



Welding Torch for Robot Coaxial Power Cable for Robot

For CO₂/MAG

<Shock sensor built-in type>



RT3500S /H /L
RT5000S /H /L
RTW5000S /H /L
RZ3500S /H /L

Instruction Manual

= Safety and Operation =

Instruction Manual No.
1L10603-E-2

Thoroughly read this instruction manual to operate the units correctly.

- Installation, maintenance, and repair of this welding torch shall be made by qualified persons or persons who fully understand welding machines to secure the safety.
- To secure the safety, operation of this welding torch shall be made by persons who have knowledge and technical skill to fully understand the contents of this manual and handle the machine.
- Regarding safety education, utilize courses and classes held by head/branch offices of the Welding Society /Association and the related societies/associations, and qualifying examinations for welding experts/consultant engineers.
- After thoroughly reading this manual, be sure to retain it with the warranty in the place where the persons concerned can read any time. Read it again as occasion demands.
- If incomprehensible, contact our offices. For servicing, contact our local distributor or sales representatives in your country.

Our addresses and telephone numbers are listed in the back cover of this Instruction Manual.




Contents


| | |
|---|----|
| ①NOTES ON SAFETY | S1 |
| ②IMPORTANT SAFEGUARDS | S2 |
| ③NOTES ON USE..... | S7 |
| 1. Specifications | 1 |
| 2. Checking the Contents..... | 6 |
| 3. Installing and Adjusting Procedure of Welding Torch..... | 8 |
| 3.1 Mounting of Welding Torch on All-V6 type Manipulator..... | 8 |
| 3.2 Mounting of Welding Torch on All-B4 Type Manipulator | 14 |
| 3.3 Connecting the Water-cooled Torch (RTW5000S/RTW5000H/RTW5000L)..... | 19 |
| 3.4 Connecting the Hose to All-B4 | 21 |
| 3.5 Handling Instructions for RT series Torch | 22 |
| 3.6 Handling Instructions for RZ series Torch | 23 |
| 4. Coaxial Power Cable for Robot | 25 |
| 4.1 Type of Coaxial Power Cables | 25 |
| 4.2 When Using the DL Welding Power Supply..... | 26 |
| 4.3 Connecting the Coaxial Power Cable | 28 |
| 4.4 Cutting the Liner..... | 29 |
| 4.5 Liner Crump Function | 30 |
| 5. Setting the Robot Controller..... | 31 |
| 5.1 Checking the Tool Parameter | 31 |
| 5.2 Checking the Shock Sensor Operation | 33 |
| 6. Troubleshooting | 34 |
| 7. Replacement Parts for Various Wire Diameters | 35 |
| 7.1 Replacement Parts for Various Wire Diameters of Torch | 35 |
| 7.2 Replacement Parts for Various Wire Diameters of Coaxial Power Cable | 38 |
| 8. Parts List | 39 |

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 these 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

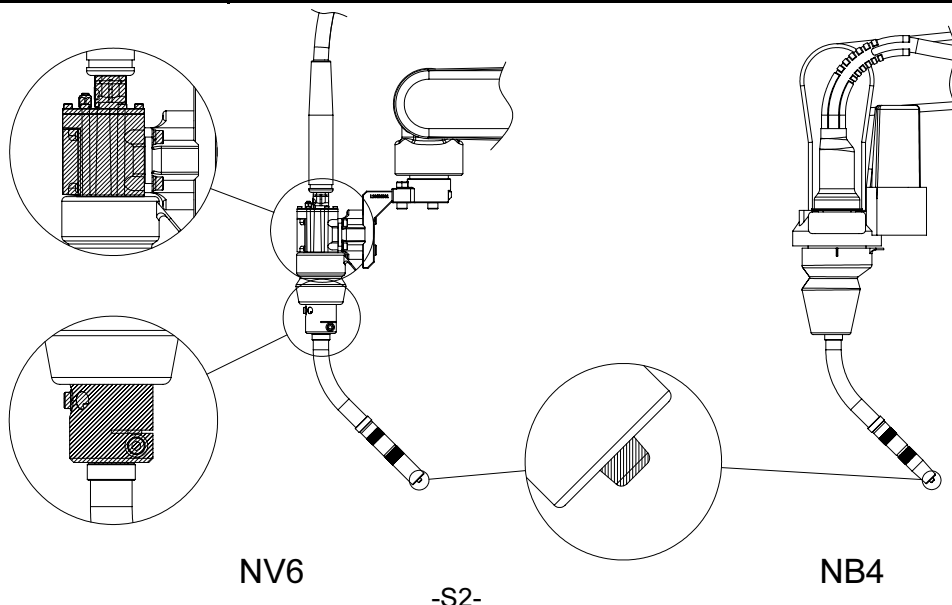
2.1 Read, understand, and comply with all safety rules described at the beginning of each instruction manual in addition to the following ones before starting Arc welding operation.

| | |
|--|--|
|  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.


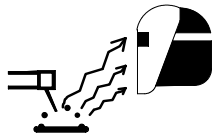
| | |
|--|---|
|  WARNING | Do not touch live electrical parts. |
|  | Touching live electrical parts can cause fatal shock or severe burns. |



IMPORTANT SAFEGUARD (continued)

- 1) 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.
- 2) Do not touch live electrical parts.
- 3) Always wear dry insulating gloves and other body protection. Do not wear torn or wet gloves/ work clothes.
- 4) 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.
- 5) Do not use cables with insufficient capacity, with damage, or with naked conductors.
- 6) Be sure to tighten the connections of cables and insulate them in order to prevent personnel from touching those parts easily.
- 7) DO NOT use a welding machine with its case or cover removed.
- 8) 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.
- 9) Make periodic inspection and maintenance. Damaged parts should be repaired before use.
- 10) Turn off POWER switch when not in use.


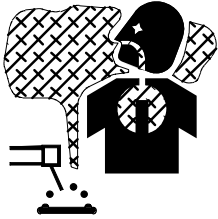
2.3 All the personnel in and around the working area including an operator should wear appropriate protection to protect themselves from arc rays, spatters, slag, and noise produced by welding.

| | |
|---|--|
|  WARNING | <ul style="list-style-type: none"> ● Install a lightproof wall where arc is generated. ● Wear appropriate eye, ear, and body protection. |
|  | <ul style="list-style-type: none"> ● 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.

IMPORTANT SAFEGUARD (continued)


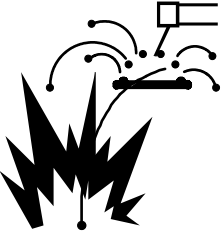
2.4 All the personnel in and around the working area including an operator should wear appropriate protection to protect themselves from fumes and gases produced by welding.

| | |
|--|--|
|  WARNING | <ul style="list-style-type: none"> •DO NOT inhale fumes and gases generated by welding. •Ventilate the area sufficiently and wear a welder's shield mask if necessary. |
|  | <ul style="list-style-type: none"> •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 | <ul style="list-style-type: none"> • 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. |
|  | <ul style="list-style-type: none"> • 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 FLAMMMBLE 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.

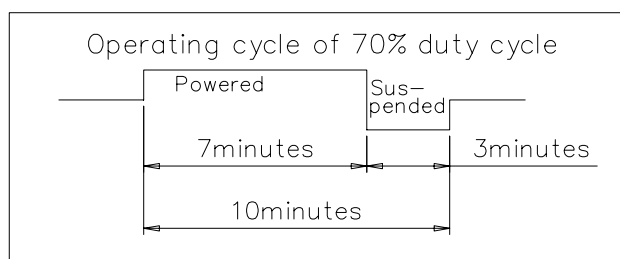
NOTES ON USE

3. Notes on Use

3.1 Duty cycle



| | |
|--|---|
|  CAUTION | <ul style="list-style-type: none"> ● Use the torch with the specified rated duty cycle or under. Otherwise, the welding torch may be deteriorated or burned out. |
|--|---|

| Welding torch | Rated duty cycle |
|----------------------------------|---|
| RT3500S RT3500H RT3500L | 350A 80% (CO ₂) 350A 60% (MAG) |
| RT5000S RT5000H RT5000L | 500A 50% (CO ₂) 350A 70% (MAG) |
| RTW5000S RTW5000H RTW5000L | 500A 70% (CO ₂) 400A 60% (MAG) |
| RZ3500S RZ3500H RZ3500L | 350A 80% (CO ₂) 350A 60% (MAG) |




- The rated duty cycle of 50% indicates that the torch shall be used at the rated welding current for 5 minutes and then suspended for 5 minutes out of 10 minutes.
- The rated duty cycle of 70% indicates that the torch shall be used at the rated welding current for 7 minutes and then suspended for 3 minutes out of 10 minutes.
- Use of the welding torch with the excess rated duty cycle may lead to the temperature rise exceeding the allowable value, resulting in damage or burn.
- When using RTW5000S, RTW5000H and RTW5000L, are sure that coolant is being supplied with the water tank. Otherwise, the temperature of welding torch may rise to over the allowable value, leading to damage or burn.

3.2 Inching


| | |
|--|---|
|  WARNING | <ul style="list-style-type: none"> ● 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. |
|  | <ul style="list-style-type: none"> ● 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. |

Set the welding torch straight, feed the wire with pressing the INCH button, and then release the button when the wire is protruded by 10mm from the tip of torch.


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.

| | |
|---|--|
|  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 parts 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 Coolant

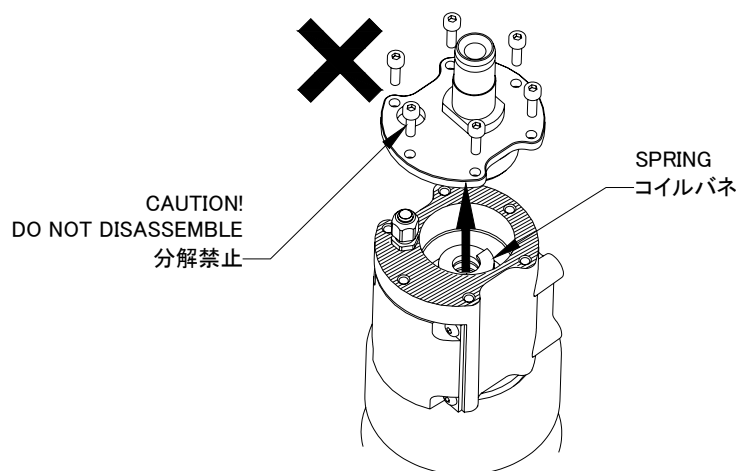
| | |
|---|---|
|  CAUTION | ●Be sure to run the coolant for the torch of liquid-cooled specification. Insufficient amount of running water may lead to damage of torch. |
|---|---|


3.5 Cable hose

| | |
|---|--|
|  CAUTION | ●Never let cable hoses neither touch any heated part of the welded, put something heavy on top nor bend them excessively because the welding torch might become damaged. |
|---|--|

3.6 Shock sensor

| | |
|---|--|
|  CAUTION | ●In the main body of shock sensor inside, a powerful coil spring is had built-in. Because there is a threat that a coil spring protrudes, please do not dismantle a shock sensor. |
|---|--|



| | |
|---|--|
|  CAUTION | ●The shock sensor absorbs damage at the speed of the manual operation (or equal with the manual operation). The shock sensor is damaged at the speed faster than manual operation. |
|---|--|

Thank you for purchasing DAIHEN CO₂ /MAG welding torch.
Before use, read this instruction manual thoroughly to use the product correctly.

