	155.481 mm	2.332 kg
405-22QCL1	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	552.29 mm	46.9 mm	0.584 mm	-2.027 mm	165.206 mm	2.281 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	561.81 mm	46.89 mm	-0.552 mm	-1.947 mm	167.200 mm	2.385 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	620.23 mm	46.89 mm	-0.503 mm	-1.734 mm	205.237 mm	2.649 kg
Motoman (MA1440, MA2010, MA3120, MH24)	657.46 mm	46.89 mm	-0.451 mm	-1.465 mm	220.646 mm	2.954 kg
Kawasaki (BA006N)	637.67 mm	46.89 mm	-0.492 mm	-1.783 mm	214.876 mm	2.733 kg
KUKA (KR16 arc HW)	564.27 mm	46.89 mm	-0.550 mm	-1.902 mm	168.433 mm	2.398 kg

5-3 Center of Mass Coordinates - 22 Degree (Solid Mount)

*Wire Stick-Out = 15 mm



Solid Mount - 22 Degree

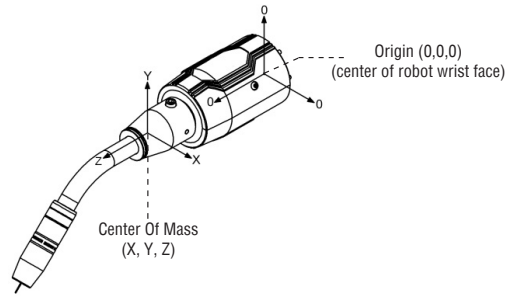
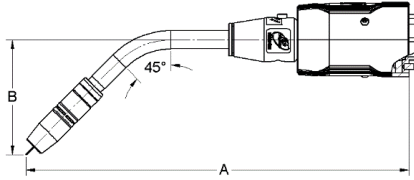
405-22QC	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	346.96 mm	46.89 mm	0.018 mm	-4.257 mm	100.620 mm	1.518 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	356.48 mm	46.89 mm	0.017 mm	-3.963 mm	103.929 mm	1.613 kg
ABB (IRB2600ID, IRB1660ID)	359.15 mm	46.89 mm	0.016 mm	-3.783 mm	100.571 mm	1.713 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	414.90 mm	46.89 mm	0.014 mm	-3.411 mm	141.956 mm	1.886 kg
Motoman (MA1440, MA2010, MA3120, MH24)	452.39 mm	46.89 mm	0.012 mm	-2.814 mm	158.759 mm	2.191 kg
Kawasaki (BA006N)	431.55 mm	46.89 mm	-0.000 mm	-3.415 mm	150.336 mm	1.960 kg
405-22QCL	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	404.74 mm	46.89 mm	0.017 mm	-4.085 mm	115.902 mm	1.577 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	414.27 mm	46.89 mm	0.016 mm	-3.811 mm	118.568 mm	1.672 kg
ABB (IRB2600ID, IRB1660ID)	416.94 mm	46.89 mm	0.015 mm	-3.646 mm	114.581 mm	1.772 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	472.69 mm	46.89 mm	0.014 mm	-3.297 mm	155.158 mm	1.945 kg
Motoman (MA1440, MA2010, MA3120, MH24)	510.17 mm	46.89 mm	0.012 mm	-2.732 mm	170.715 mm	2.250 kg
Kawasaki (BA006N)	489.34 mm	46.89 mm	-0.000 mm	-3.297 mm	163.871 mm	2.030 kg
405-22QCL1	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	460.09 mm	46.89 mm	0.016 mm	-3.919 mm	132.160 mm	1.644 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	469.62 mm	46.89 mm	0.015 mm	-3.664 mm	134.207 mm	1.739 kg
ABB (IRB2600ID, IRB1660ID)	472.28 mm	46.89 mm	0.015 mm	-3.513 mm	129.607 mm	1.839 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	528.04 mm	46.89 mm	0.013 mm	-3.187 mm	169.399 mm	2.012 kg
Motoman (MA1440, MA2010, MA3120, MH24)	565.52 mm	46.89 mm	0.012 mm	-2.653 mm	183.714 mm	2.317 kg
Kawasaki (BA006N)	544.68 mm	46.89 mm	-0.000 mm	-3.192 mm	177.798 mm	2.097 kg

