Shock Sensor Torch (MTZ-3502)

CO_2 arc welding

Instruction Manual

= Safety and Handling Operation =

Instruction Manual No.

Shock sensor torch [MTZ-3502]‥1K2132-E-1

First, read this instruction manual thoroughly, and operate the unit correctly.

- To ensure the safety, only the qualified personnel or those who have fully understood this product must perform installation, maintenance, inspection, and repair work.
- To ensure the safety, only the personnel who can fully understand this instruction manual and have acquired sufficient knowledge and skill must perform the operation work of this unit.
- Regarding the safety education, take courses or classes held by the head/branch offices of Welding Society/Association or related ones.
  Also, utilize the qualifying examination for welding expert and consultant engineers.
- After reading this instruction manual, retain it for future reference with a warranty so that the operator can review anytime as needed.
- If you find anything unclear, or about servicing, contact our local distributor or sales representatives in your country.
  The addresses and telephone numbers that you may contact are listed on the back cover of this instruction manual.

Contents

NOTES ON SAFETY

1. Notes on Safety

- ●Before operating this product, thoroughly read this instruction manual first to operate the product correctly.
- ●Cautions described in this instruction manual are to prevent you and other people from being injured or damaged by having the product operated correctly and safely.
- ●Although this product is designed and manufactured in due consideration of safety, carefully follow the notes and cautions described in this manual. Otherwise, there may occur an accident causing serious injury or death.
- ●Various ranks of accidents resulting in injury, damage, or death may occur if mishandling the product. The caution alert symbols and signals are classified into three ranks as below, used throughout this instruction manual as well as warning labels put on each unit and device.

Symbol	Signal	Description
	DANGER	Mishandling may cause seriously dangerous situation that could result in serious injury or death to personnel. Limited situation of great urgency.
	WARNING	Mishandling may cause a dangerous situation that could cause serious injury or death to personnel.
	CAUTION	Mishandling may cause a dangerous situation that could cause medium or slight injury to personnel, or material damage.

Hazards and special instructions described by  CAUTION are very important as well. Neglect of them may occasionally cause serious injury or death to personnel. Therefore, be sure to follow the instructions described by all three safety alert symbols and signal words.

The meanings of "serious injury", "medium or slight injury", and "material damage" are as follows.

Serious injury	:	Injury with a sequela due to a loss of eyesight, injury, burn (high temperature and low temperature), electric shock, a bone fracture, poisoning and so on as well as injury that requires hospital treatment or long treatment as an outpatient.
Medium or slight injury	:	Injury, burn, electric shock and so on that require no hospital treatment nor long treatment as an outpatient.
Material damage	:	Damage to property, and direct and incidental / consequential damage due to the damage to devices.

Ref.:  IMPORTANT : The sign “IMPORTANT” indicates special instructions necessary for the most efficient operation.

IMPORTANT SAFEGUARD

2. Important Safeguard

2.1 Read, understand, and comply with all safety rules described at the beginning of each instruction manual in addition to the following ones before starting Arc welding operation.

⚠ WARNING	Observe the following notices to prevent a serious accident that results in serious injury or death.

1) This torch is designed and manufactured in due consideration of safety, but you must follow the handling precautions described in this instruction manual. If you fail to do so, there may occur an accident resulting in serious injury or death.
2) Related laws, regulations, and your company's standards should be observed in constructing input power source, selecting an installation area, handling/storing/piping high pressure gas, storing welded products, and disposing wastes.
3) Keep out of the robot operating zone and the welding area.
4) A person with pacemaker should not approach the operating welding machine and the welding area unless his or her doctor permits. A welding machine generates a magnetic field around it during powered, which will have a bad effect on the pacemaker.
5) Installation, maintenance, and repair of this torch should be performed by qualified personnel or those who fully understand a welding torch for further safety.
6) Operation of this torch should be done by personnel who have knowledge and technical skill to fully understand the contents of this manual and to handle the torch safely.
7) This torch must not be used for purposes other than welding.

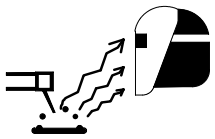
2.2 Observe the following to prevent electric shock.

⚠ WARNING	Do not touch live electrical parts.
	Touching live electrical parts can cause fatal shock or severe burns.

8) Only qualified personnel should perform grounding work of the welding power supply and workpiece, or a workpiece and powered peripheral jigs while abiding by domestic regulations.
9) Do not touch live electrical parts.
10) Always wear dry insulating gloves and other body protection. Do not wear torn or wet gloves/ work clothes.
11) Before doing the installation, inspection, maintenance, etc. of this product, be sure to turn off all the input power sources and check, several minutes later, that there is no charging voltage since the condenser and the like may have been recharged.
12) Do not use cables with insufficient capacity, with damage, or with naked conductors.
13) Be sure to tighten the connections of cables and insulate them in order to prevent personnel from touching those parts easily.
14) DO NOT use a welding machine with its case or cover removed.
15) Secure a firm foothold before initiating work. DO NOT perform work with an unstable foothold or with a foothold at a height of two meters or above.
16) Make periodic inspection and maintenance. Damaged parts should be repaired before use.
17) Turn off POWER switch when not in use.