- [Note] 1. The contents in this instruction manual are subject to change without prior notice.
2. We have carefully written the standard specifications to eliminate as many errors as possible.
Even if any errors are found in the contents, we are not responsible for any damage resulting from those errors.
3. No part of this instruction manual may be reproduced or stored in any form without the express written permission.

1. Specifications

This is the "CO₂ /MAG welding torch" to be used for CO₂/MAG welding.

The specifications are shown in Table 1.1. (Refer to Fig.1.1 - 1.4 for the outline drawing.)

Table 1.1 Specifications of welding torch

| | | | | | | | | | |
|------------------------|---|--------------|--------------|------------|--------------|--------------|--------------------|--------------|--------------|
| M o d e l | RT3500S | RT3500H | RT3500L | RT5000S | RT5000H | RT5000L | RTW5000S | RTW5000H | RTW5000L |
| Torch type | Straight | Curved (45°) | Curved (31°) | Straight | Curved (45°) | Curved (31°) | Straight | Curved (45°) | Curved (31°) |
| Welding process | CO ₂ (MAG) | | | | | | | | |
| Max. operating current | 350A(350A) | | | 500A(350A) | | | 500A(400A) | | |
| Rated duty cycle | 80% (60%) | | | 50% (70%) | | | 70% (60%) | | |
| Wire type | Solid wire, Flux cored wire | | | | | | | | |
| Applicable wire | (φ0.8) (φ0.9) (φ1.0) φ1.2 (φ1.4) (φ1.6) | | | | | | (φ1.2) (φ1.4) φ1.6 | | |
| Cooling system | Air cooling | | | | | | Liquid cooling | | |
| Shock sensor | SSV | SSV、SSB | | SSV | SSV、SSB | | SSV | SSV、SSB | |

| M o d e l | RZ3500S | RZ3500H | RZ3500L |
|------------------------|----------------------------------|--------------|--------------|
| Torch type | Straight | Curved (45°) | Curved (31°) |
| Welding process | CO ₂ (MAG) | | |
| Max. operating current | 350A(350A) | | |
| Rated duty cycle | 80% (60%) | | |
| Wire type | Solid wire, Flux cored wire | | |
| Applicable wire | (φ0.9) (φ1.0) φ1.2 (φ1.4) (φ1.6) | | |
| Cooling system | Air cooling | | |
| Shock sensor | SSV | SSV, SSB | |

- Note) 1. While using RTW5000S, RTW5000H and RTW5000L, are sure that DAIHEN coolant liquid is being supplied with the water tank (PU-301).
2. The maximum operating current and rated duty cycle are different between CO₂ and MAG welding system.
3. Shock sensor function
Arc welding robots may cause the welding torch to come into contact with workpiece or jig, thus resulting in the deformation of the welding torch or damage to the robot itself. To prevent such problem, this welding torch incorporates the shock sensor function that outputs an external force detection signal the instant when the nozzle portion gets displaced to immediately stop the robot if external force larger than that specified is applied to the torch tip portion (nozzle portion). This function is incorporated on the assumption that the welding torch comes into contact with workpiece or jig during robot teaching. Contact of the welding torch with it while in automatic operation may cause damage to the robot or the torch.
The shock sensor function does not provide any guarantees against the accuracy of aiming point of the torch tip portion. After the shock sensor gets activated, ensure the aiming point. (For detail, refer to information in Section 5.2.)
4. None of RZ3500S or RZ3500L or RZ3500H accepts stainless wire.

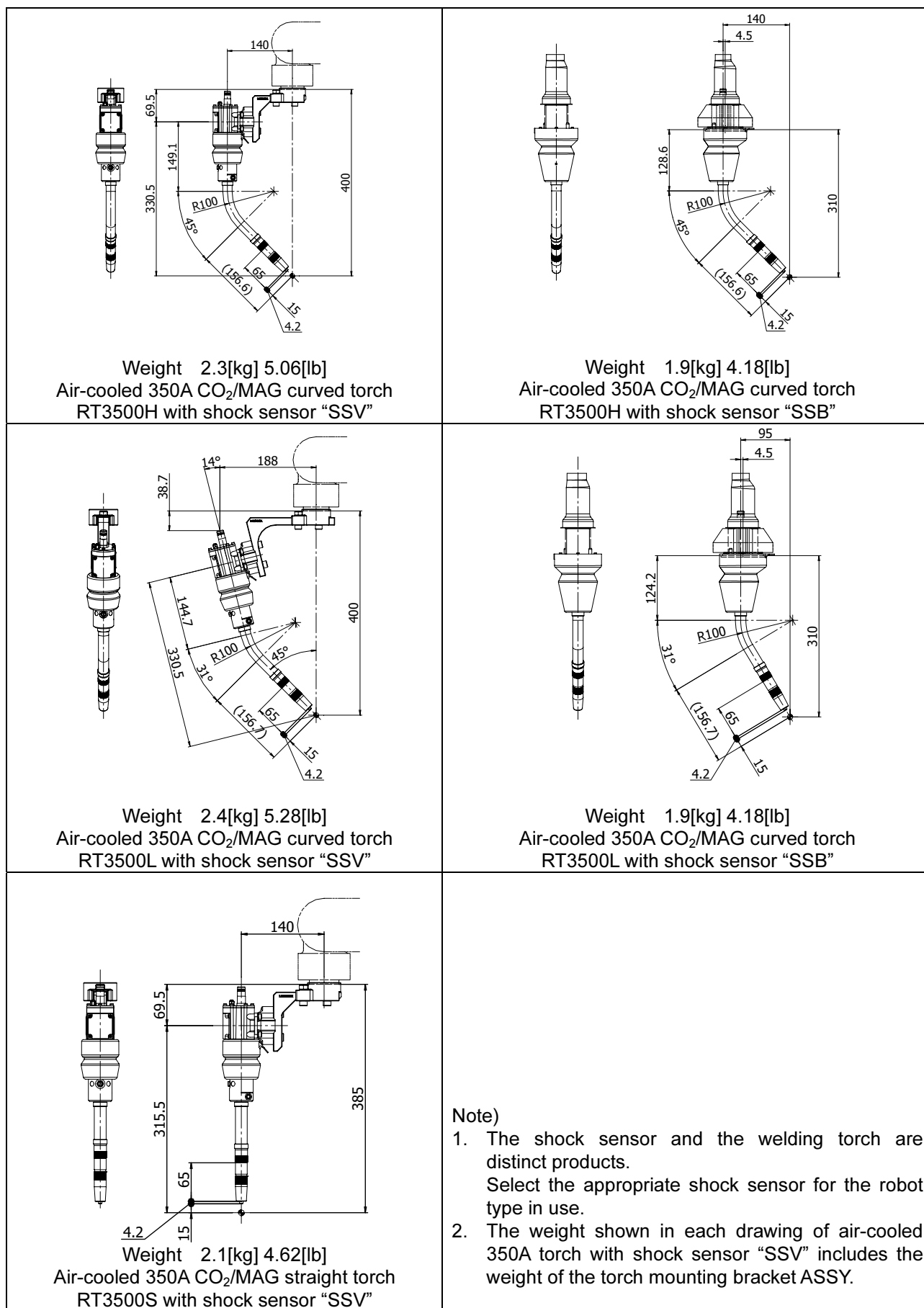


Fig. 1.1 Outline drawing of air-cooled 350A torch Unit (mm)

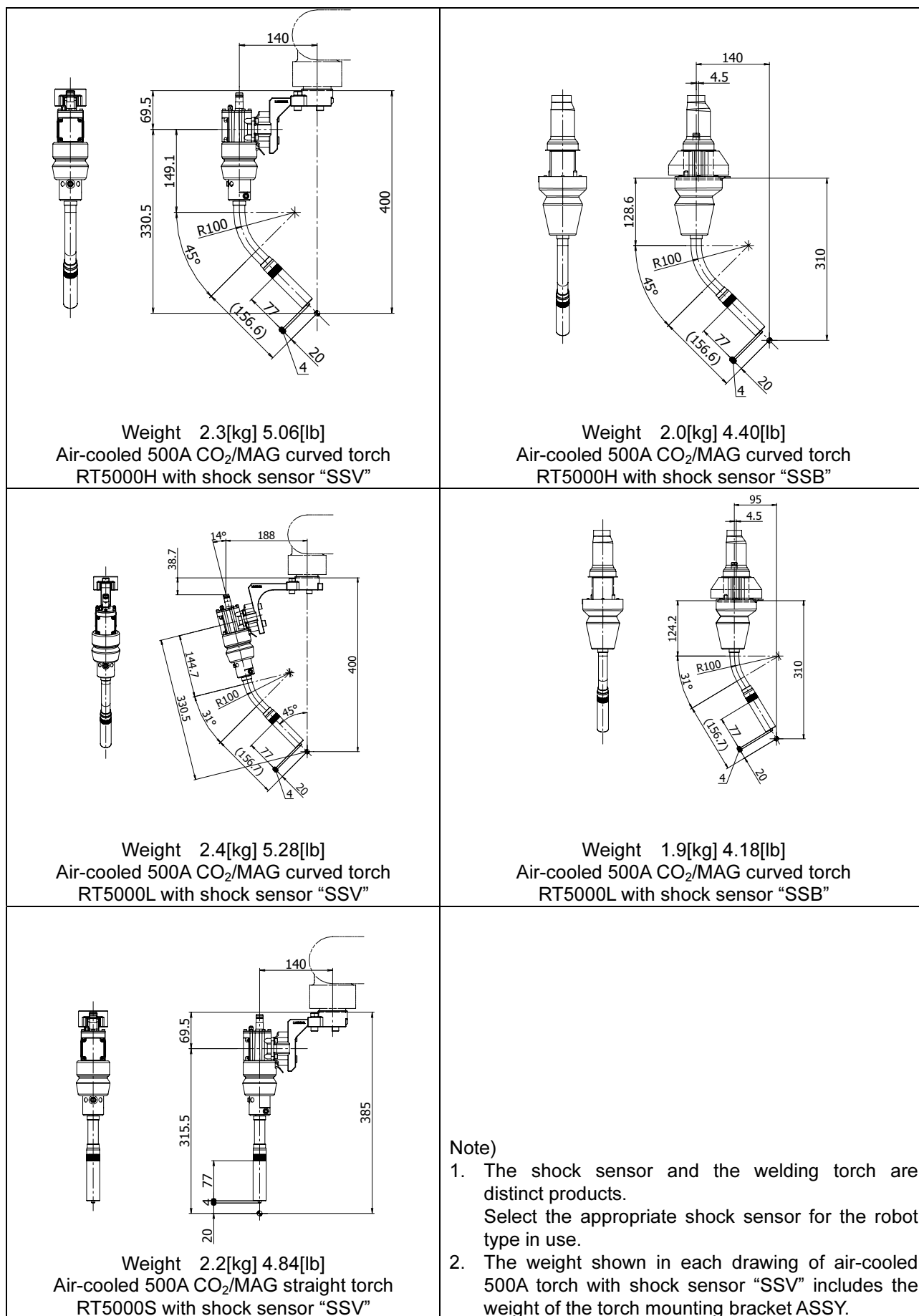
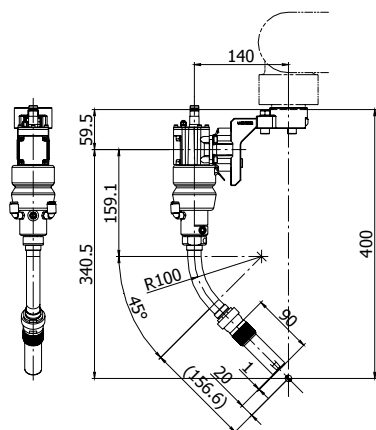
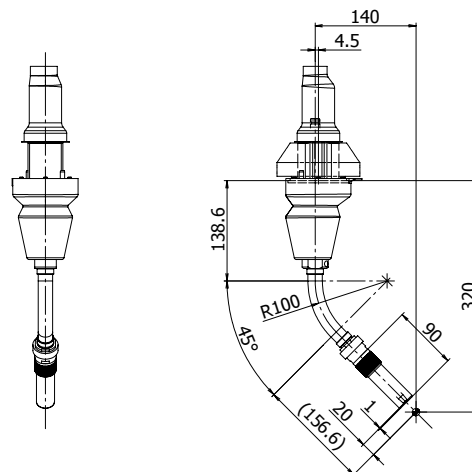


