AMERICAN WELDQUIP

SERVICE QUALITY SOLUTIONS

ArcSafe™, MultiClutch, ArcSafe™-SW

PATENT # 4,998,606

Robotic Collision Detection

This Product is
MADE IN THE U.S.A.

INSTALLATION, OPERATIONS AND REPLACEMENT PARTS MANUAL

SERVICE QUALITY SOLUTIONS

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INTRODUCTION

Thank you for purchasing an American Weldquip product. The American Weldquip product you have purchased has been carefully manufactured, assembled and fully tested. This manual contains information on the installation, operation, maintenance and replacement part breakdown. Please read, understand and follow all safety instructions, warnings and procedures. Keep this manual handy for referencing installation, operation, maintenance and part ordering information. While every precaution has been taken as to the accuracy in this manual, American Weldquip, Inc. assumes no responsibility for errors or omissions. American Weldquip, Inc. assumes no liability for damages resulting from the use of the information contained in this manual. American Weldquip, Inc. shall have no liability to the buyer for consequential damages or expenses by any defect whatsoever.

WARRANTY

AMERICAN WELDQUIP MIG guns and parts are warranted to be free of defects in material and/or workmanship for the period of time listed below. For any product found to be defective under normal use, AMERICAN WELDQUIP, INC. at our option, will repair, replace or issue a credit for the value of the defective product. All warranty claims must be submitted by the original purchaser. Use of non-genuine AMERICAN WELDQUIP parts and/or consumables may damage and/or severely limit the performance of the equipment which may limit or void any warranties. AMERICAN WELDQUIP, INC. will not assume responsibility for incidental damages or expenses related to any defect. This warranty does not cover damage caused by misuse or abuse, accident, alteration of product, improper installation, misapplication, lack of reasonable care and maintenance, unauthorized repairs or modifications, loss of use while at a repair facility or other conditions that are beyond the control of American Weldquip, Inc.

A Return Authorization Number (RA#) must be attained from the factory for any product being returned for Warranty Repair or Replacement. All returned product must be shipped freight prepaid by the sender. No- charge replacements, repaired products, or credit will be issued, once the returned product has been evaluated and warranty condition has been verified. If an immediate replacement is required before proper warranty evaluation, a purchase order number is required and the goods will be invoiced. A credit will be issued once it is determined that a warranty condition exists.

STANDARD WARRANTY

All Semi-Automatic, Automatic, Robotic MIG TORCHES and Components	= 120 Days
MIG Torch Trigger Switches (Contacts only) -Excludes Smoke Extraction	= LIFETIME
Robotic Nozzle Cleaning Stations, Wire Cutter	= 90 Days
Robotic Peripherals, ArcSafe, Gun Mounts	= 90 Days
TIG POINT Tungsten Electrode Grinders	= 90 Days

LIMITED EXTENDED WARRANTY PROTECTION

This limited extended warranty protection expands coverage to loyal customers who use all GENUINE American Weldquip consumables. Customers filing a claim under the extended warranty will need to prove, by providing past invoices, that they have been purchasing and using Genuine American Weldquip consumables.

All Semi-Automatic, Automatic, Robotic MIG TORCHES and Components	= 1 YEAR

MIG Torch Trigger Switches (Contacts only) -Excludes Smoke Extraction	= LIFETIME
MIG Torch Handles	= LIFETIME
Robotic Nozzle Cleaning Stations, Wire Cutter	= 90 Days
Robotic Peripherals, ArcSafe, Gun Mounts	= 90 Days
TIG POINT Tungsten Electrode Grinders	= 90 Days

ROHS COMPLIANT

RoHS (Restriction of Hazardous Substances) is an environmental law which addresses the European Union directive 2002/95/EC known as the RoHS Directive. The RoHS directive restricts the use of hazardous substances listed below in electrical and electronic equipment. While it is not a requirement to meet the directive in the United States, at this time, American Weldquip Inc. feels this is an important part of our "Go Green initiative. We have taken all reasonable steps to try to insure the supporting evidence regarding the absence of the restricted substances to support RoHS compliance.

For reference, the maximum concentration values of the restricted substances by weight in homogenous materials are:

Lead/Lead Components	- 0.1%
Mercury	- 0.1%
Hexavalent Chromium	- 0.1%
Polybrominated Biphenyls (PBBs)	- 0.1%
Polybrominated Diphenyl Ethers (PBDEs)	- 0.1%
Cadmium	-0.01%

For RoHS Certification of Compliance Letter on a particular product please visit our website – www.weldquip.com or email us at technical@weldquip.com or call 330-239-0317.