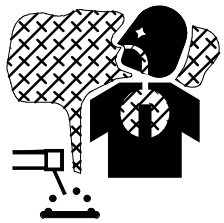
IMPORTANT SAFEGUARD (continued)

2.3 All the personnel in and around the working area including an operator should wear appropriate protection to protect themselves from arc rays, spatters, slag, and noise produced by welding.

⚠ WARNING	●Install a lightproof wall where arc is generated. ●Wear appropriate eye, ear, and body protection.
	●Arc rays may cause inflammation of eyes and burns on skin ●Spatter s and slag may cause eye troubles and burns. ●Noise may cause hearing problems.

1) Wear lightproof glasses or a welder's shield helmet with a proper shade of filter when welding or watching a welder work.
2) INSTALL ARC PROTECTIVE CURTAINS in between an operator and arc rays.
3) WEAR PROPER SAFETY GLASSES in work area at all times.
4) WEAR PROPER EAR PROTECTION.
5) WEAR PROPER BODY PROTECTION including woolen clothing, flameproof apron and gloves, leather leggings, high boots and leather arm and shoulder gauntlets.
6) WEAR PROPER SAFETY GLASSES to protect eyes and skin from spatters and slag.

2.4 All the personnel in and around the working area including an operator should wear appropriate protection to protect themselves from fumes and gases produced by welding.

⚠ WARNING	●DO NOT inhale fumes and gases generated by welding. ●Ventilate the area sufficiently and wear a welder's shield mask if necessary.
	●Fumes and gases generated by welding have a harmful effect on human body. ●Welding in a small area may cause suffocation due to the lack of air.

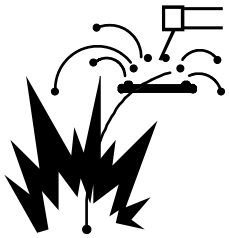
1) KEEP YOUR HEAD out of fumes and DO NOT inhale any.
2) USE FORCED EXHAUST VENTILATION at the arc.
3) VENTILATE the area to prevent build-up of fumes and gases.
4) If ventilation is insufficient, USE APPROVED BREATHING DEVICES.
5) READ AND FOLLOW WARNING LABELS on all containers of welding materials.
6) Before use, READ AND UNDERSTAND the manufacture's instructions, Material Safety Data Sheets (MSDSs), and follow your employer's safety practices.
7) To prevent gas poisoning and suffocation, use a local ventilator or a respirator specified by your country's domestic laws.
8) Be sure to ventilate the area or wear a respirator by welding in a small place. A well-trained watchman should observe the work.
9) Do not weld near the place where degreasing, cleaning or spraying is carried out. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases. If welding is

carried out there, harmful gases may be produced.

10) Toxic fumes and gases are produced when coated steel is welded. Be sure to ventilate the area sufficiently or use a respirator.

IMPORTANT SAFEGUARD (continued)

2.5 Prevent fire, explosion, burns and injury caused by heated workpiece, spatters, slag, and arc sparks right after welding as described below.

⚠ WARNING	●Do not weld near flammable materials. ●Watch for fire: keep a fire extinguisher nearby. ●NEVER do welding on inflammables such as a piece of wood or cloth. ●Do not weld on closed containers.
	●Heated workpiece, spatters, slag and arc sparks right after welding may cause fire. ●Incomplete cable connections, incomplete contacts in the current circuit of the workpiece such as steel frames may cause a fire due to the heat generated when powered. ●Arc generated on containers of inflammables such as gasoline may cause an explosion. ●Welding of airtight tanks and pipes may cause a bursting. ●Touching a heated workpiece, spatters, slag or arc sparks will cause a serious burn.

1) KEEP FLAMMBLE MATERIALES out of the robotic cell.
2) Welders should wear appropriate protection such as flameproof leather gloves, work clothes with long sleeves, a leg cover, a flameproof leather apron in order to prevent burns caused by touching heated workpiece, spatters, slag and arc sparks right after welding..
3) WATCH for fire.
4) Have a fire extinguisher nearby. Operators should know how to use it.
5) DO NOT touch heated workpiece and peripheral jigs with inflammables such as a piece of wood or cloth. Doing so might cause not only a fire but also burns.
6) DO NOT put heated workpiece close to inflammables right after welding.
7) Remove inflammables from the place where welding is carried out so that spatters and slag will not strike them.
8) Do not use inflammable gases near the welding sight.
9) Tighten and insulate the cable connections completely.
10) Connect the cables on the workpiece side as close to the welding area as possible to prevent the welding current from traveling along unknown paths and causing electric shock and fire hazards.
11) A gas pipe with gas sealed in, an airtight tank and a pipe must not be welded because they might explode.
12) NEVER do welding on inflammables such as a piece of wood or cloth.
13) When welding a large-size structure such as a ceiling, floor, wall, etc., remove any inflammables hidden behind a workpiece.