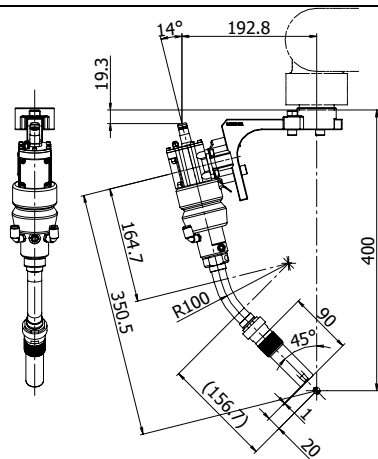
Fig. 1.2 Outline drawing of air-cooled 500A torch Unit (mm)



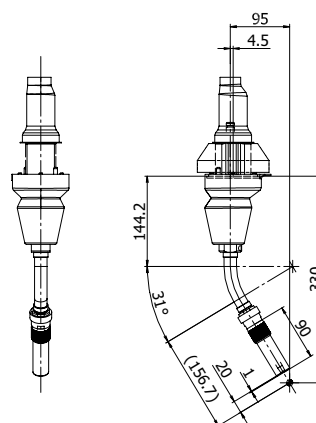
Weight 2.4[kg] 5.28[lb]
Liquid-cooled 500A CO₂/MAG curved torch
RTW5000H with shock sensor "SSV"



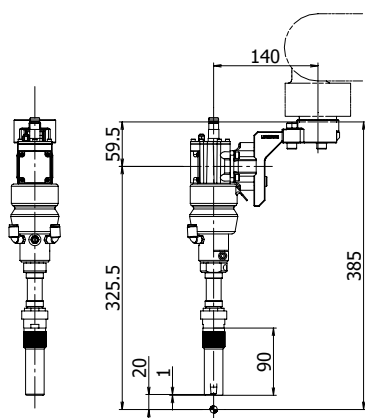
Weight 2.1[kg] 4.62[lb]
Liquid-cooled 500A CO₂/MAG curved torch
RTW5000H with shock sensor "SSB"



Weight 2.6[kg] 5.72[lb]
Liquid-cooled 500A CO₂/MAG curved torch
RTW5000L with shock sensor "SSV"



Weight 2.0[kg] 4.40[lb]
Liquid-cooled 500A CO₂/MAG curved torch
RTW5000L with shock sensor "SSB"



Weight 2.3[kg] 5.06[lb]
Liquid-cooled 500A CO₂/MAG straight torch
RTW5000S with shock sensor "SSV"

Note)

1. The shock sensor and the welding torch are distinct products.
Select the appropriate shock sensor for the robot type in use.
2. The weigh shown in each drawing of liquid-cooled 500A torch with shock sensor "SSV" includes the weight of the torch mounting bracket ASSY.

Fig. 1.3 Outline drawing of Liquid-cooled 500A torch Unit (mm)

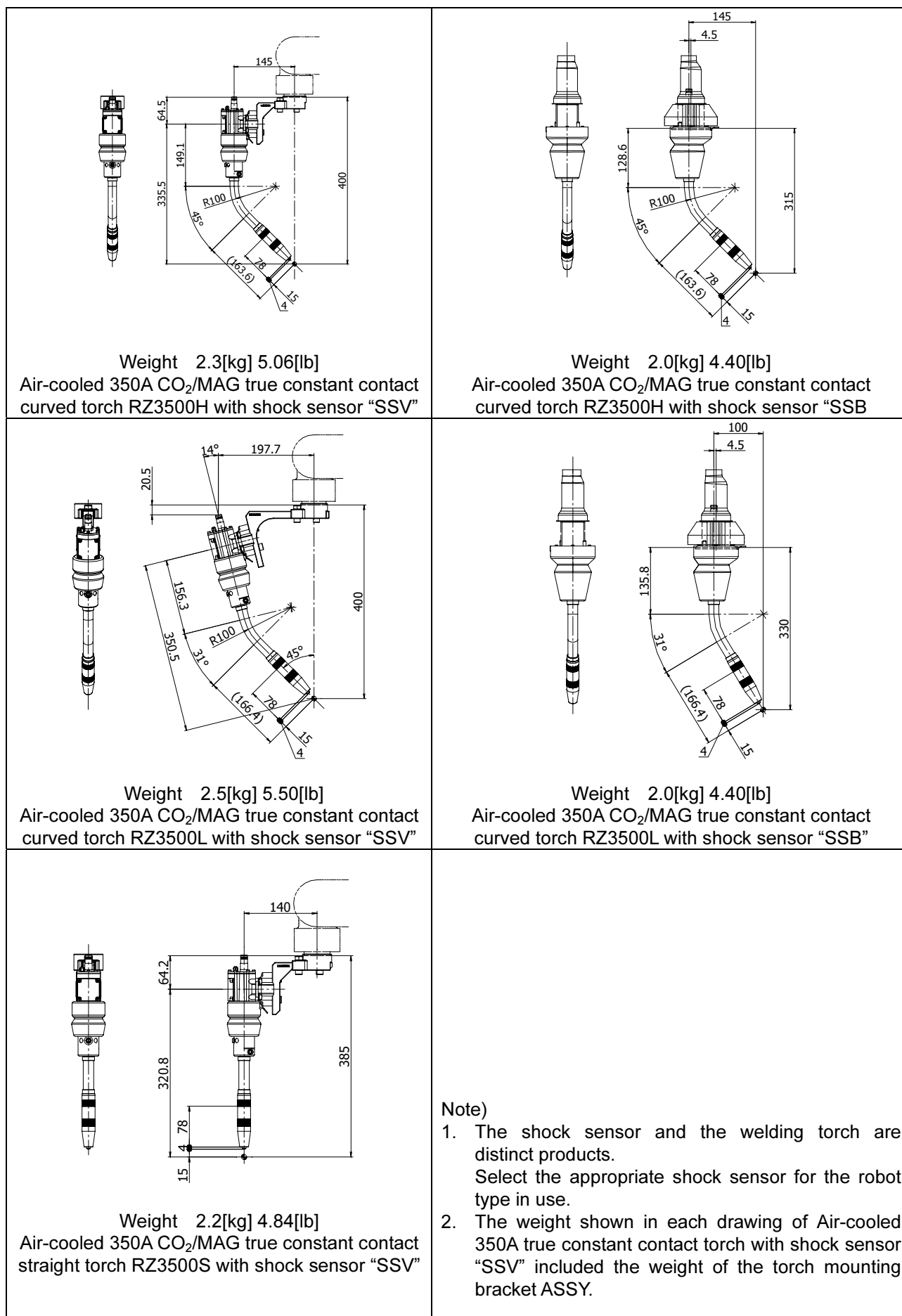


Fig. 1.4 Outline drawing of Air-cooled 350A true constant contact torch Unit (mm)

2. Checking the Contents

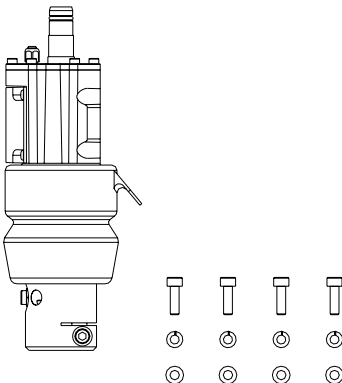
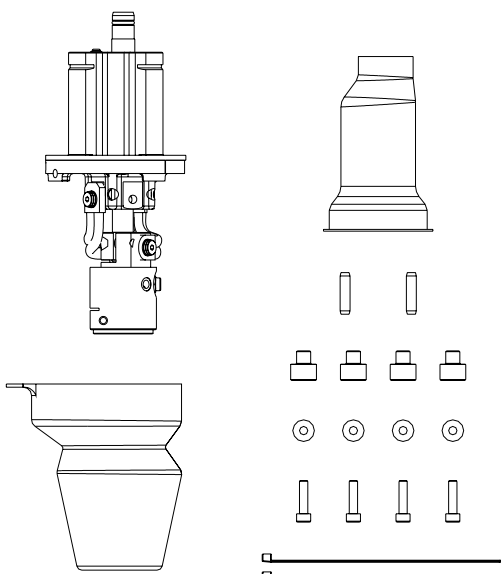
| SSV | SSB |
|---|---|
|  <p>Shock sensor unit Mounting bolt (M5×15) 4 pieces Spring washer (M5) 4 pieces Washer (M5) 4 pieces</p> |  <p>Shock sensor unit Hood Power cable cover Mounting bolt (M5×20) 4 pieces Spacer 4 pieces Insulating bushing 4 pieces Insulating dowel pin 2 pieces Cable tie 2 pieces</p> |

Fig. 2.1 Checking the contents of package

Note) 1. Use the mounting bolts (M5×40) listed above to mount the shock sensor unit on the mounting bracket.
 2. Use the cable tie listed above to mount the power cable cover on the coaxial power cable.


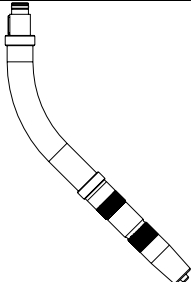
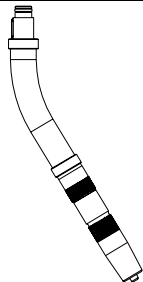

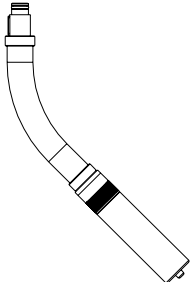
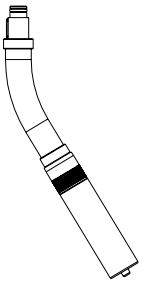
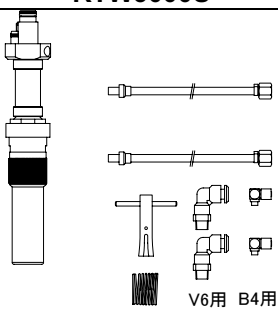
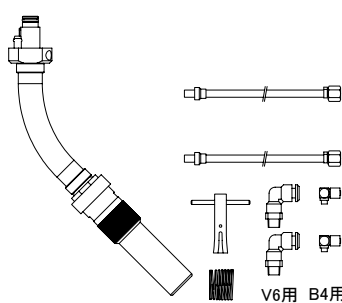
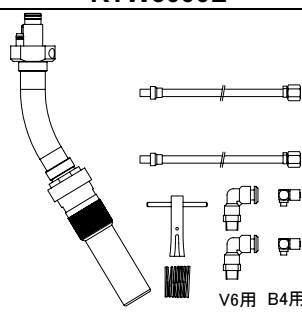

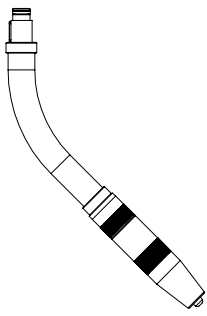
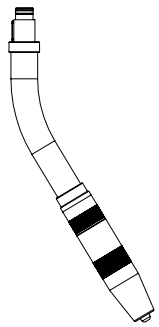
| | | |
|--|--|--|
| RT3500S  Welding torch main body | RT3500H  Welding torch main body | RT3500L  Welding torch main body |
| RT5000S  Welding torch main body | RT5000H  Welding torch main body | RT5000L  Welding torch main body |
|  Welding torch main body Wrench 1 piece Applicator 1 piece Cooling water hose(6m) 2 pieces Elbow(For B4) 2 pieces Elbow(For V6) 2 pieces |  Welding torch main body Wrench1 piece Applicator1 piece Cooling water hose(6m) 2 pieces Elbow(For B4)2 pieces Elbow(For V6)2 pieces |  Welding torch main body Wrench 1 piece Applicator 1 piece Cooling water hose(6m) 2 pieces Elbow(For B4) 2 pieces Elbow(For V6) 2 pieces |
| RZ3500S  Welding torch main body | RZ3500H  Welding torch main body | RZ3500L  Welding torch main body |

Fig. 2.2 Checking the contents of package

- Note) 1. Use of the RTW5000S, RTW5000H, or RTW5000L Liquid-cooled torch requires a water tank in addition to this torch. Purchase the water tank (PU-301) separately.
2. Use the wrench that comes with the Liquid-cooled torch to dismount the contact tip.