SAFETY PRECAUTIONS – READ BEFORE USING

Before installing, operating or performing maintenance please read the safety precautions below. Failure to observe safety precautions can result in injury or death.

CALIFORNIA PROPOSITION 65 WARNINGS

This product, when used for welding and cutting, can produce fumes or gases which contain chemicals known to cause birth defects and cancer. (California Health & Safety Code Section 25249.5 et seq.) **WASH HANDS AFTER HANDLING**

EMF – ELECTRICAL AND MAGNETIC FIELDS MAY BE DANGEROUS

Electrical current flowing through any conductor causes localized Electric and Magnetic Fields(EMF). Welding current creates and EMF field around welding cables and welding machines.

WARNING - EMF fields may interfere with some pacemakers and other medical implants. Implanted medical device wearers should consult their doctor before operating or going near any arc welding applications. In addition, exposure to EMF fields in welding may have other unknown health effects.

Welders should use the below procedures to minimize the exposure to EMF fields from the welding circuit.

1) Route the cables close together. Secure by twisting, taping or using a cable cover to keep together.
2) Never coil, wrap or drape welding cables around your body.
3) Do not place your body between welding cables. Arrange so that cables are on one side and away from the operator.
4) Connect the work clamp(ground) to the workpiece as close as possible to the area to be welded.
5) Do not sit, lean and stand next to the welding power source.

FUMES AND GASES CAN BE DANGEROUS

WARNING - WELDING AND CUTTING PRODUCE FUMES AND GASES THAT ARE HAZARDOUS TO YOUR HEALTH

1) Do not breathe the fumes and gases as they can cause asphyxiation.
2) Fumes and gases generated from welding can cause severe injury to respiratory system and even death. In poorly vented areas it is required to properly ventilate the area and/or use local forced ventilation or other fume control equipment at the arc to remove welding and cutting fumes and gases.
3) The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed. The worker exposer level should be checked initially and periodically thereafter to maintain applicable OSHA PEL and ACGIH TVL limits.
4) In a poorly ventilated area it is necessary to wear an approved air-supplied respirator.
5) Always read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes and metals.
6) 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.
7) 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.
8) 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.

ELECTRIC SHOCK CAN KILL

WARNING - ELECTRICAL SHOCK CAN KILL. DO NOT TOUCH LIVE ELECTRICAL PARTS AND/OR USE IN DAMP LOCATIONS.

1) The electrode and work (ground) circuit is electrically "HOT" whenever the welding equipment is on. Do not touch these electrically live parts with your bare skin or wet/damp clothing. Wear dry, hole-free gloves. Incorrectly installed or improperly grounded equipment is a hazard.
2) Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
3) 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 semi-automatic DC constant voltage, 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!
4) Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tag out input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
5) Properly install ground and operate this equipment according to its Owner's Manual and national, state/provincial and local codes.
6) Always verify the supply ground. Make 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.
7) Keep cords dry, free of oil and grease and protected from hot metal and sparks.
8) Frequently inspect input power cord for damage or bare wiring. Replace cord immediately if damaged. Bare wiring can kill.
9) Turn off all equipment when not in use.
10) Do not use worn, damaged, undersized or poorly spliced cables. It is illegal to use electrical tape to repair torch power cable or ground cable that has damaged outer insulation. The cable must be replaced.
11) Do not drape cables over your body.
12) Do not touch electrode if you are in contact with the work, ground or another electrode from a different machine.
13) Do not touch electrode holders connected to two welding machines at the same time since double open circuit voltage will be present.
14) Use only well maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
15) Wear a safety harness if working above floor level.
16) Keep all panels and covers securely in place.
17) Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
18) Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process when not in use.

ARC RAYS HAZARDS

WARNING – A WELDING ARC EMITS ULTRAVIOLET (UV) AND OTHER RADIATION AND CAN CAUSE SERIOUS INJURY TO UNPROTECTED SKIN AND EYES.

1) Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.
2) Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

3) Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

WELDING AND CUTTING CAN CAUSE FIRE OR EXPLOSION

WARNING – Welding and cutting produces sparks that fly off from the arc and can cause fires and/or explosions.

1) 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.
2) 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.
3) Do not weld or cut where flying sparks can strike flammable material.
4) Remove all flammables and fire hazards from the welding area. If this is not possible, tightly cover them with approved covers to prevent the welding sparks from starting a fire.
5) When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
6) Be alert that welding sparks and hot materials from welding and cutting can easily go through small cracks and openings and cause a fire in the adjacent areas.
7) Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.
8) Do not heat, cut or weld tanks, drums or containers that have held combustibles until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society .
9) Do not weld or cut where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
10) Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
11) 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.
12) Do not use welder to thaw frozen pipes.
13) Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding or cutting.
14) Inspect area to ensure it is free of sparks, glowing embers, and flames after work is complete.