IMPORTANT SAFEGUARD (continued)

For reference

PRINCIPAL SAFETY STANDARDS

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office.

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, from American Welding Society.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association.

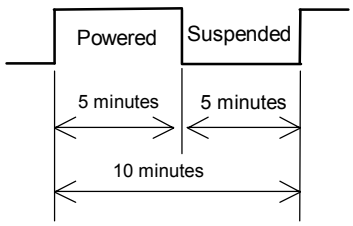
NOTES ON USE

3. Notes on Use

3.1 Duty cycle

⚠ CAUTION	●Observe the following to prevent a serious accident that results in serious injury or death.

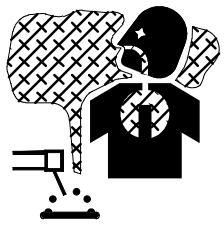
Operating cycle of 50% duty cycle



Welding torch	Rated duty cycle
MTZ-3052	350A 50%

- The rated duty cycle of 50% means that the torch is operated at the rated welding current for 5 minutes out of 10 minutes and suspended for 5 minutes.
- If the torch is operated at more than the rated duty cycle, the welding torch temperature rises over the allowable value to cause to be burnt and cause a burn.

3.2 Inching

⚠ WARNING	●Do not look into the tip hole in inching to cheek. ●In inching, the welding torch tip must not be put near to your face, eye, and body.
	●Do not look into the tip hole in inching to check if the wire is fed. The wire may spring out and stick into your face, eyes, and body. It is very dangerous. ●In inching, the welding torch tip must not be put near to your face, eyes, and body. The wire may spring out and stick into your face, eyes, and body to injure.

3.3 Replacement of Parts

⚠ CAUTION	●To prevent burns, comply with the following cautions.

●Do not directly touch the high-temperature parts of a nozzle, an electrode and so on.
●When welding, wear suitable protection such as leather gloves for welding.
●Do not replace torch tip elements before they cool off.

NOTES ON USE (continued)

⚠ CAUTION	●If any parts are damaged, replace them with new ones for further safety and better quality.

●Be sure to place an order for replacement at our sales office or our agency.

⚠ CAUTION	●Do not disassemble the shock sensor. If disassembled, gas leak and malfunction may be caused.

3.4 Cable hose

⚠ CAUTION	●Never let cable hoses touch any heated part of the welded, put something heavy on top nor bend them excessively because the welding torch might become damaged.

Thank you very much for purchasing OTC shock sensor torch for CO_2 arc welding [MTZ-3502].
Before you use the product, be sure to read this instruction manual thoroughly, and use the product correctly.

[Note]

1. The contents in this instruction manual are subject to change without notice.
2. We have carefully created this instruction manual to avoid mistakes. Even if any mistakes are found in the contents, we are not responsible for any damage caused by them.
3. No part of this instruction manual may be reproduced or stored in any form without the express written permission.

1. Specifications

The shock sensor torch (MTZ-3502) is the robot-dedicated forced pressure power feeding torch equipped with shock sensor, used for CO_2 arc welding. The specifications of this product are as follows. (See Fig.1 for its outline drawing.)

Table 1. Specifications

Type	MTZ-3502
Welding method	CO_2 arc welding
Max. current	350A
Usage rate	50%
Applicable wire	(φ0.8), (φ0.9), (φ1.0), φ1.2, (φ1.4), (φ1.6)
Cooling method	Air-cooled system