3. Installing and Adjusting Procedure of Welding Torch

3.1 Mounting of Welding Torch on All-V6 Type Manipulator

3.1.1 Mounting of shock sensor and mounting bracket

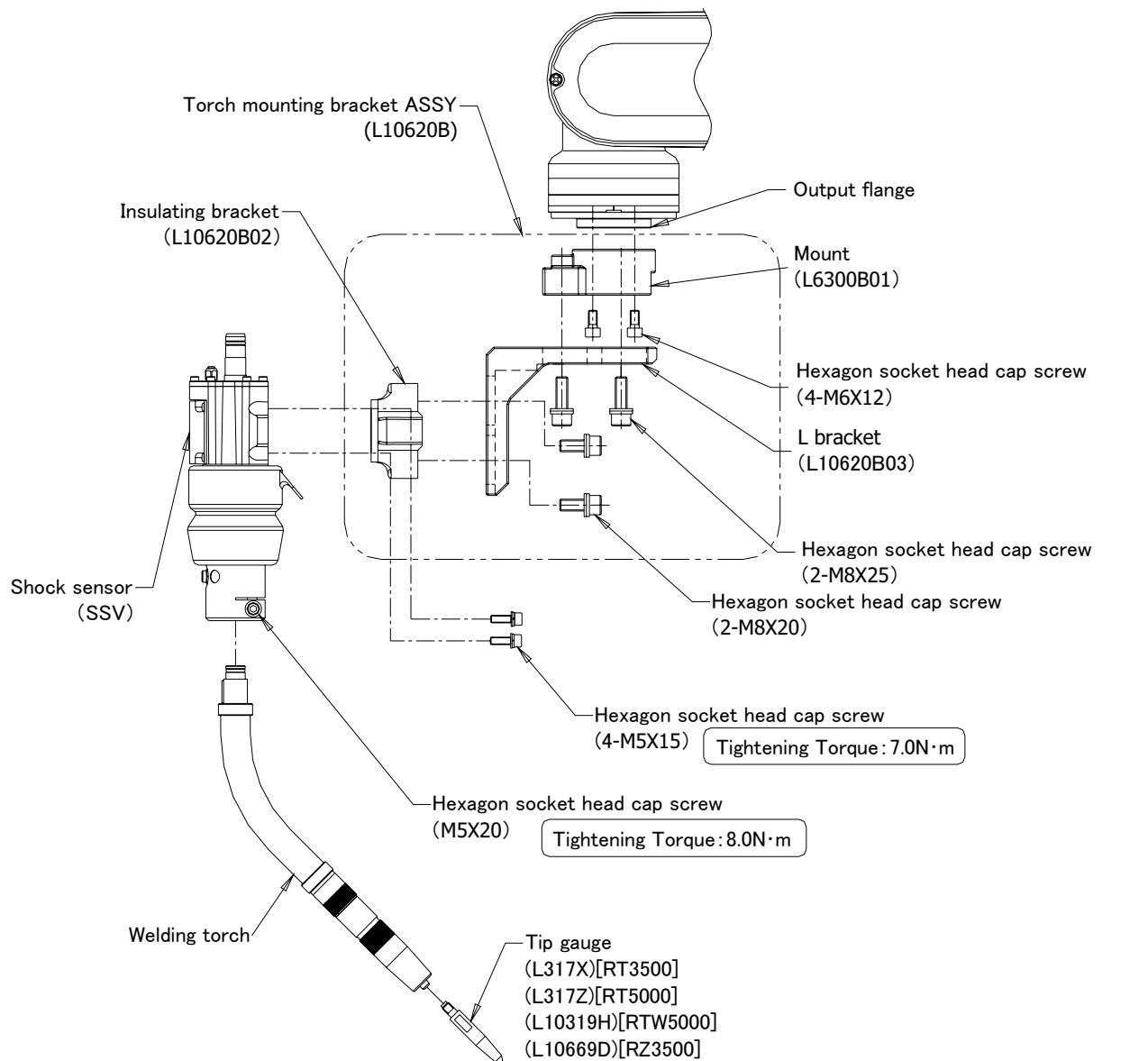
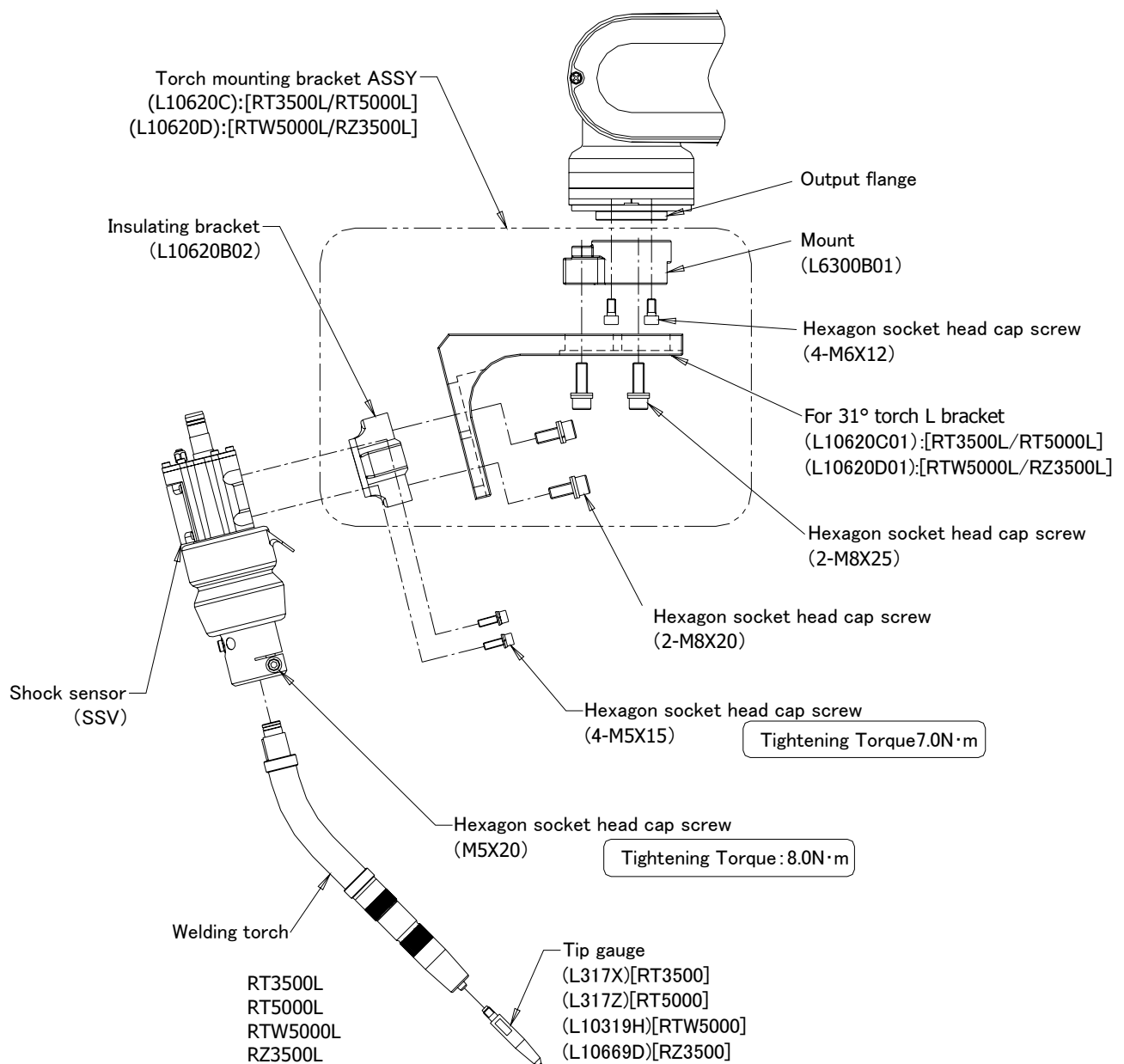


Fig. 3.1 Mounting of torch and shock sensor (for 45° curved / straight torch)

- (1) Assemble the mount (L6300B01) onto the output flange of manipulator using 4 pieces of hexagon socket head cap screws (M6×12).
- (2) Mount the L-bracket (L10620B03) to the mount that has assembled in the procedure (1) with 2 pieces of hexagon socket head cap screws (M8×25).
- (3) Mount the insulating bracket (L10620B02) to the L-bracket that has mounted in the procedure (2) with 2 pieces of hexagon socket head cap screws (M8×20).
- (4) Mount the shock sensor onto the insulating bracket with 4 pieces of hexagon socket head cap screws (M5×15).
- (5) Loosen the hexagon socket head cap screw (M5×20) of shock sensor to insert the torch. Fix it by tightening the screw.

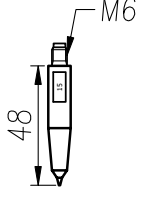
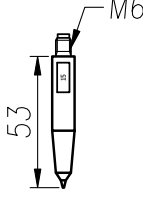
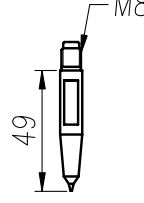
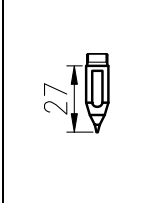


(Note: Purchase the torch mounting bracket ASSY separately.)

Fig. 3.2 Mounting of torch and shock sensor (for 31° curved torch)

- (1) Assemble the mount (L6300B01) onto the output flange of manipulator using 4 pieces of hexagon socket head cap screws (M6×12).
- (2) Mount the L-bracket (L10620B01 or L10620D01) to the mount that has assembled in the procedure (1) with 2 pieces of hexagon socket head cap screws (M8×25).
Choose an L bracket according to the type of the welding torch. (For detail, refer to Fig. 3.2)
- (3) Mount the insulating bracket (L10620B02) to the L-bracket that has mounted in the procedure (2) with 2 pieces of hexagon socket head cap screws (M8×20).
- (4) Mount the shock sensor onto the insulating bracket with 4 pieces of hexagon socket head cap screws (M5×15).
- (5) Loosen the hexagon socket head cap screw (M5×20) of shock sensor to insert the torch. Fix it by tightening the screw.