Solid Mount with Wire Brake - 22 Degree

405-22QC	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	382.77 mm	46.89 mm	0.009 mm	-2.337 mm	112.054 mm	1.859 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	392.30 mm	46.89 mm	0.009 mm	-2.187 mm	115.894 mm	1.953 kg
ABB (IRB2600ID, IRB1660ID)	394.96 mm	46.89 mm	0.008 mm	-2.124 mm	112.948 mm	2.054 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	450.72 mm	46.89 mm	0.008 mm	-1.937 mm	155.569 mm	2.226 kg
Motoman (MA1440, MA2010, MA3120, MH24)	488.20 mm	46.89 mm	0.007 mm	-1.599 mm	173.513 mm	2.532 kg
Kawasaki (BA006N)	467.37 mm	46.89 mm	-0.004 mm	-1.989 mm	164.572 mm	2.301 kg
405-22QCL	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	440.56 mm	46.89 mm	0.009 mm	-2.255 mm	125.376 mm	1.918 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	450.08 mm	46.89 mm	0.009 mm	-2.113 mm	128.758 mm	2.012 kg
ABB (IRB2600ID, IRB1660ID)	452.75 mm	46.89 mm	0.008 mm	-2.055 mm	125.357 mm	2.113 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	508.50 mm	46.89 mm	0.007 mm	-1.879 mm	167.380 mm	2.286 kg
Motoman (MA1440, MA2010, MA3120, MH24)	545.99 mm	46.89 mm	0.007 mm	-1.555 mm	184.379 mm	2.591 kg
Kawasaki (BA006N)	525.15 mm	46.89 mm	-0.003 mm	-1.930 mm	176.799 mm	2.370 kg
405-22QCL1	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	495.90 mm	46.89 mm	0.009 mm	-2.179 mm	139.733 mm	1.985 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	505.43 mm	46.89 mm	0.008 mm	-2.045 mm	142.661 mm	2.079 kg
ABB (IRB2600ID, IRB1660ID)	508.10 mm	46.89 mm	0.008 mm	-1.992 mm	138.805 mm	2.180 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	563.85 mm	46.89 mm	0.007 mm	-1.825 mm	180.231 mm	2.352 kg
Motoman (MA1440, MA2010, MA3120, MH24)	601.33 mm	46.89 mm	0.006 mm	-1.516 mm	196.270 mm	2.658 kg
Kawasaki (BA006N)	580.50 mm	46.89 mm	-0.003 mm	-1.877 mm	189.409 mm	2.437 kg

5-4 Center of Mass Coordinates - 45 Degree (Clutch)