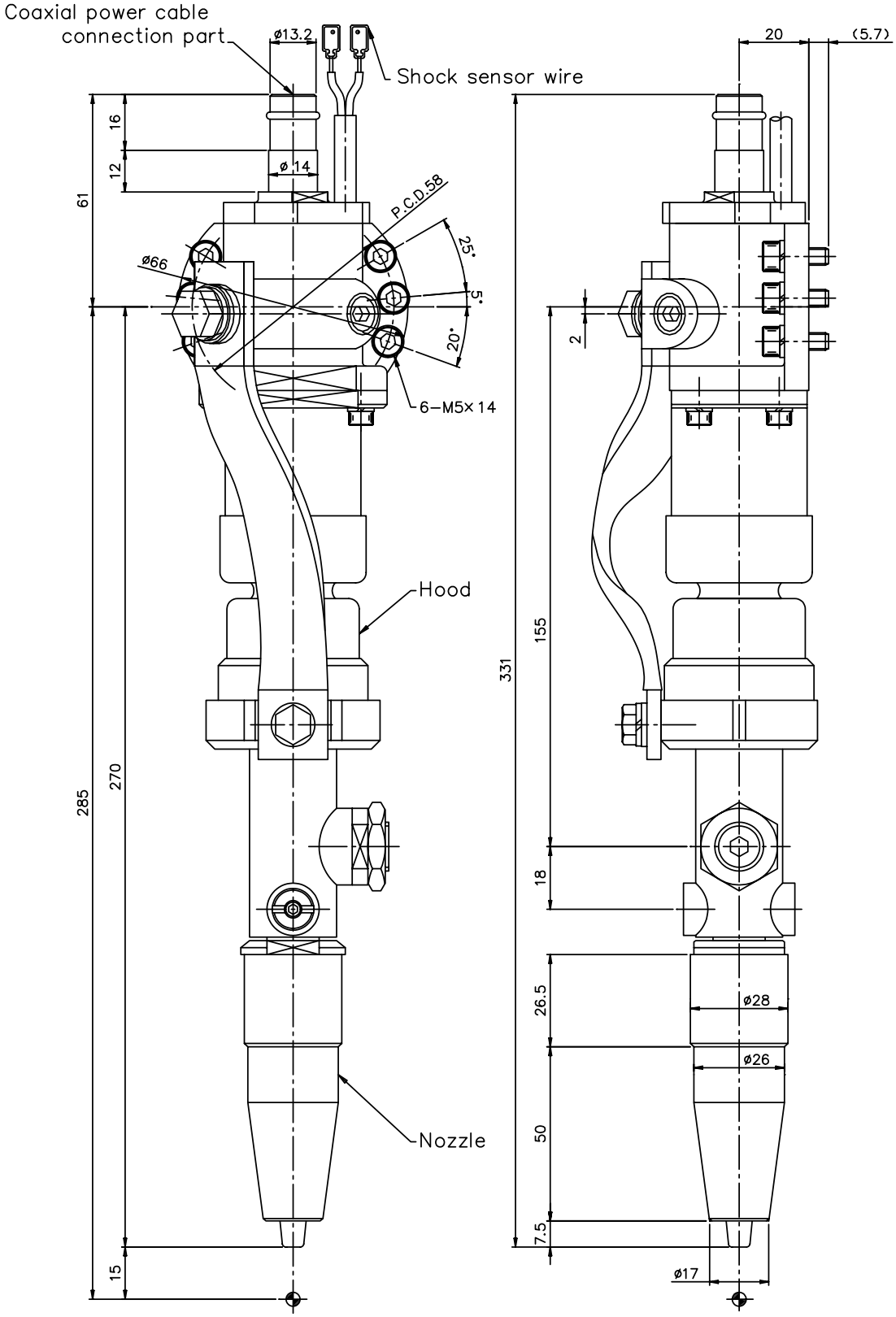


Fig.1 Outline drawing of forced pressure power feeding torch equipped with shock sensor [MTZ-3502]

2. Features of Forced Pressure Power Feeding Torch with Shock Sensor

A welding torch and robot in arc welding may be occasionally distorted or damaged by colliding with workpiece or jigs.

To avoid this accident, this shock sensor torch is equipped with the function that the nozzle repulses against the external force on the nozzle side face or from the bottom when external force beyond the set value is applied to the torch tip (nozzle) part, although there are some exceptions depending on the conditions such as a robot motion speed, contact position, and coasting amount.
Especially, when the location of collision occurred is higher than the rubber cover, the torch cannot effectively repulse against a large external force. In this case, the manipulator body may get damaged. (See Fig.2.) In addition, the nozzle does not repulse against the force that pulls the nozzle downward (the force produced when lifting the torch upward with the wire still stuck). Therefore, consider the notice in the section 5.8 when teaching.

The torch is rarely distorted if its contact with workpiece or jigs within the range of stroke tolerance is released, it returns to the original position by the restoring spring force. Unless the torch has got rickety or distorted, precision of the torch restoring is ± 0.2mm or less at the tip.

Also, as a forced pressure power feeding type torch, it enables to perform stable welding since the contact tip makes contact with wire by appropriate pressure, adjusting the spring force.

Furthermore, the aiming guide is built in the welding torch to achieve constant aiming performance. Thus, it realizes arc stableness, resulting in high-quality welding performance.

In addition, since the life duration of a contact tip is long, replacement is less frequently required, resulting in the improvement in productivity.