3.1.2 Mounting the torch gauge

| | | | |
|---|---|---|---|
| L317X 350A トーチ用 for 350A torch | L317Z 500A 空冷トーチ用 for 500A torch | L10319H 500A 水冷トーチ用 for 500A torch | L10669D RZ トーチ用 for RZ torch |
| エクステンション Extension 15mm | エクステンション Extension 20mm | エクステンション Extension 20mm | エクステンション Extension 15mm |
|  |  |  |  |
| RT3500S RT3500H RT3500L | RT5000S RT5000H RT5000L | RTW5000S RTW5000H RTW5000L | RZ3500S RZ3500H RZ3500L |

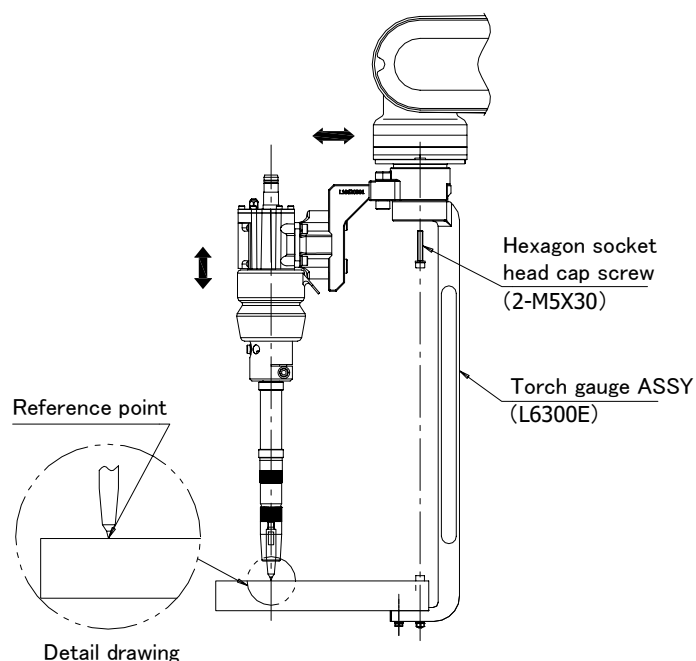


Fig. 3.3 Mounting the torch gauge (for straight torch)

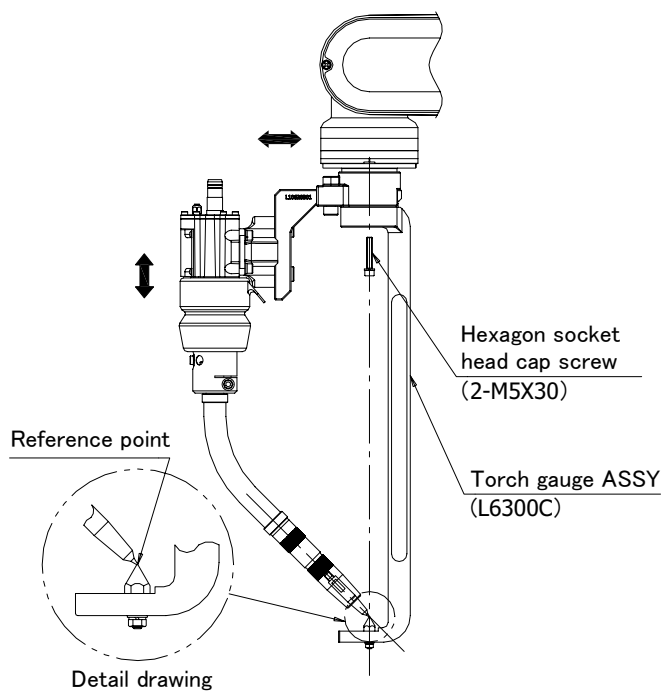


Fig. 3.4 Mounting the torch gauge (for 45° curved torch)

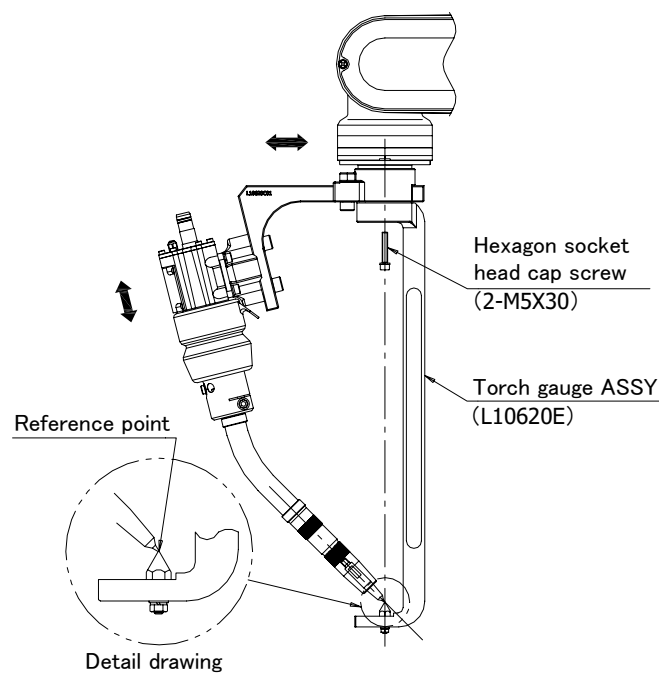
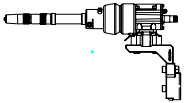
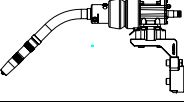
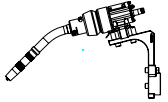
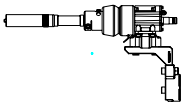
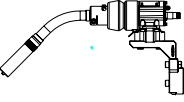
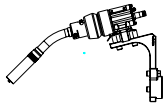
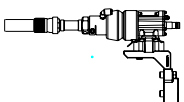
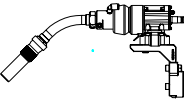
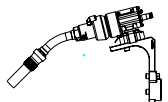
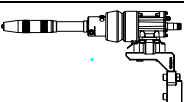
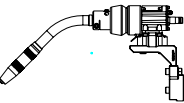
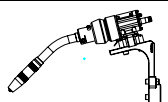


Fig. 3.5 Mounting the torch gauge (for 31° curved torch)
(Note: Purchase the torch gauge ASSY separately.)

- (1) As for the RT series dismount the nozzle and the contact tip from the torch. As for the RZ series dismount the nozzle and the tip holder from the torch.
- (2) Mount the tip gauge firmly to the torch. (The gauge is an attached component of the torch mount.)
- (3) Mount the torch gauge ASSY with 2 pieces of hexagon socket head cap screws (M5x30). (The screws are attached components of the torch gauge Assy.)
- (4) Make sure that the reference point of torch gauge matches with the tip gauge end. If not, make adjustments for the reference point to align with it.

In addition, about each part to use at the time of torch installation to the V6 type manipulator, confirm it in Table 3.1.

Table 3.1 Type of Torch mounting bracket ASSY / Torch gauge ASSY / Tip gauge

| Torch model | Torch mounting bracket ASSY | Torch gauge ASSY | Tip gauge |
|---|-----------------------------|------------------|-----------|
| RT3500S  | L10620B | L6300E | L317X |
| RT3500H  | | L6300C | |
| RT3500L  | L10620C | L10620E | |
| RT5000S  | L10620B | L6300E | L317Z |
| RT5000H  | | L6300C | |
| RT5000L  | L10620C | L10620E | |
| RTW5000S  | L10620B | L6300E | L10319H |
| RTW5000H  | | L6300C | |
| RTW5000L  | L10620D | L10620E | |
| RZ3500S  | L10620B | L6300E | L10669D |
| RZ3500H  | | L6300C | |
| RZ3500L  | L10620D | L10620E | |

3.1.3 Adjusting procedure of the torch

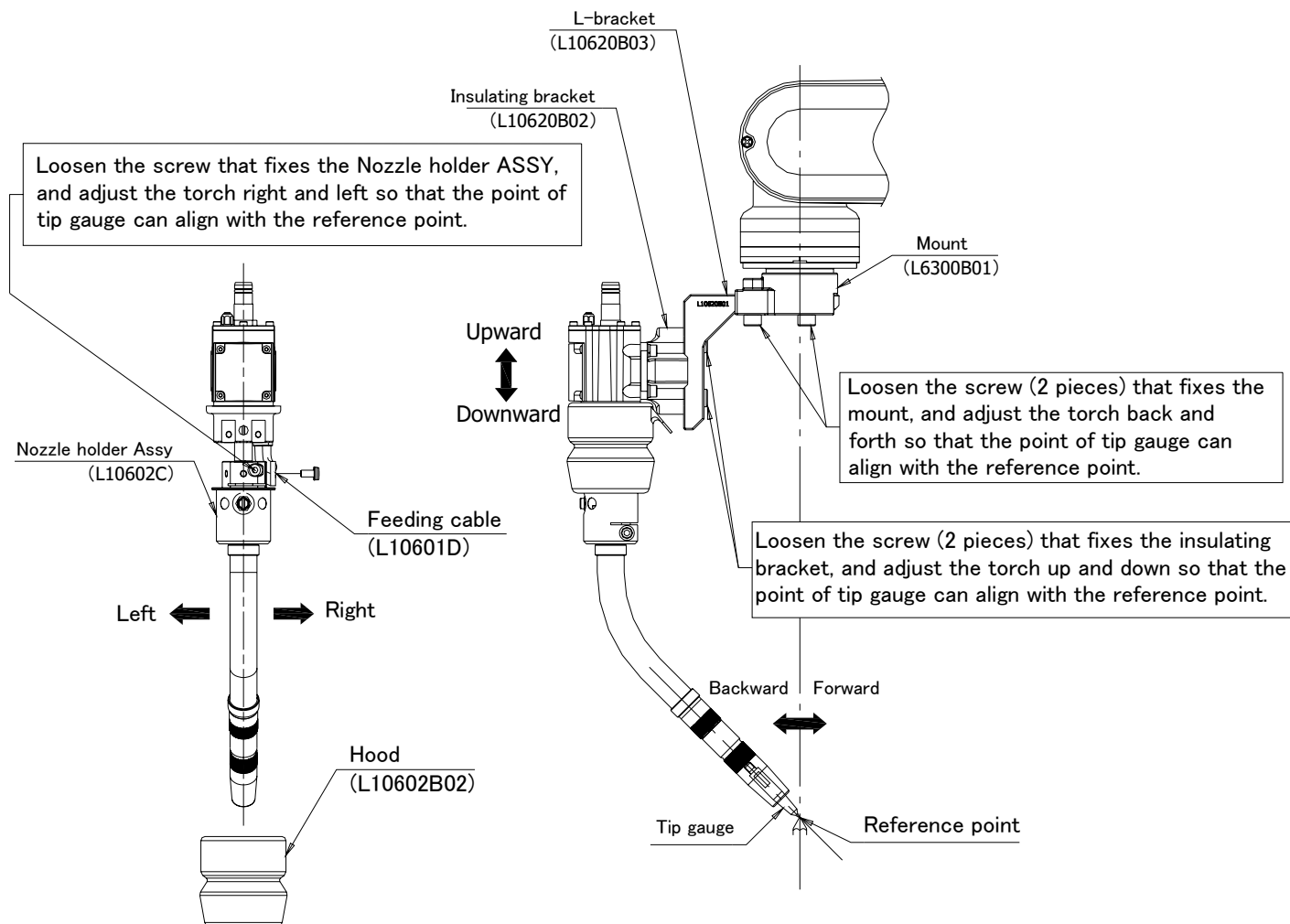


Fig. 3.6 Adjusting procedure of the torch

- (1) If the tip gauge end slips out of the reference point of torch gauge in the upward or downward direction, loosen the 2 pieces of hexagon socket head cap screws (M8×20) that fix the insulating bracket (L10620B02) onto the L-bracket (L10620B03). Correct the position, moving the insulating bracket upward or downward, and then fix it firmly by tightening the screws.
- (2) If the tip gauge end slips out of the reference point of torch gauge in the frontward or rearward direction, loosen the 2 hexagon socket head cap screws (M8×25) that fix the mount (L6300B01) onto the L-bracket (L10620B03). Correct the position, moving the mount frontward or rearward, and then fix it firmly by tightening the screws.