CYLINDERS CAN EXPLODE IF DAMAGED

WARNING – Compressed gas cylinders contain gas under high pressure and/or flammable gas. If damaged, the cylinder can explode.

1) Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

2) Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
3) Cylinders should be located away from areas where they may be struck or subjected to physical damage and a safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.
4) Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
5) Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
6) Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
7) Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

DESCRIPTION

WARNING: THE ARCSAFE, MULTICLUTCH AND ARCSAFE-SW USE A HIGH COMPRESSION SPRING. DO NOT DISASSEMBLE THE UNIT AS BODILY INJURY CAN RESULT.

The **ArcSafe™, MultiClutch™ and the ArcSafe™-SW robotic** safety mount is designed to provide the user with the ability to protect robot tooling, robots, and assembly fixtures from damage while the robot cell is in operation.

The ArcSafe and MultiClutch utilize an integrated switch designed to prevent damage to the robotic end of arm equipment and/or tooling. In the event of a "crash" situation with the end of arm equipment the switch activates the E-Stop circuit, thus stopping the robot movement.

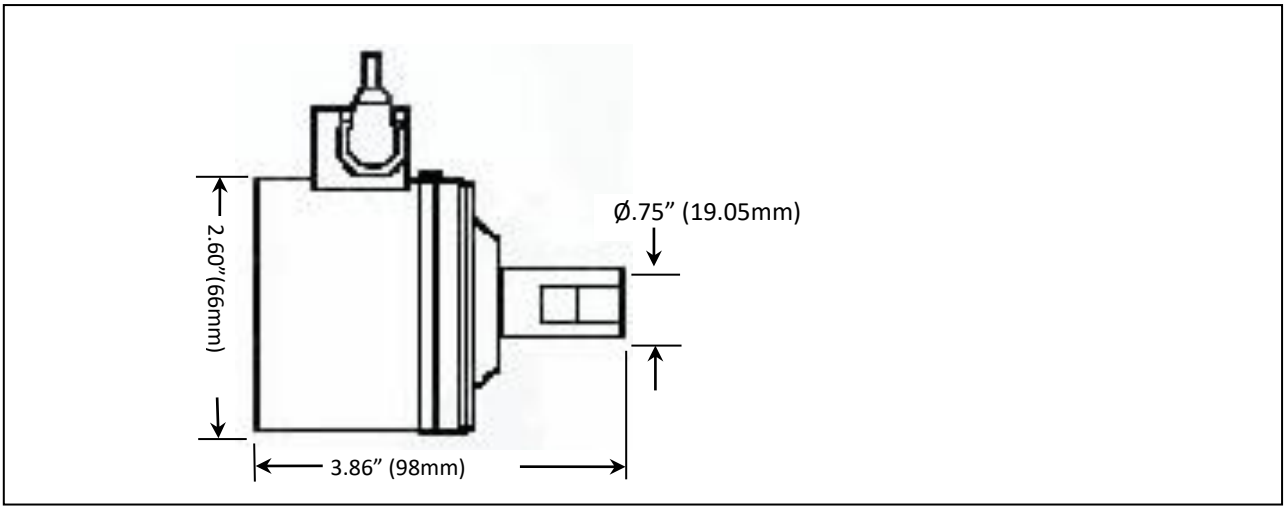
The **NEW ArcSafe-SW** is specifically designed for use in robotic application where the crash protection is integrated into the robotic software package. Most integrated robotic collision detection software systems take time to come to a complete stop - especially with high speed movements. This is where the ArcSafe-SW offers additional protection over solid mount type devices.

The built-in spring deflection feature allows the ArcSafe-SW to deflect the end of arm equipment in the event of a crash. This additional safe guard provides the extra protection required to reduce or eliminate bent goosenecks, cracked insulating disks, and damaged tooling.

The ArcSafe and MultiClutch offer the air-assist option for use in applications of extremely fast movements or heavy payloads. See chart below.

Without Air			With Air Assist @ 100 PSA		
Mx,My	**Mz**	**Fz**	**Mx, My**	**Mz**	**Fz**
93 in. lbs.	168 in. lbs.	172 lbs.	275 in-lbs.	430 in.lbs.	500 lbs.