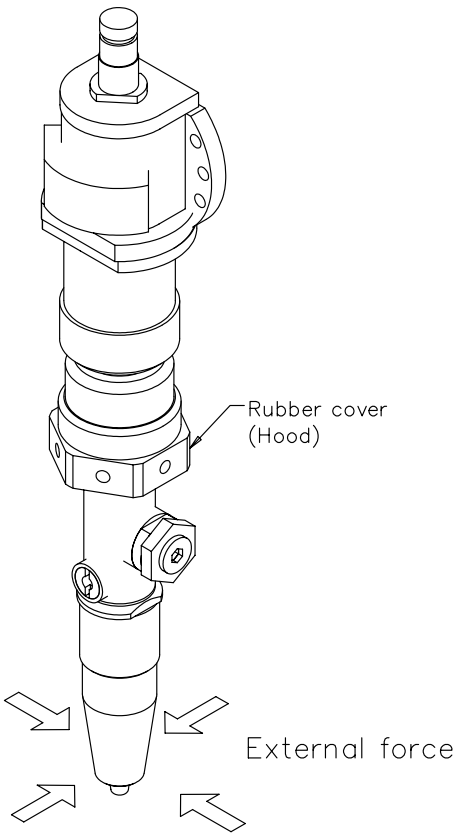


Fig.2

3. Assembly Parts and Accessory

Table 2

Parts No.	Item	Q'ty for built-in	Q'ty for attachment	Remarks
K1736D06	Contact tip (1.2φ)	1	1	Consumable component
K1734D08	Aiming guide (1.2)	1	1	
K1736D10	Special tool		1	To attach and detach the aiming guide
K1714D19	Tip gauge		1	
K1714D20	Cover		1	

A contact tip and aiming guide at shipment build in the components for wire (φ1.2).

Therefore, change them to the appropriate ones in advance depending on the wire to be used. (Refer to Fig.7 and Table 4.) For how to replace the aiming guide, see the section 4.3.

4. How to Mount

4.1 How to Mount Shock Sensor Torch

To mount the torch on robot, the dedicated torch-mounting component is required between the torch and robot. For details, see the instruction manual for robot.

4.2 Change of Jig-dedicated Terminal

The jig-dedicated terminals of robot controller are provided with the terminals for shock sensor signal, and the jumper wire is also standardized. To use this torch, take off the jumper wire. For details, see the instruction manual for Almega (Maintenance < Electrical >) or for Robot controller.

4.3 Replacement of Aiming Guide

To replace the aiming guide, remove the nozzle and contact tip first. And, take off the aiming guide using the attached special tool (K1736D10).

Note that since the tip body is compressed by spring, insert the special tool with pushing the tip body. (See Fig.3.)

Mount a new aiming guide, contact tip, and nozzle using the special tool. Select a proper contact tip and aiming guide according to the wire to be used. (See Fig.7 and Table 4.)

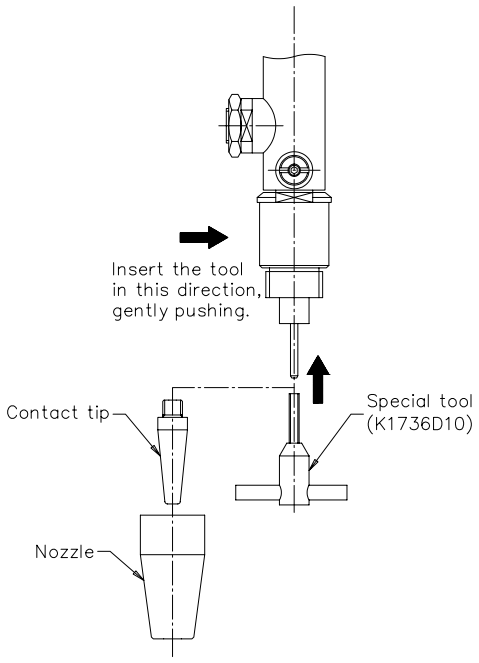


Fig.3 How to replace the aiming guide

5. Important Notices

5.1

Be sure to mount a baffle properly. This is an essential component to avoid not only short-circuit between nozzle and torch body, but also the gas turbulence.

5.2

Remove the spatter stuck to the nozzle and tip before it gathers too much.

5.3

Be sure that you have to use the OTC genuine tip (See Table 4). Using the tip with a large hole causes conducting failure or wire deflection, which leads to arc unstableness or aiming deviation. Therefore, appropriately replace it with new one.

5.4

Note that the gas flow should be at least 15ℓ /min. or more.

5.5

Clean up the coil liner (inside the coaxial power cable) once in 10 days or so using compressed air, otherwise waste wire and dust gather inside, which may cause wire feeding failure and poor welding quality.

5.6

If a wire is stuck at the top of tip (wire stick etc.), it may buckle inside the coil liner or may be scraped off at the feed roll. If this happens, first replace the wire in the feed roll. If feeding the wire without replacement, feeding failure or arc outage may occur.