- (3) If the tip gauge point is out of alignment in the horizontal direction to the reference point of the touch gauge, make alignment adjustment following the procedure shown below.
1. Dismount the hood (L10602B02).
 2. Disconnect the power cable (L10601D) from the nozzle holder assembly (L10602C), unfasten the hexagon socket head cap screws (M5×20) that fix the nozzle holder to rotate it to the direction of misalignment (or to the left or right), and then make adjustment.
 3. Securely fix the nozzle holder and power supply cable, and then mount the hood.

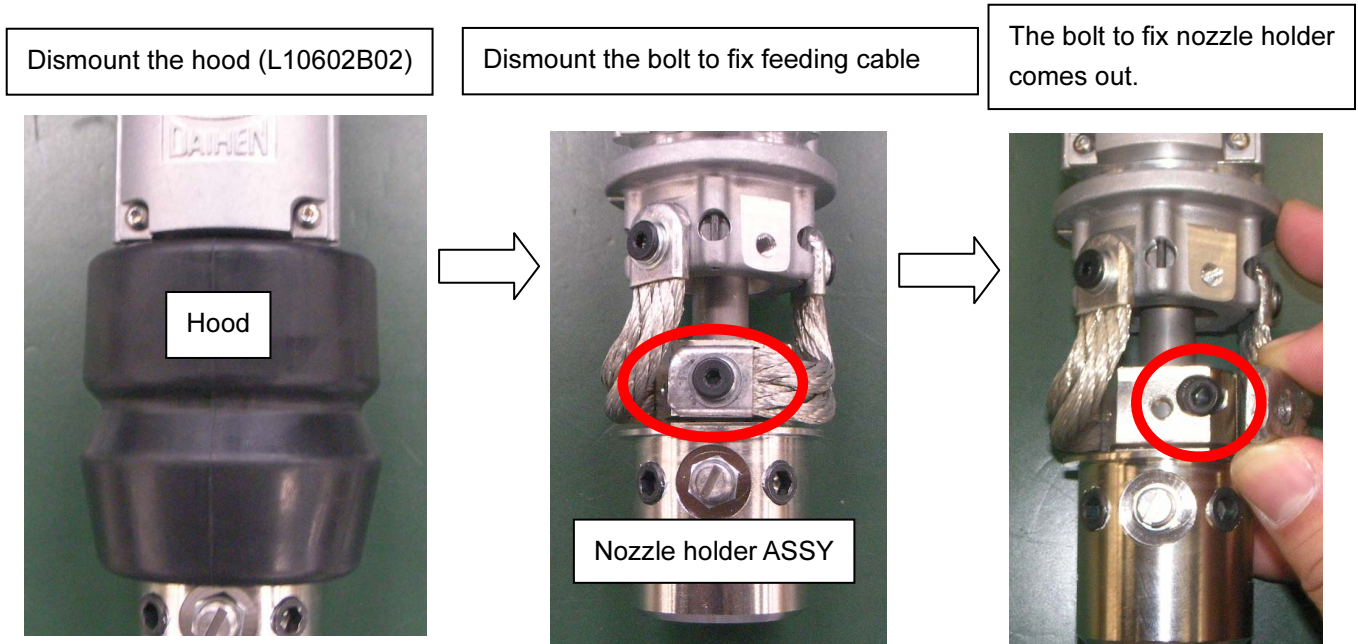


Fig. 3.7 Right and left direction adjusting procedure of the torch

- (4) In case that the torch tip is not correctly positioned even after making adjustments as shown in (1) - (3), it is possible that there is a distortion in the L-bracket or the nozzle assembly. Follow the procedures (1) - (3) once again, and if it remains uncorrected, please contact to your nearest sales distributor of our company.
- (5) Dismount the torch gauge when the adjusting procedure of torch is finished. Note that you need to create the origin position checking program before removing the tip gauge and mounting the nozzle and the contact tip onto the torch.

3.2 Mounting of Welding Torch on All-B4 Type Manipulator

3.2.1 Mounting of curved torch

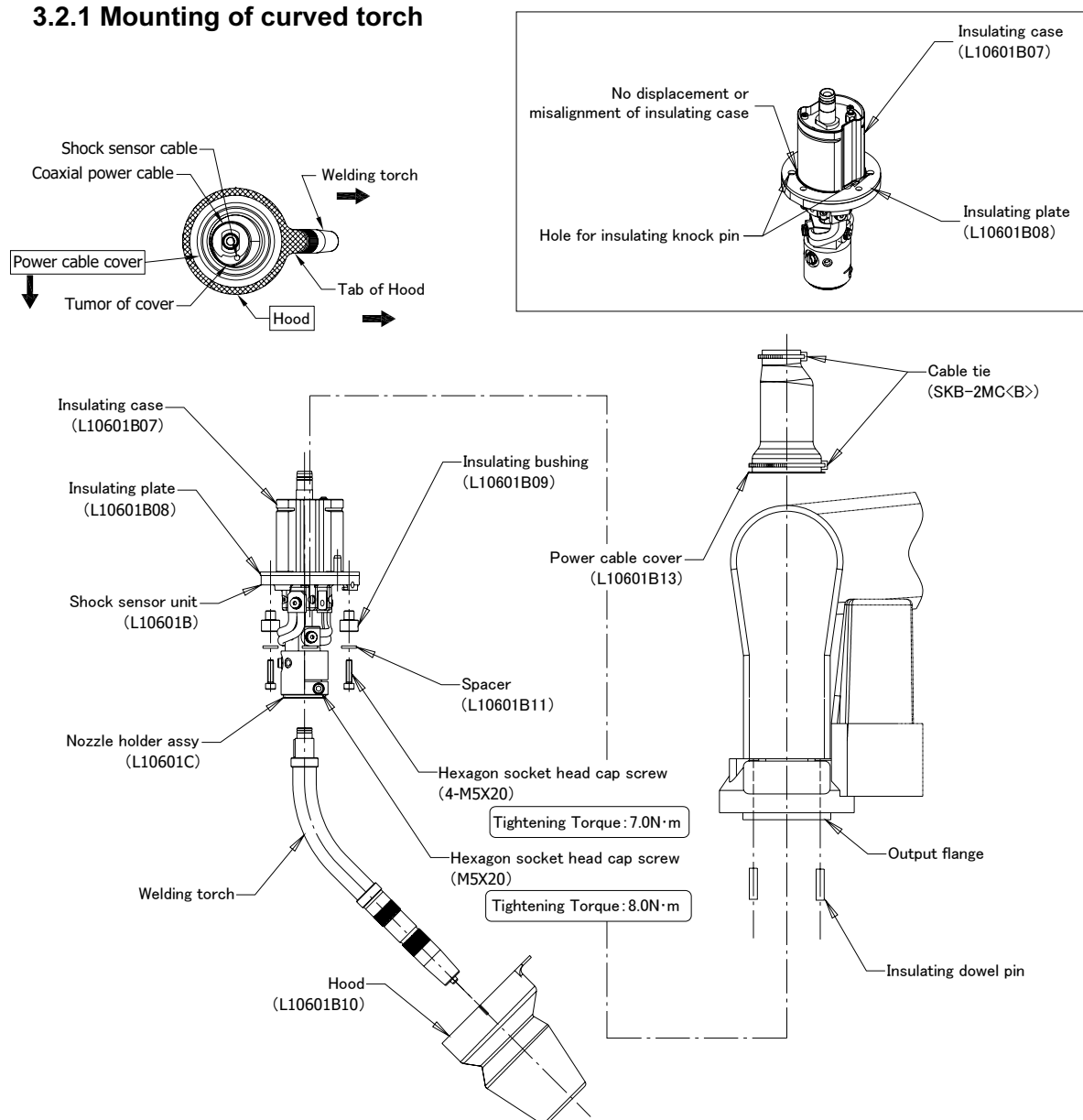


Fig. 3.8 Mounting of torch and shock sensor

- (1) Drive the two insulating dowel pins onto the output flange of manipulator from underneath. (The pins are attached to the shock sensor unit (L10601B).)
- (2) Make sure that the insulating case (L10601B07) and the insulating plate (L10601B08) are fixed properly.
- (3) Insert the shock sensor unit into the output flange of manipulator from underneath. Position correctly the holes for insulating dowel pin of shock sensor to the insulating dowel pins.
- (4) Mount the insulating bushing (L10601B09) and the spacer (L10601B11) onto the shock sensor unit from underneath, using 4 pieces of hexagon socket head cap screws (M5×20). (The screws are attached to the shock sensor unit.)
- (5) Unfasten the hexagon socket head bolt (M5×20) that fixes the shock sensor, and then insert and fix the welding torch.
- (6) Attach the power cable cover (L10601B13) from above, and the hood (L10601B10) from underneath. (Refer to the top view in fig.3.8 for the installation direction.)
To fix the power cable cover, use the cable ties that come with the shock sensor. (Fix the cover at the top and bottom.)

3.2.2 Reference point teaching procedure (Creation of home position confirmation program)

- (1) On the RT series, dismount the nozzle and the contact tip from the torch. On the RZ series, dismount the nozzle and the tip holder from the torch.
- (2) Secure the tip gauge to the torch.
- (3) To set a reference point, prepare a sharp-pointed object fixed to the ground (e.g. tip gauge) (hereinafter referred to as the “reference gauge”).
- (4) Align the point of the tip gauge on tip of the reference gauge, and then teach such point as the reference point 2 (point teaching). Use this reference point 2 to confirm the mechanical deviation of the torch.

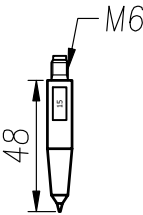
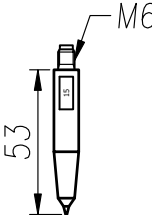
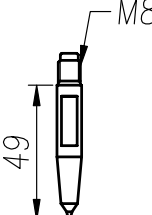

| L317X for 350A torch | L317Z for 500A torch | L10319H for 500A torch | L10669D for RZ torch |
|--|--|--|---|
| Extension 15mm | Extension 20mm | Extension 20mm | Extension 15mm |
|  |  |  |  |
| RT3500S RT3500H RT3500L | RT5000S RT5000H RT5000L | RTW5000S RTW5000H RTW5000L | RZ3500S RZ3500H RZ3500L |

Fig.3.9 Tip gauge

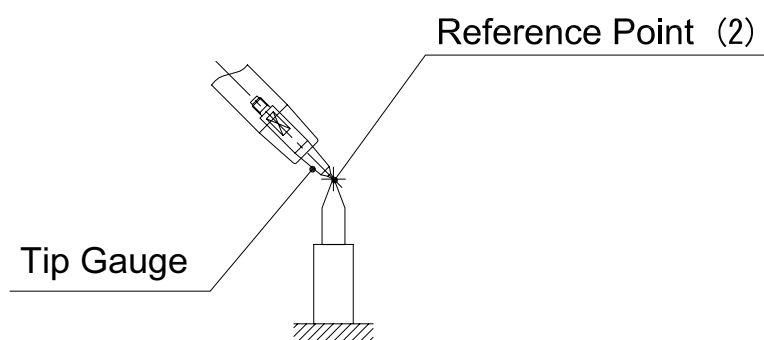


Fig.3.10 Teaching of reference point

3.2.3 Mounting of gauge ASSY (option)

- (1) Dismount the nozzle and the contact tip from the torch to the RT series. Dismount the nozzle and the tip holder from the torch to the RZ series.
- (2) Secure the tip gauge (L317X, L317Z, L10319H or L10669D01) to the torch.
- (3) Dismount the hood from the shock sensor. Mount the gauge ASSY (L10618B) with the two hexagon socket head cap bolts (M5×16) that comes with the gauge ASSY.
- (4) To set a reference point, prepare a sharp-pointed object fixed to the ground (e.g. tip gauge (L317X)) (hereinafter referred to as the “reference gauge”).