*Wire Stick-Out = 15 mm



Clutch - 45 Degree

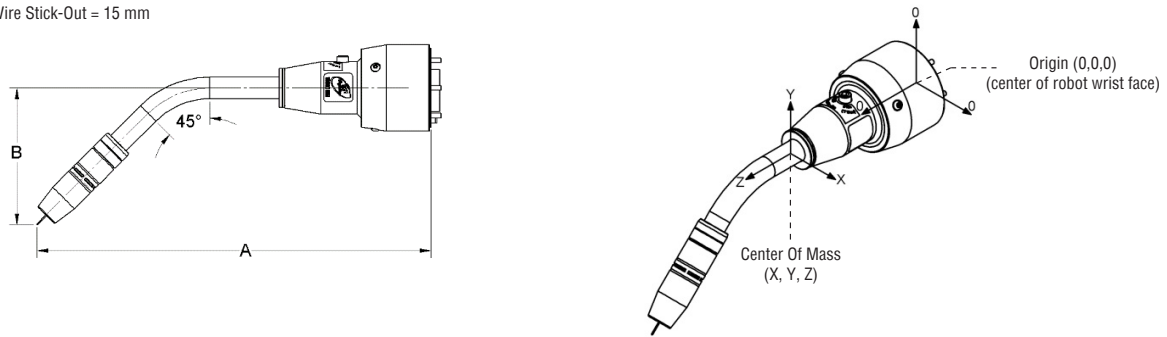
405-45QC	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	354.61 mm	100.35 mm	-0.706 mm	-9.227 mm	118.853 mm	1.724 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	364.13 mm	100.35 mm	-0.656 mm	-8.699 mm	121.188 mm	1.829 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	422.55 mm	100.35 mm	-0.582 mm	-7.591 mm	159.603 mm	2.092 kg
Motoman (MA1440, MA2010, MA3120, MH24)	459.78mm	100.35 mm	-1.008 mm	-6.514 mm	175.753 mm	2.397 kg
Kawasaki (BA006N)	439.99 mm	100.35 mm	-0.565 mm	-7.450 mm	169.082 mm	2.177 kg
KUKA (KR16 arc HW)	366.58 mm	100.35 mm	-0.653 mm	-8.629 mm	122.475 mm	1.843 kg
405-45QCL	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	401.69 mm	120.24 mm	-0.679 mm	-11.994 mm	131.757 mm	1.792 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	411.22 mm	120.24 mm	-0.633 mm	-11.333 mm	133.639 mm	1.897 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	469.64 mm	120.24 mm	-0.564 mm	-9.939 mm	171.168 mm	2.160 kg
Motoman (MA1440, MA2010, MA3120, MH24)	506.86 mm	120.24 mm	-0.994 mm	-8.601 mm	186.469 mm	2.465 kg
Kawasaki (BA006N)	487.08 mm	120.24 mm	-0.548 mm	-9.699 mm	180.374 mm	2.244 kg
KUKA (KR16 arc HW)	413.67 mm	120.24 mm	-0.630 mm	-11.229 mm	134.800 mm	1.910 kg
405-45QCL1	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	457.04 mm	120.24 mm	-0.655 mm	-11.563 mm	146.815 mm	1.859 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	466.56 mm	120.24 mm	-0.0611 mm	-10.947 mm	148.157 mm	1.964 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	524.98 mm	120.24 mm	-0.547 mm	-9.640 mm	184.597 mm	2.227 kg
Motoman (MA1440, MA2010, MA3120, MH24)	562.21 mm	120.24 mm	-0.981 mm	-8.373 mm	198.860 mm	2.532 kg
Kawasaki (BA006N)	542.42 mm	120.24 mm	-0.532 mm	-9.418 mm	193.560 mm	2.311 kg
KUKA (KR16 arc HW)	469.02 mm	120.24 mm	-0.609 mm	-10.849 mm	149.270 mm	1.977 kg
405-45QCL2	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	507.03 mm	120.24 mm	-0.634 mm	-11.199 mm	161.171 mm	1.920 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	516.55 mm	120.24 mm	-0.593 mm	-10.620 mm	162.015 mm	2.024 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	574.97 mm	120.24 mm	-0.532 mm	-9.385 kg	197.442 mm	2.287 kg
Motoman (MA1440, MA2010, MA3120, MH24)	612.20 mm	120.24 mm	-0.969 mm	-8.178 mm	210.728 mm	2.592 kg
Kawasaki (BA006N)	592.41 mm	120.24 mm	-0.518 mm	-9.178 mm	206.171 mm	2.372 kg
KUKA (KR16 arc HW)	519.00 mm	120.24 mm	-0.591 mm	-10.527 mm	163.084 mm	2.037 kg