5.7

When using mixed gas (Ar + CO_2) for welding, the electric current must be 250A or under.

5.8

In order to move the torch away from workpiece after welding performance finished, perform the teaching to pull the torch obliquely upward so that the shock sensor can function even if the wire is touched with workpiece. (See Fig.4 on the right.)

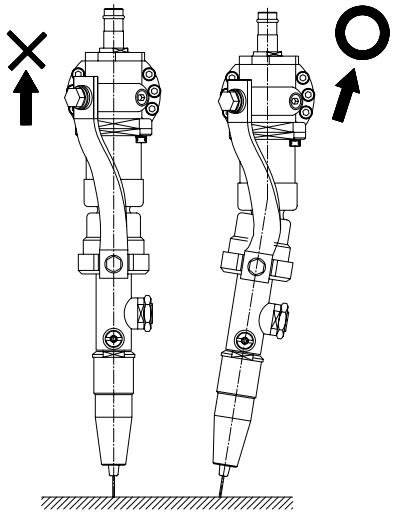


Fig.4

6. Use of Air-blow or Oil-blow

It can reduce the spatter stuck to the nozzle and contact tip to use air-blow or oil-blow together. As the dedicated unit is required, contact our sales engineers or agents for arrangement.

7. Maintenance and Inspection

7.1 Replacement of Spring and Pressure Adjustment

After replacing the spring, perform the adjustment of spring pressure as follows to obtain proper amount of power feeding capacity. (See Fig.5.)

Loosen the lock nut, and remove the cap. → Remove the cap using M14 Allen wrench.

↓

Replace the spring, and install the cap.

↓

Insert a straight round bar (the same diameter as wire, approx. 150mm long) into the torch. → For example, use a TIG welding rod.

↓

Adjust the cap so that the round bar falls when the force of 1.0 ~ 1.2kg is applied to the point of tip in the direction of arrow, shown in the diagram on the right.

↓

Tighten the lock nut. → Be sure that the cap is not turning when tightening the lock nut.

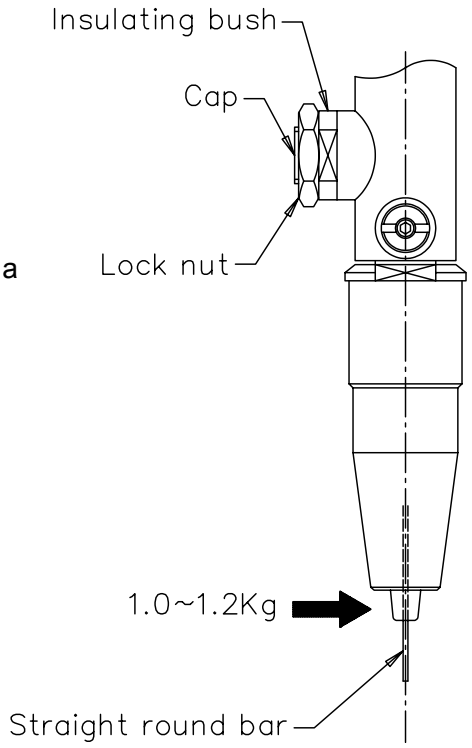
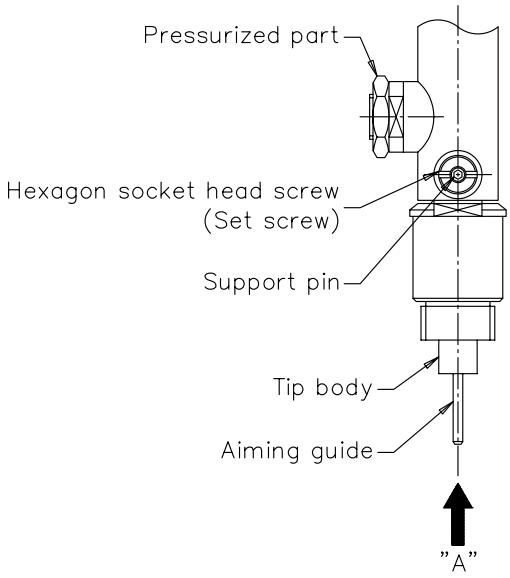


Fig.5 Adjustment of pressure force

7.2 Adjustment of Set Screw at Support Pin

As illustrated in Fig.6, the hexagon socket head screw (described as “set screw” in the following) is screwed in the center of support pin. This set screw is to fix the wire guide inside. Since it is properly adjusted at shipment, do not tighten or loosen it unnecessarily.

If still required to adjust it, follow the procedures below.