Note) This gauge is designed to confirm the current position of the robot. (Unlike the conventional torch gauges, it is not designed to make measurement of positional accuracy of the torch.) For the adjustment procedure, refer to information in Section 3.2.4.

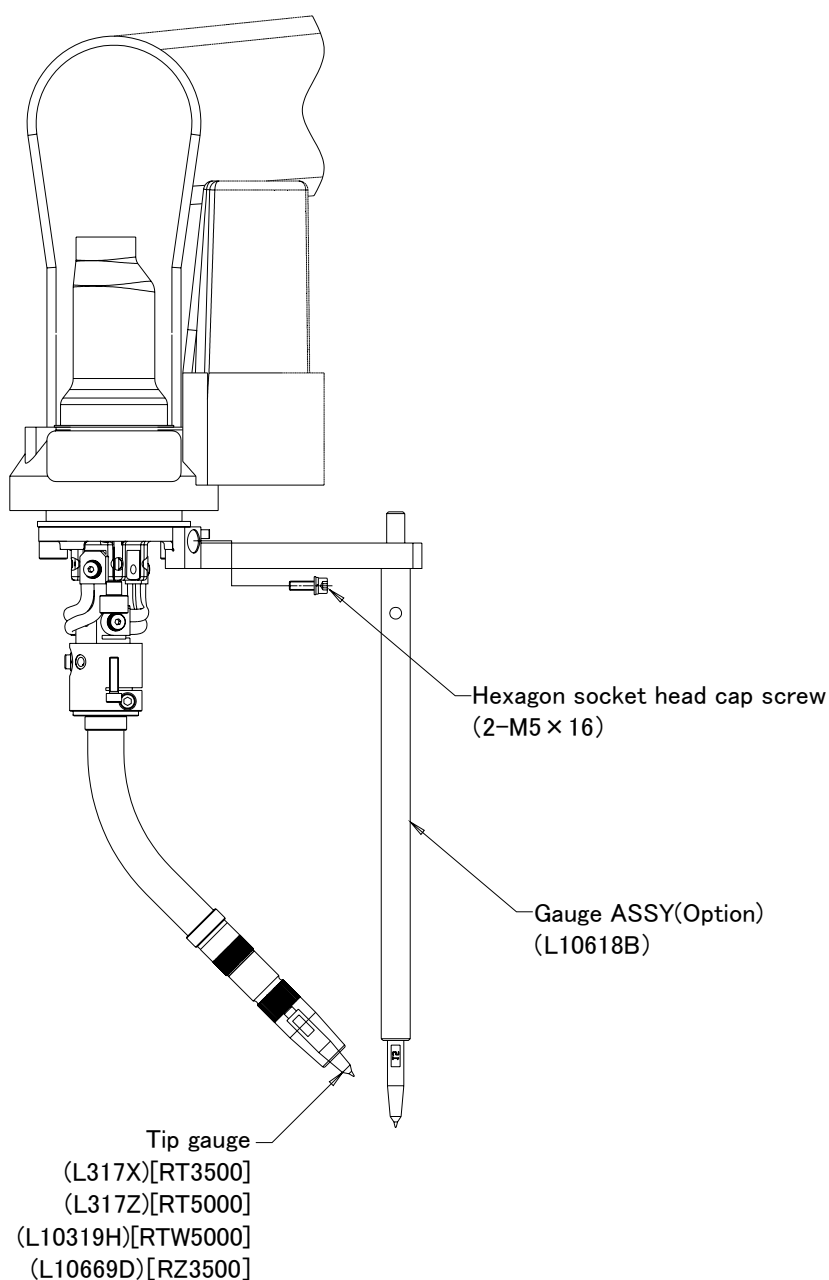


Fig.3.11 Mounting of gauge ASSY

3.2.4 Teaching the reference point using the gauge ASSY (Option) (Creating the origin position checking program)

- (1) Align the point of gauge ASSY with the reference gauge prepared when the gauge ASSY was installed, and teach it as the reference point (1) (point-teaching).

This reference point (1) is used for checking the mechanical deviation of robot.

- (2) Align the point of tip gauge secured on the torch tip with the tip of reference gauge, and teach it as the reference point (2) (point-teaching).

This reference point (2) is used for checking the mechanical deviation of torch.

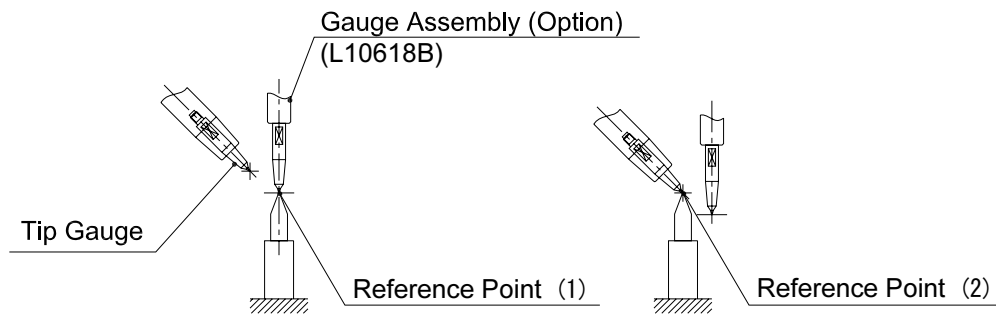


Fig.3.12 Teaching the reference point

3.2.5 Daily check of reference point

In the daily check, see if no deviation has occurred in the reference point (2) taught by the origin-position check program. If any deviation has occurred caused by the torch collision etc., correct it by the procedure Fig.3.13.

If a deviation has occurred in the reference point (1) taught by the origin-position check program, provided with the gauge ASSY (option), that deviation shall be attributed to the manipulator. Contact our sales department.

If no deviation has occurred in the reference point (1), that deviation shall be attributed to the torch. In this case, correct it by the following procedure.

Note that when checking the reference point (1) first taught, be sure to use the gauge applied in the first. If using a wrong gauge, the precise position accuracy cannot be obtained.

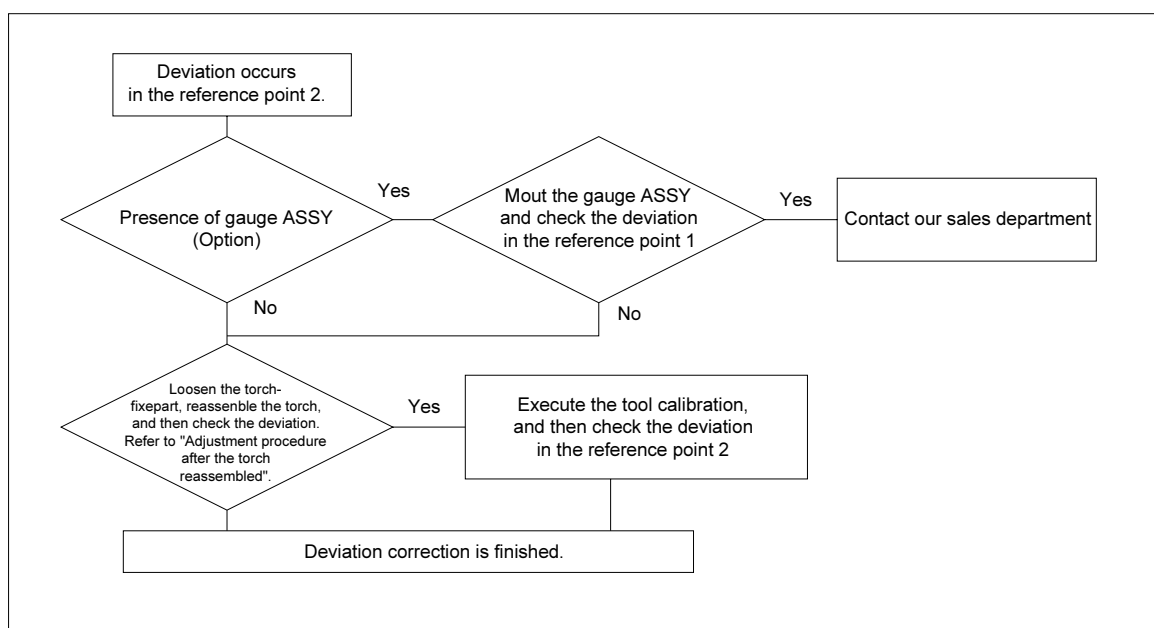


Fig.3.13 Checking procedure when the torch deviated

3.2.6 Adjustment procedure with the tool length automatic setting

- (1) Copy the existing origin position check program (Program "A" for example), and newly create the program B. Running this program B, align the tip of reference gauge and the point of tip gauge fixed on the torch tip by performing the **rectangular manual operation holding the torch posture** from the position of program A to perform teaching (point-teaching).

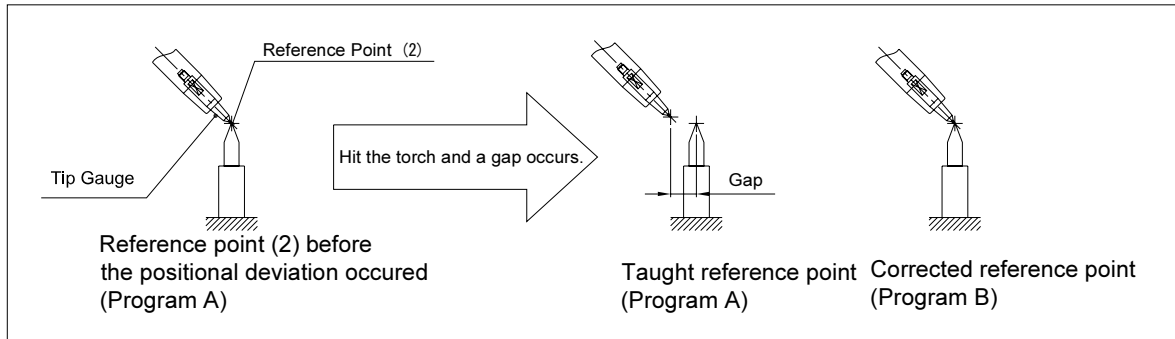


Fig.3.14 Checking the reference point

- (2) Perform the 2-point tool length setting. With this setting, the amount of torch (tool) deviation can be automatically reflected to the program. For details of the operation procedure, see the instruction manual; section 4.5.2 "Tool length" in INSTALLATION.
- (3) As the tool conversion function is automatically executed, follow the instruction and convert the program that you would like to perform the tool conversion. For details of the operation procedure, see the instruction manual; section 4.5.8 "Tool conversion" in INSTALLATION.
- (4) Call the program A and check that the deviation in the reference point (2) has been corrected, having a proper reference point.