Clutch with Wire Brake - 45 Degree

405-45QC	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	391.44 mm	100.35 mm	-0.629 mm	-5.907 mm	133.101 mm	2.121 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	400.96 mm	100.35 mm	-0.592 mm	-5.639 mm	136.062 mm	2.226 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	459.38 mm	100.35 mm	-0.536 mm	-5.022 mm	176.082 mm	2.489 kg
Motoman (MA1440, MA2010, MA3120, MH24)	496.26 mm	100.35mm	-0.477 mm	-4.379 mm	193.426 mm	2.794 kg
Kawasaki (BA006N)	476.82 mm	100.35 mm	-0.523 mm	-4.989 mm	186.257 mm	2.574 kg
KUKA (KR16 arc HW)	403.41 mm	100.35 mm	-0.589 mm	-5.591 mm	137.464 mm	2.240 kg
405-45QCL	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	438.52 mm	120.24 mm	-0.609 mm	-8.276 mm	144.369 mm	2.189 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	448.05 mm	120.24 mm	-0.574 mm	-7.908 mm	147.012 mm	2.294 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	506.47 mm	120.24 mm	-0.521 mm	-7.074 mm	186.395 mm	2.557 kg
Motoman (MA1440, MA2010, MA3120, MH24)	543.35 mm	120.24 mm	-0.966 mm	-6.227 mm	202.763 mm	2.862 kg
Kawasaki (BA006N)	523.91 mm	120.24 mm	-0.509 mm	-6.962 mm	196.350 mm	2.641 kg
KUKA (KR16 arc HW)	450.50 mm	120.24 mm	-0.572 mm	-7.832 mm	148.303 mm	2.307 kg
405-45QCL1	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	493.87 mm	120.24 mm	-0.591 mm	-8.031 mm	157.497 mm	2.256 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	503.39 mm	120.24 mm	-0.558 mm	-7.684 mm	159.753 mm	2.361 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	561.81 mm	120.24 mm	-0.508 mm	-6.894 mm	198.344 mm	2.624 kg
Motoman (MA1440, MA2010, MA3120, MH24)	598.69 mm	120.24 mm	-0.955 mm	-6.085 mm	213.935 mm	2.929 kg
Kawasaki (BA006N)	579.23 mm	120.24 mm	-0.497 mm	-6.790 mm	208.119 mm	2.708 kg
KUKA (KR16 arc HW)	505.85 mm	120.24 mm	-0.556 mm	-7.611 mm	161.011 mm	2.374 kg
405-45QCL2	A	B	X	Y	Z	Weight
Motoman, OTC (AX-V4, AX-V4L), KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	543.86 mm	120.24 mm	-0.575 mm	-7.821 mm	170.076 mm	2.316 kg
OTC (AII B4, AII B4L, FD B4, FD B4L), COMAU (Smart5 Arc6)	553.38 mm	120.24 mm	-0.544 mm	-7.492 mm	171.970 mm	2.421 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	611.80 mm	120.24 mm	-0.497 mm	-6.739 mm	209.809 mm	2.684 kg
Motoman (MA1440, MA2010, MA3120, MH24)	648.68 mm	120.24 mm	-0.946 mm	-5.962 mm	224.661 mm	2.989 kg
Kawasaki (BA006N)	629.24 mm	120.24 mm	-0.486 mm	-6.642 mm	219.409 mm	2.768 kg
KUKA (KR16 arc HW)	555.83 mm	120.24 mm	-0.542 mm	-7.422 mm	173.196 mm	2.434 kg