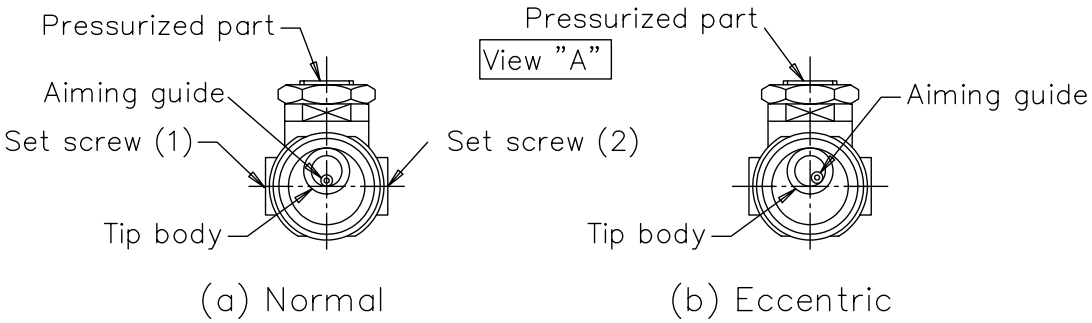


Fig.6 Adjustment of set screw at the support pin

< How to adjust >

(1) Remove the nozzle and contact tip.

(2) As described in Fig.6 (a), tighten the set screw to align the aiming guide with the center line of tip body.

Note1） When the aiming guide is eccentric as described in Fig.6 (b), loosen the set screw (1) first, and then tighten the set screw (2).

Note2） Apply adhesive (ThreeBond: 1401B or similar product) to the screw part of set screw in advance.

8. Trouble and Possible Cause

Table 3

Trouble	Possible cause
No arc	Contact failure or disconnection of welding cable
Wire feeding not steady	・Shortage of wire pressure in feed roll part ・Tip abrasion ・Coil liner abrasion
Wire stick on tip	・Unsteady wire feeding ・Too large hole on tip ・Too short distance between tip and workpiece
Aiming deviation	・Tip abrasion ・Aiming guide abrasion ・Loose set screw ・Loose support pin
Shock sensor unable to be released	・Contact failure or disconnection of shock sensor wire ・Bent nozzle ・When the collision accident occurs, and the robot stops by the shock sensor detection signal, investigate the cause of accident first. Otherwise, operating the robot or turning the power ON before investigating the accident may lead to danger. For how to release the collision, see the instruction manual for Almega (Operation).

9. Parts List

● If the components are consumed or damaged while this torch is used, refer to Fig.7 and Table 4, and contact our local distributors or sales agents. When ordering, be sure to inform us of the product name and parts No. (or specification).

< Term of parts supply >

The term of parts supply for this product is approx. 7 years after manufacturing. It is not a subject if the parts supply from other distributors is discontinued.

Table 4 Parts list of MTZ-3502

Ref. No.	Part No.	Item	Q'ty	Remarks
1	K1782B01	Torch body	1	
2	K1782B14	Holder	1	
3	K1736B31	Swing shaft	1	
4	K1782B02	Adaptor	1	
5	K1643B36	Sleeve	1	
6	K1630B06	Spring (1)	1	
7	K1630B23	Spring (2)	1	
8	K1782B11	Ring	1	
9	K1736B40	Hood	1	
10	K1714D07	Wire guide	1	
11	K1736H00	Tip body Assy.	1	
12	K1731S	Pressure spring Assy.	1	
13	K1714B03	Power feeding wire	1	
14	K1630B13	Protection tube	1	
15	K1583B10	Insulating sheet	1	
16	4254-008	Compact micro switch	1	SS-5
17	K1643B31	Packing	1	
18	K1643B30	Switch cover	1	
19	K1630B16	Insulating sheet	1	Adhering to K1643B20
20	K1736D22	Baffle	1	
21	3572-012	"O"-ring (P-12)	1	
22	3572-332	"O"-ring (S-32)	1	
23	3572-225	"O"-ring (S-25)	1	
24	3574-008	"O"-ring (S-11, 2)	1	
25	S-20	"O"-ring	1	
26	P-10	"O"-ring	1	

27	K1714D02	Cap nut (1)	1	
28	K1714D03	Cap nut (2)	1	
29	K1736D01	Nozzle body	1	
30	K1714D12	Support pin	2	
31	K1714D13	Pin	2	
32	M5*6	Hexagon socket head screw (Flat point)	2	
33	φ18	C-shape shaft snap ring	1	
34	WR30	Shaft snap ring	1	
35	K1736D21	Nozzle adaptor	1	
36	K1714D06	Nozzle	1	
37	K1736D06	Contact tip (1.2)	1	
38	K1714D08	Aiming guide (1.2)	1	
39	3311-204	Steel ball (Spec. 5/32)	1	NTN
40	M6*10	Hexagon head bolt	5	Brass bolt
41	K1736D09	Contact tip (0.8)	(1)	Optional accessory
42	K1736D16	Contact tip (0.9)	(1)	Optional accessory
43	K1736D08	Contact tip (1.0)	(1)	Optional accessory
44	K1736D18	Contact tip (1.4)	(1)	Optional accessory
45	K1736D07	Contact tip (1.6)	(1)	Optional accessory
46	K1714D11	Aiming guide (0.8)	(1)	Optional accessory
47	K1736D15	Aiming guide (0.9)	(1)	Optional accessory
48	K1714D10	Aiming guide (1.0)	(1)	Optional accessory
49	K1736D17	Aiming guide (1.4)	(1)	Optional accessory
50	K1714D09	Aiming guide (1.6)	(1)	Optional accessory
51	K1736D10	Special tool	1	Standard accessory