SPECIFICATIONS



Weight- 1lb. 9 oz. (.709 KG)

Repeatability - ± .001" (± .025mm)

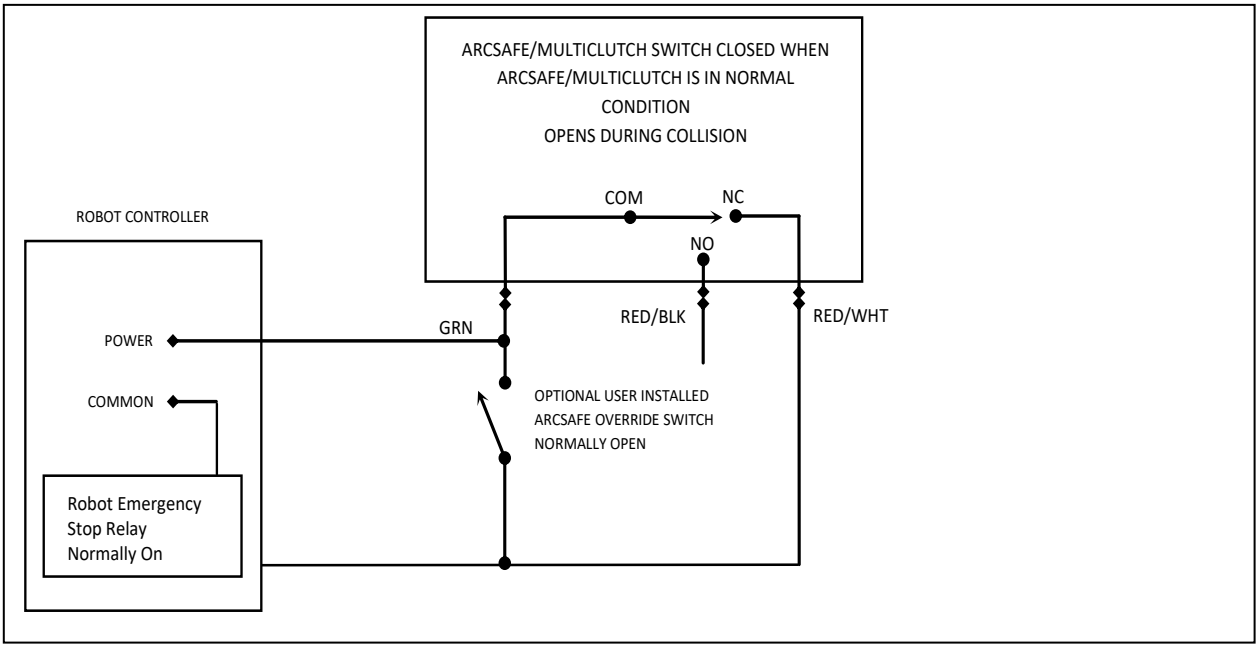
Range Of Travel - 20˚ Pivot, 360˚ Rotation
.50" (12.7mm) Compression

Spring Force

Mx, My	= 93 in-lbs
Mz	= 168 in.lbs.
Fz	= 172 lbs.

Electrical – ArcSafe and MultiClutch Only
Micro Switch – Normally Closed
Operational Voltage – 10 – 30 VDC

WIRING DIAGRAM



INSTALLATION AND SETUP

To insure proper installation position of torch or other hardware, orientate torch etc. in position with adaptor plate or insulating disk before mounting. Otherwise home position in relation to robot may not be correct.

1. Installing the Insulating Disk or Adaptor Plate

a. Place the robot wrist face in the Home or Maintenance position.
b. Remove ***ArcSafe*** from the packaging.
c. Install the proper insulating disk or adaptor plate(purchased separately) with correct mount screws (not supplied).
d. Torque screws to 45 in.lbs. (5 nm).

2. Installing the ArcSafe, MultiClutch, ArcSafe-SW to the Disk or Plate

a. Remove the dust boot.
b. Select correct mounting hardware.
    i. If using the Adaptor Plate – requires 4ea. M4 x 57mm
    ii. If using the Insulating Disk – requires 4ea. M4 x 60mm
c. With the switch assembly facing up install the ArcSafe or MultiClutch to the insulating disk or adaptor plate with the screws provided.
d. Torque screws to 45 in.lbs.
e. Reinstall the dust boot.

3. Installing the Torch Mount on the ArcSafe or ArcSafe –SW

a. Loosen wedge pin bolt but do not remove.
b. Install torch mount on Arcsafe Shaft. Torch mount wedge pin must align with flat face on ArcSafe arbor shaft.
c. Torque wedge pin screw to 50 in.lbs.
d. Install torch in mount and secure by tightening gun holder screws. Torch to 45 in. lbs.
e.