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

*Wire Stick-Out = 15 mm



Solid Mount - 45 Degree

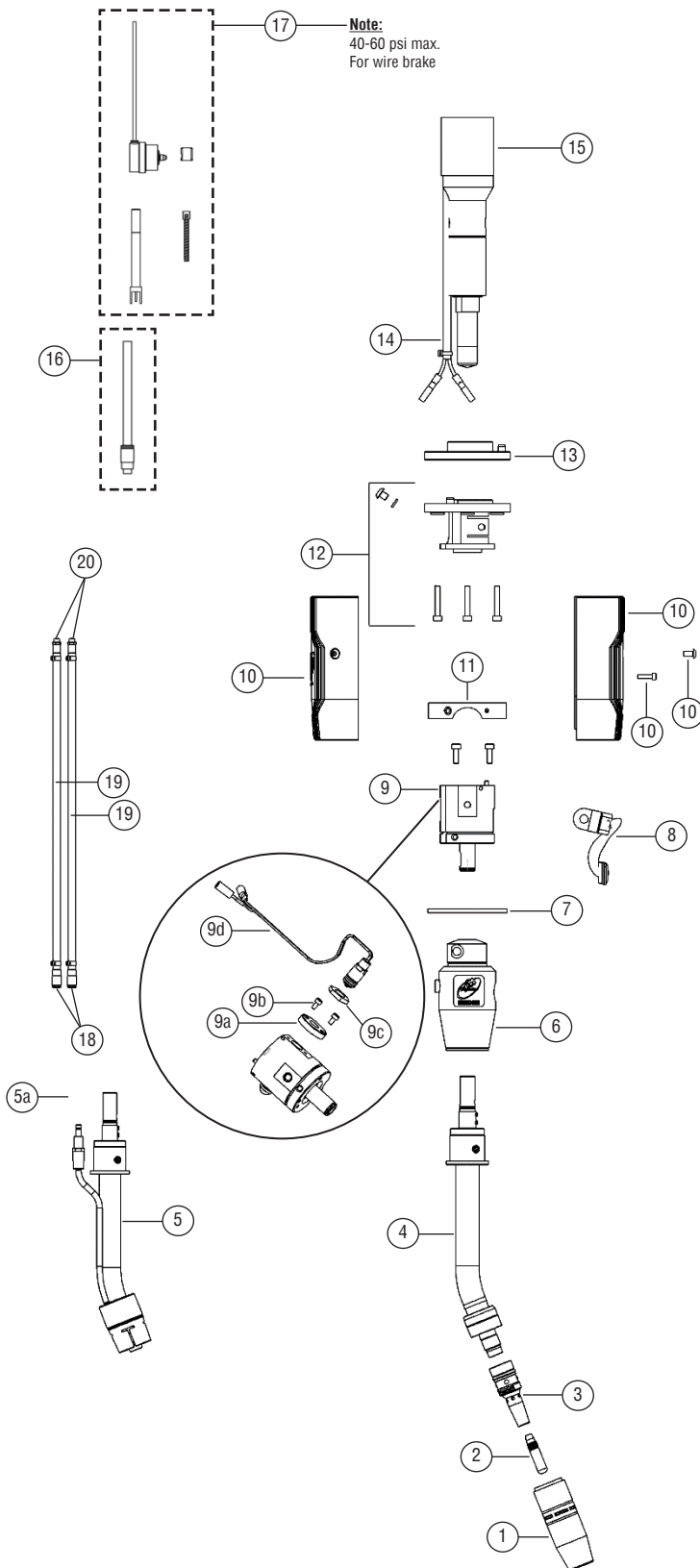
405-45QC	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	299.24 mm	100.35 mm	0.017 mm	-9.666 mm	92.663 mm	1.484 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	308.77 mm	100.35 mm	0.016 mm	-9.042 mm	96.313 mm	1.579 kg
ABB (IRB2600ID, IRB1660ID)	311.43 mm	100.35 mm	0.015 mm	-8.555 mm	90.623 mm	1.679 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	367.19 mm	100.35 mm	0.014 mm	-7.731 mm	135.091 mm	1.852 kg
Motoman (MA1440, MA2010, MA3120, MH24)	404.67 mm	100.35 mm	0.012 mm	-6.514 mm	152.540 mm	2.157 kg
Kawasaki (BA006N)	383.83 mm	100.35 mm	0.000 mm	-7.565 mm	144.367 mm	1.938 kg
405-45QCL	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	346.33 mm	120.24 mm	0.017 mm	-12.841 mm	106.279 mm	1.553 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	355.85 mm	120.24 mm	0.016 mm	-12.062 mm	109.393 mm	1.647 kg
ABB (IRB2600ID, IRB1660ID)	358.52 mm	120.24 mm	0.015 mm	-11.419 mm	103.171 mm	1.747 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	414.27 mm	120.24 mm	0.014 mm	-10.367 mm	147.006 mm	1.920 kg
Motoman (MA1440, MA2010, MA3120, MH24)	451.76 mm	120.24 mm	0.012 mm	-8.826 mm	163.435 mm	2.225 kg
Kawasaki (BA006N)	430.92 mm	120.24 mm	0.000 mm	-10.078 mm	155.956 mm	2.005 kg
405-45QCL1	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	401.67 mm	120.24 mm	0.016 mm	-12.311 mm	122.333 mm	1.619 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	411.20 mm	120.24 mm	0.015 mm	-11.591 mm	124.813 mm	1.714 kg
ABB (IRB2600ID, IRB1660ID)	413.87 mm	120.24 mm	0.014 mm	-10.998 mm	117.996 mm	1.814 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	469.62 mm	120.24 mm	0.013 mm	-10.018 mm	161.005 mm	1.987 kg
Motoman (MA1440, MA2010, MA3120, MH24)	507.10 mm	120.24 mm	0.011 mm	-8.568 mm	176.185 mm	2.292 kg
Kawasaki (BA006N)	486.26 mm	120.24 mm	0.000 mm	-9.753 mm	169.640 mm	2.072 kg
405-45QCL2	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	451.66 mm	120.24 mm	0.016 mm	-11.868 mm	137.627 mm	1.680 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	461.19 mm	120.24 mm	0.015 mm	-11.196 mm	139.533 mm	1.774 kg
ABB (IRB2600ID, IRB1660ID)	463.85 mm	120.24 mm	0.014 mm	-10.644 mm	132.118 mm	1.875 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	519.61 mm	120.24 mm	0.013 mm	-9.722 mm	174.416 mm	2.048 kg
Motoman (MA1440, MA2010, MA3120, MH24)	557.09 mm	120.24 mm	0.011 mm	-8.348 mm	188.430 mm	2.353 kg
Kawasaki (BA006N)	536.25 mm	120.24 mm	0.000 mm	-9.476 mm	182.754 mm	2.132 kg