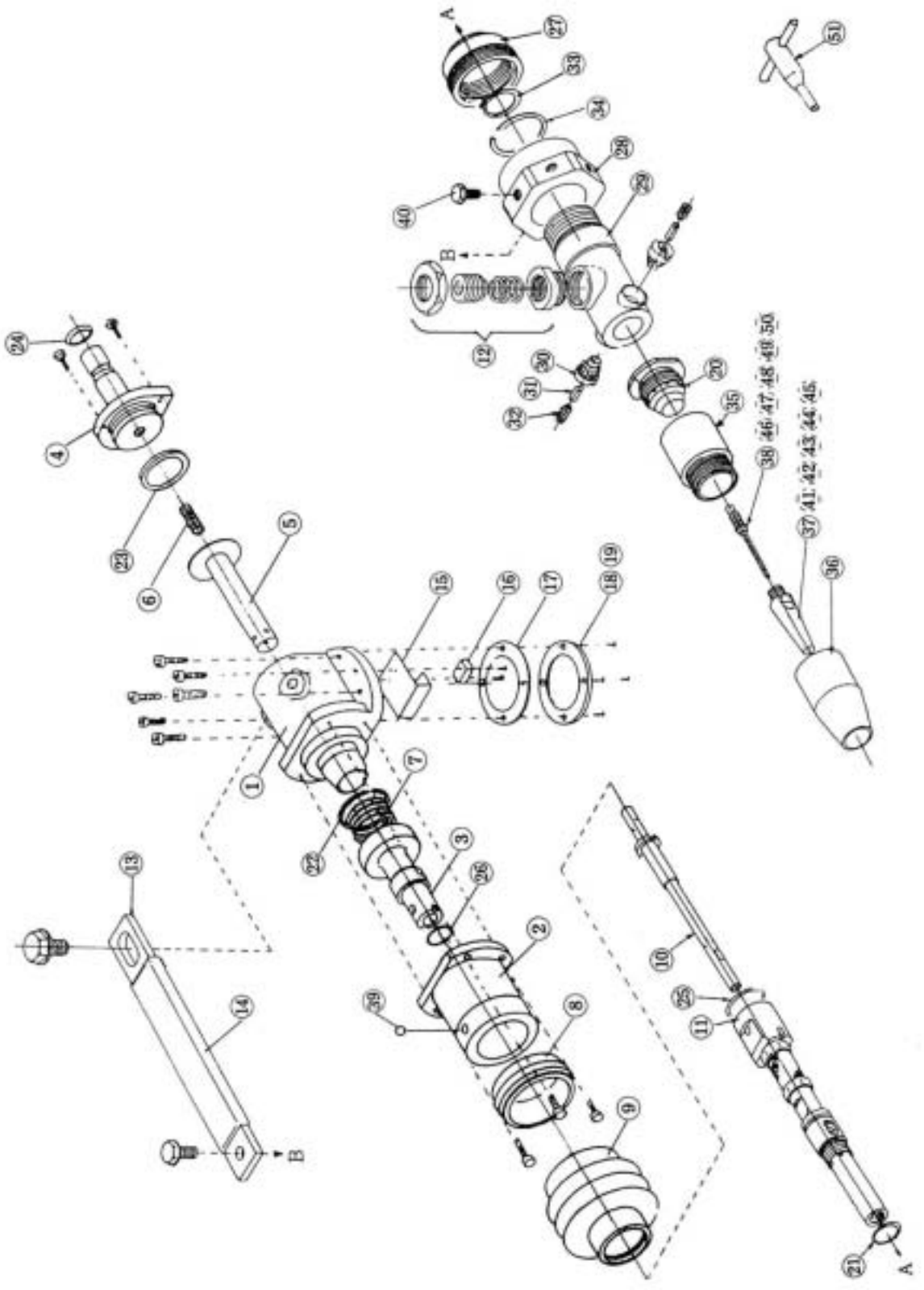


Fig.7　Exploded diagram of forced pressure power feeding torch
equipped with shock sensor [MTZ-3502]

INSTRUCTION MANUAL
for Shock Sensor Torch [MTZ-3502]

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