NOTE: When the torch/ArcSafe is in the proper "HOME" position the Torch Mount Arm will be parallel with the switch housing. In any of the other positions will feel a slight looseness and WILL NOT MAINTAIN TCP.

4. Installing equipment to MultiClutch

a. The MultiClutch is supplied with a mounting flange. Customer must supply own equipment configuration to match mounting flange.

SIGNAL WIRING – ArcSafe and MultiClutch Only

The ArcSafe and MultiClutch use a single normally closed switch. Since the circuit is normally closed, the emergency stop relay will be **on** during normal operation. If power is lost, a wire breaks, or if there is a collision, the robot will emergency stop when the relay turns off. See Wiring Diagram – Page 3.

SETTING SENSITIVITIES – ArcSafe and MultiClutch Only

Collision detection is done by detecting piston movement using a small micro switch. The micro switch has been adjusted at the factory for optimal sensitivity. At times the user may want to change the reaction time of the switch to an overload condition. The switch can be adjusted for a more or less responsive E-STOP detection.

Older model ArcSafe's and MultiClutch's utilize a ball bearing and spring to activate the switch. New improved switch design was introduced in April 09 and is easily identifiable. The new design has distinct markings on the side of the switch housing – **LOCK** and **ADJUST**. The new design simplifies the adjustment procedures. The new designed switch is easily retro-fit able to the older design ArcSafe's and MultiClutch.

NEW DESIGN SWITCH ADJUSTMENT PROCEDURES

1) On the switch housing loosen the locking (marked **LOCK**) screw one (1) turn.
2) Using a short pigtail and ohm/continuity checking device or AWQ test box
    a. Turn the adjusting(marked **ADJUST**) screw CCW up to one (1) turn until
        i. Switch closes and shows continuity or;
        ii. Light on test box illuminates.
    b. Slowly turn the adjustment screw CW until
        i. Switch opens and shows no continuity on test device or;
        ii. Light on test box is not illuminated.
3) The ArcSafe and MultiClutch is now set for maximum sensitivity. In some applications you may wish to further reduce the sensitivity. To do so turn the adjustment screw further CW in 1/16 turn increments.
4) Turn the locking screw (marked LOCK) CW to secure the setting. The locking screw requires a snug fit. DO NOT OVERTIGHTEN

OLDER DESIGN SWITCH ADJUSTMENT PROCEDURES

Take care when adjusting switch height as wires are delicate.

To adjust the switch trip point:

1) Adjust the trip point by removing the (2) Allen screws securing the switch housing to the body and remove the switch assembly. **NOTE: Be careful when removing the switch housing from the body as there is a small spring and ball bearing in the clutch housing that could fall out.**
2) Loosen the switch mounting screws located on the side of the switch housing 1/4 turn. Screws should be snug enough so that switch does not float freely in mount.
3) Gently use a small screwdriver to rock and pry switch up above the surface of the connector block.

4) Normally the tip of switch should protrude approximately 1/32" from the face of connector block. To make less sensitive tip of switch should be position less than 1/32”, more sensitive increase measurement.
5) Snug switch mounting screws to hold switch in housing
6) Remount connector block to side of clutch and tighten switch mounting

AIR-ASSIST

The air assist option can be added for use in applications of extremely fast movements or heavy payloads.

This option requires the use of a 1/8”NPT air fitting to accept 5/32 tubing, 5/32 tubing and an adjustable air regulator.

1) Remove the Red Plug from the air-assist port.
2) Thread the air-fitting into the ArcSafe and tighten.
3) Install the tubing to the air fitting.
4) Run the tubing to an air regulator. Adjust air- pressure to desired level.

PARTS LIST

If service is required other than the parts listed below it is recommended to return to the factory for repair.

Item #	Part Number	Description
1	502099	Switch Module Assembly – ArcSafe and MultiClutch models only
NS	900114	Ball Bearing ¼”diameter
NS	903402	Spring – Century #N-75
2	901729	Dust Boot
3	901696	Control Cable 20’ – ArcSafe and MultiClutch models only
4	900299	Air Assist Plug – 1/8”NPT
NS	502729	Mounting Bolts for use with Insulating Disk – M4 X 60mm
NS	502728	Mounting Bolts for use with Adaptor Plate – M4 X 57mm
NS	900626	M4 Lockwasher

AMERICAN WELDQUIP

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WORKING TO REDUCE OUR ENVIRONMENTAL IMPACT ON THE WORLD

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