Solid Mount with Wire Brake - 45 Degree

405-45QC	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	335.06 mm	100.35 mm	0.009 mm	-6.702 mm	105.127 mm	1.825 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	344.58 mm	100.35 mm	0.009 mm	-6.335 mm	109.207 mm	1.919 kg
ABB (IRB2600ID, IRB1660ID)	347.25 mm	100.35 mm	0.008 mm	-6.064 mm	106.501 mm	2.020 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	403.00 mm	100.35 mm	0.008 mm	-5.564 mm	149.427 mm	2.192 kg
Motoman (MA1440, MA2010, MA3120, MH24)	440.14 mm	100.35 mm	0.007 mm	-4.778 mm	167.505 mm	2.498 kg
Kawasaki (BA006N)	419.65 mm	100.35 mm	-0.004 mm	-5.505 mm	159.286 mm	2.279 kg
405-45QCL	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	382.14 mm	120.24 mm	0.009 mm	-9.413 mm	117.136 mm	1.893 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	391.67 mm	120.24 mm	0.009 mm	-8.930 mm	120.832 mm	1.987 kg
ABB (IRB2600ID, IRB1660ID)	394.33 mm	120.24 mm	0.008 mm	-8.543 mm	117.741 mm	2.088 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	450.09 mm	120.24 mm	0.008 mm	-7.869 mm	160.195 mm	2.261 kg
Motoman (MA1440, MA2010, MA3120, MH24)	487.22 mm	120.24 mm	0.007 mm	-6.829 mm	177.499 mm	2.566 kg
Kawasaki (BA006N)	466.73 mm	120.24 mm	-0.003 mm	-7.712 mm	169.789 mm	2.345 kg
405-45QCL1	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	437.49 mm	120.24 mm	0.009 mm	-9.092 mm	131.253 mm	1.960 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	447.01 mm	120.24 mm	0.008 mm	-8.639 mm	134.491 mm	2.054 kg
ABB (IRB2600ID, IRB1660ID)	449.68 mm	120.24 mm	0.008 mm	-8.278 mm	130.941 mm	2.155 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	505.43 mm	120.24 mm	0.007 mm	-7.643 mm	172.797 mm	2.327 kg
Motoman (MA1440, MA2010, MA3120, MH24)	542.57 mm	120.24 mm	0.007 mm	-6.656 mm	189.144 mm	2.633 kg
Kawasaki (BA006N)	522.08 mm	120.24 mm	-0.003 mm	-7.498 mm	182.152 mm	2.412 kg
405-45QCL2	A	B	X	Y	Z	Weight
Motoman, KUKA (KR5 HW, KR16 L8 HW), Panasonic (TB1800WGIII)	487.47 mm	120.24 mm	0.009 mm	-8.820 mm	144.775 mm	2.020 kg
ABB (IRB1600ID, IRB1520ID), KUKA (KR16 arc HW)	497.00 mm	120.24 mm	0.008 mm	-8.392 mm	147.589 mm	2.115 kg
ABB (IRB2600ID, IRB1660ID)	499.67 mm	120.24 mm	0.008 mm	-8.052 mm	143.614 mm	2.215 kg
Panasonic (TM-1100, TM-1400, TM-1600, TM-1800, TM-2000)	555.42 mm	120.24 mm	0.007 mm	-7.449 mm	184.905 mm	2.388 kg
Motoman (MA1440, MA2010, MA3120, MH24)	592.55 mm	120.24 mm	0.007 mm	-6.507 mm	200.346 mm	2.693 kg
Kawasaki (BA006N)	572.06 mm	120.24 mm	-0.003 mm	-7.315 mm	194.030 mm	2.473 kg

SECTION 6 - PARTS LIST

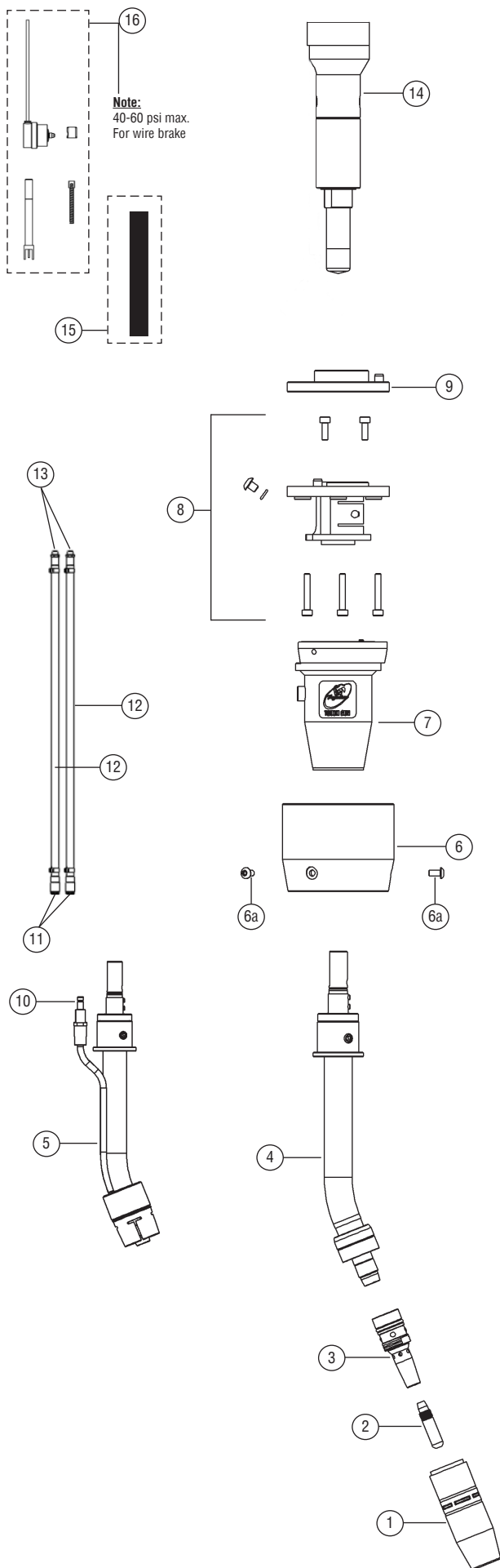
6-1 Exploded View and Parts List - Clutch System



ITEM	PART #	DESCRIPTION
1	See SP-TA3 Spec Sheet	Nozzle, Heavy Duty
		Nozzle, Standard Duty
		Nozzle, TOUGH ACCESS™
2	See SP-TA3 Spec Sheet	Contact Tip, TOUGH LOCK™
3	See SP-TA3 Spec Sheet	Retaining Head, TOUGH LOCK
		Retaining Head, TOUGH ACCESS
4	See SP-TA3 Spec Sheet	Neck, air-cooled
5	See SP-TA3 Spec Sheet	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 Assembly
9	AS-714	Clutch
9a	AS-714-7-2	Switch Base
9b	Not Sellable	M3x0.5-6 LG. SHCS
9c	AS-714-7-3	Hex Nut
9d	AS-714-9	Clutch Switch
10	580-5A	Outer Cover Kit (includes M4x0.7-8 SHCS and M3x0.5-12 SHCS)
	580-5B	Outer Cover Kit for guns equipped with TOUGH GUN I.C.E. Technology (includes M4x0.7-8 SHCS and M3x0.5-12 SHCS)
	580-5C	Outer Cover Kit for guns equipped with wire brake (includes M4x0.7-8 SHCS and M3x0.5-12 SHCS)
	580-5D	Outer Cover Kit for guns equipped with TOUGH GUN I.C.E. Technology and wire brake (includes M4x0.7-8 SHCS and M3x0.5-12 SHCS)
11	AS-114-3	Mounting Ring
12	580-19	Cable Connector Kit, Motoman® (includes Flange Cable Connector, M4x0.7-12 LG. SHCS, M3x0.5-6 LG. SBHCS)
	580-20	Cable Connector Kit, KUKA® (includes Flange Cable Connector, M4x0.7-12 LG. SHCS, M3x0.5-6 LG. SBHCS)
	580-21	Cable Connector Kit, Panasonic® TB1800WGIII (includes Flange Cable Connector, M4x0.7-12 LG. SHCS, M3x0.5-6 LG. SBHCS)
13	See SP-TA3 Spec Sheet	Insulating Disc
14	AS-714-19	Control Cable
15	See SP-TA3 Spec Sheet	LSR Unicable
16	580-A	Air Blast Kit option
17	WB-045*	Wire Brake Kit option for 0.045" wire
	WB-116*	Wire Brake Kit option for 1/16" wire
18	658-8	Water Line Fittings, Female (x2) + clamps (x2) (included with ITEM 19) (TOUGH GUN I.C.E. assembly components)
19	580-501-2	TOUGH GUN I.C.E. Water Lines (includes ITEMS 18 and 20)
20	658-2	Quick Connect Brass Fittings, Male (x2) = clamps (x2) (included in ITEM 19) (TOUGH GUN I.C.E. assembly components)

* 580-7-045 or 580-7-116 (see 5 above) required if retrofitting wire brake

6-2 Exploded View and Parts List - Solid Mount System



ITEM	PART #	DESCRIPTION
1	See SP-TA3 Spec Sheet	Nozzle, Heavy Duty
		Nozzle, Standard Duty
		Nozzle, TOUGH ACCESS™
2	See SP-TA3 Spec Sheet	Contact Tip, TOUGH LOCK™
3	See SP-TA3 Spec Sheet	Retaining Head, TOUGH LOCK
		Retaining Head, TOUGH ACCESS
4	See SP-TA3 Spec Sheet	Neck
5	See SP-TA3 Spec Sheet	Neck, TOUGH CUN I.C.E.™ assembly (only available for FANUC®, ABB® and Panasonic®)
6	580-300-5-1	Outer Cover Kit
	580-300-5-1W	Outer Cover Kit, wire brake
	I580-300-5-1	Outer Cover Kit, TOUGH GUN I.C.E.
	I580-300-5-1W	Outer Cover Kit, TOUGH GUN I.C.E. with wire brake (includes ITEM 6a)
6a	Not Sellable	M4x0.7-8mm LG. SBHCS (included in ITEM 6)
7	580-2S	Connector Housing
	580-2SW	Connector Housing (for guns equipped with wire brake)
8	580-19	Cable Connector Kit, Motoman® (includes Flange Cable Connector, M4x0.7-12 LG. SHCS, M3x0.5-6 LG. SBHCS)
	580-20	Cable Connector Kit, KUKA® (includes Flange Cable Connector, M4x0.7-12 LG. SHCS, M3x0.5-6 LG. SBHCS)
	580-21	Cable Connector Kit, Panasonic® TB1800WGIII (includes Flange Cable Connector, M4x0.7-12 LG. SHCS, M3x0.5-6 LG. SBHCS)
9	See SP-TA3 Spec Sheet	Insulating Disc
10	590-8	Water Line Fittings, Male (TOUGH GUN I.C.E. assembly components)
11	658-8	Water Line Fittings, Female (x2) + clamps (x2) (included in ITEM 12) (TOUGH GUN I.C.E. assembly components)
12	580-501-2	TOUGH GUN I.C.E. Water Lines (includes ITEMS 11 and 13)
13	658-2	Quick Connect Brass Fittings, Male (x2) + clamps (x2) (included in ITEM 12) (TOUGH GUN I.C.E. assembly components)
14	See SP-TA3 Spec Sheet	LSR Unicable
15	580-A	Air Blast Kit option
16	WB-045**	Wire Brake Kit option for 0.045" wire
	WB-116**	Wire Brake Kit options for 1/16" wire

SECTION 7 - TROUBLESHOOTING

7-1 Troubleshooting Table

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

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

**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

For additional support materials such as Spec Sheets, troubleshooting information, how-to guides and videos, animations, online configurators and much more, please visit Tregaskiss.com. Scan the QR Code with your smart phone for immediate access to Tregaskiss.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 TOUGH LOCK™ Consumables.....



Scan to view the QUICK LOAD™ Liners.....



Scan to view Tregaskiss Spec Sheets.....