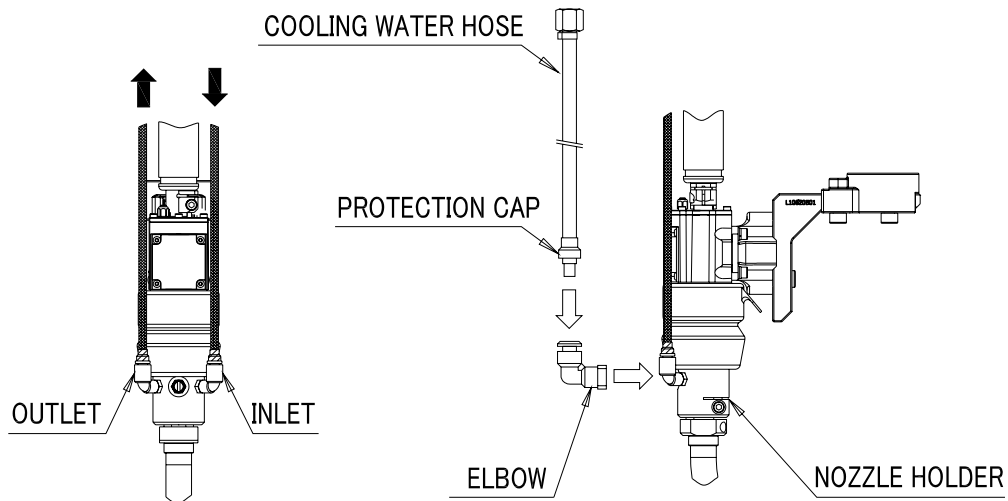
In addition, do not execute the tool conversion function in the program where the reference point (1) has been taught with the optional gauge ASSY provided.

If executing the tool conversion function in all the programs, teach the reference point (1) again.

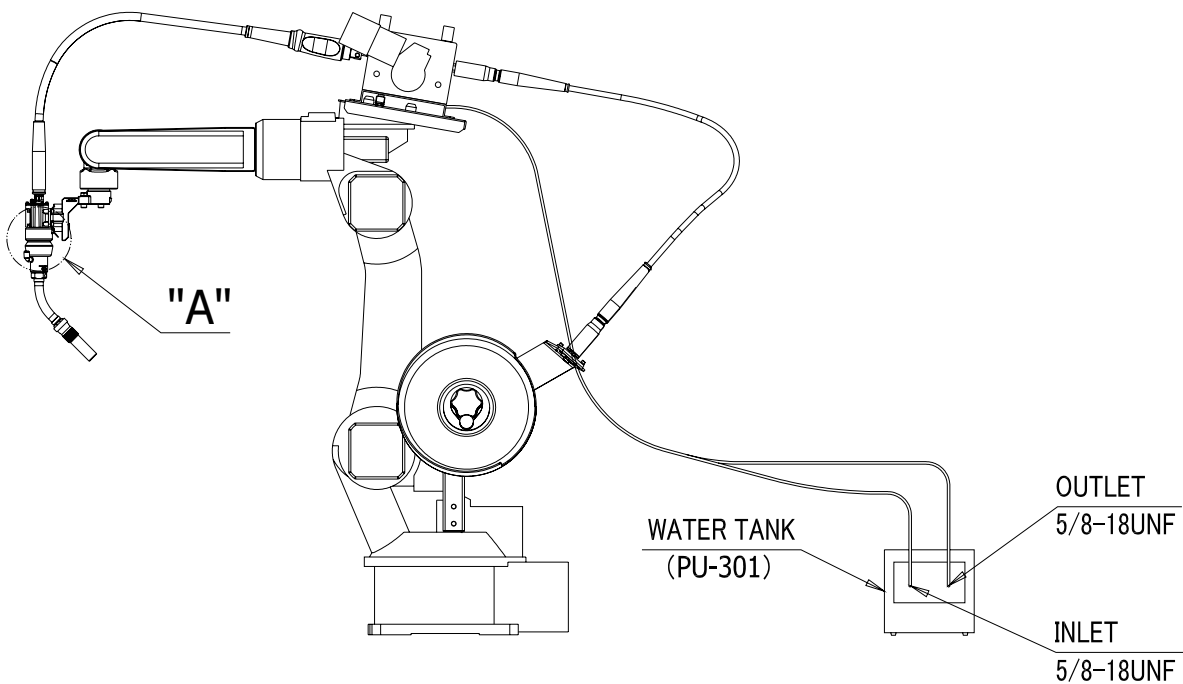
3.3 Connecting the Liquid-cooled Torch (RTW5000S, RTW5000H, RTW5000L)

3.3.1 Mounting on All-V6 type

- (1) Remove the taper plugs from the nozzle holder and mount the elbows (WL-06-01) onto it. The elbows are attached components of the liquid-cooled torch.
- (2) Connect the cooling water hoses to each of the elbows and fix the protection caps for each.
- (3) Run the cooling water hoses along the coaxial power cable to connect them to the water tank (PU-301).
- (4) Connect the liquid-cooled torch to the nozzle holder.



Detail : A



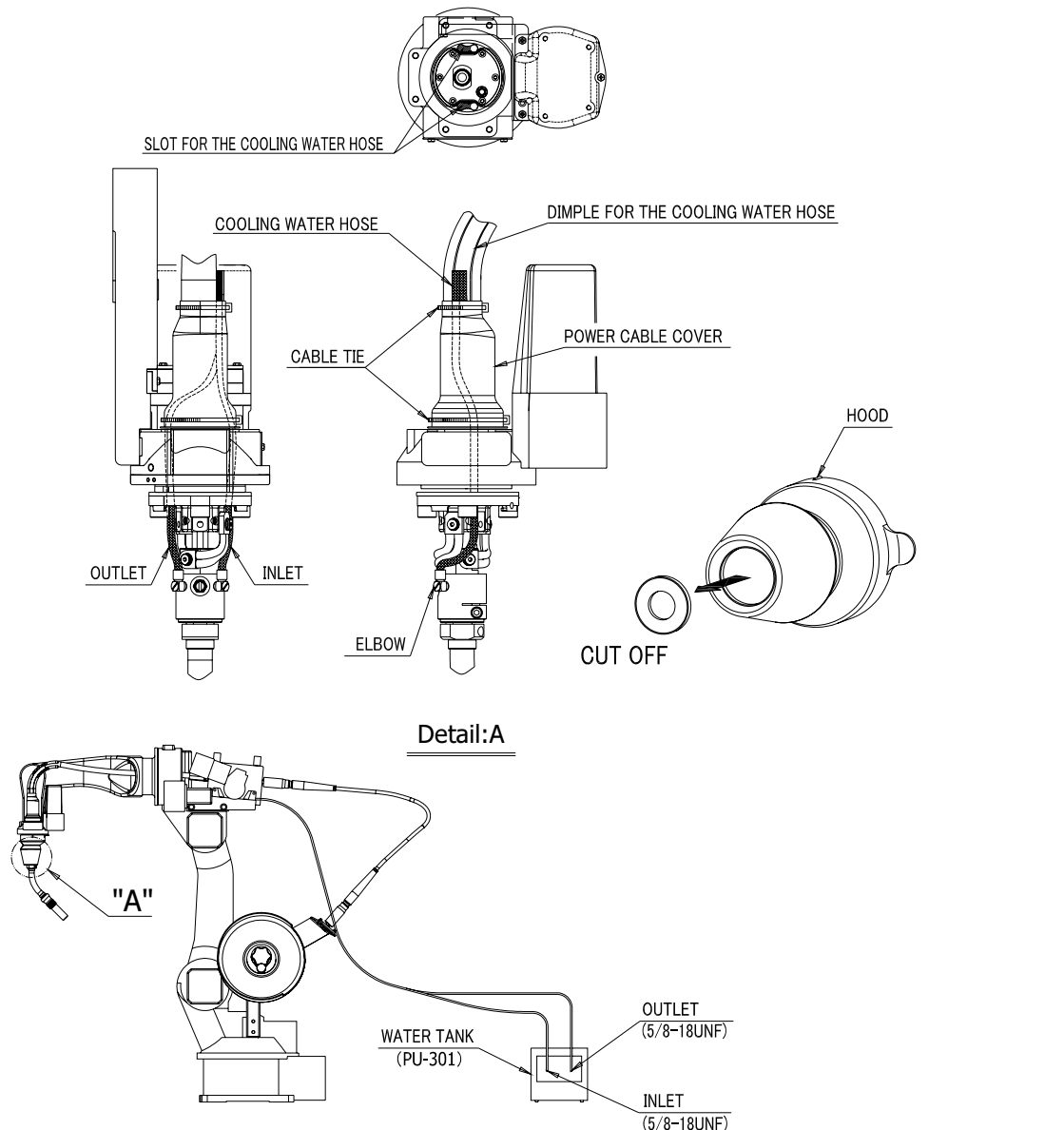
(Note: Purchase the water tank PU-301 separately.)

Fig.3.15 Connection procedure of liquid-cooled torch (For All-V6)

3.3.2 Mounting on All-B4 type

The connection of the liquid-cooled torch to the All-B4 type manipulator requires the hose mounting kit (L7898P).

- (1) Remove the hood from the shock sensor.
- (2) Mount the elbows (M-5HL-6-X112) to the nozzle holder. The elbows are attached components of the liquid-cooled torch.
- (3) Slide the power cable cover upward along the coaxial power cable.
- (4) Insert the cooling water hoses into the power cable cover along the dimple formed on the power cable.
- (5) Pass the hoses separately towards the bottom of the shock sensor through the oval openings located on its both sides.
- (6) Connect the cooling water hoses to each of the elbows that have been mounted in the procedure (2).
- (7) Fix power cable cover with cable ties (Top and bottom).
- (8) Cut off the cylindrical dented part from the bottom of the hood and mount the hood onto the shock sensor.
- (9) Connect the liquid-cooled torch to the nozzle holder.
- (10) Refer to the section 3.4 for the connection of cooling water hose.



(Note: Purchase the water tank PU-301 separately.)

Fig.3.16 Connection procedure of liquid-cooled torch (For All-B4)

3.4 Connecting the Hose to All-B4

1. Connect the hose to the torch along with the coaxial power cable.
2. Bind up the hose and coaxial power cable with a spiral tube.
Connect spiral tubes to the W/F side as shown with *1 to *3.
[Caution] Slacken off the portions marked with "*" in Fig.3.17.
3. Adjust the slack in the tube.
 - (1) Make the robot posture upright and horizontal.
 - (2) Rotate the 6th axis to in the maximum (soft limit), and check that no stress is applied to the hose.
 [Both +/- side]
 - (3) Rotate the 6th axis to in the maximum (soft limit) in either + or – side, and 4th axis in the other side of the 6th axis to the maximum (soft limit), and then check that no stress is applied the hose.
 - (4) Rotate both the 4th and 6th axis to the maximum (soft limit) respectively in the other side of the above operation (3), and check that no stress is applied to the hose.
4. Check the slack of hose, and secure the spiral tube at its end with a cable tie.
5. Bind the hose and coaxial power cable on the W/F side with a cable tie.
6. Use cable ties that come with the shock sensor to fix the top end of the power cable cover together with the coaxial power cable, shock sensor cable and hose.

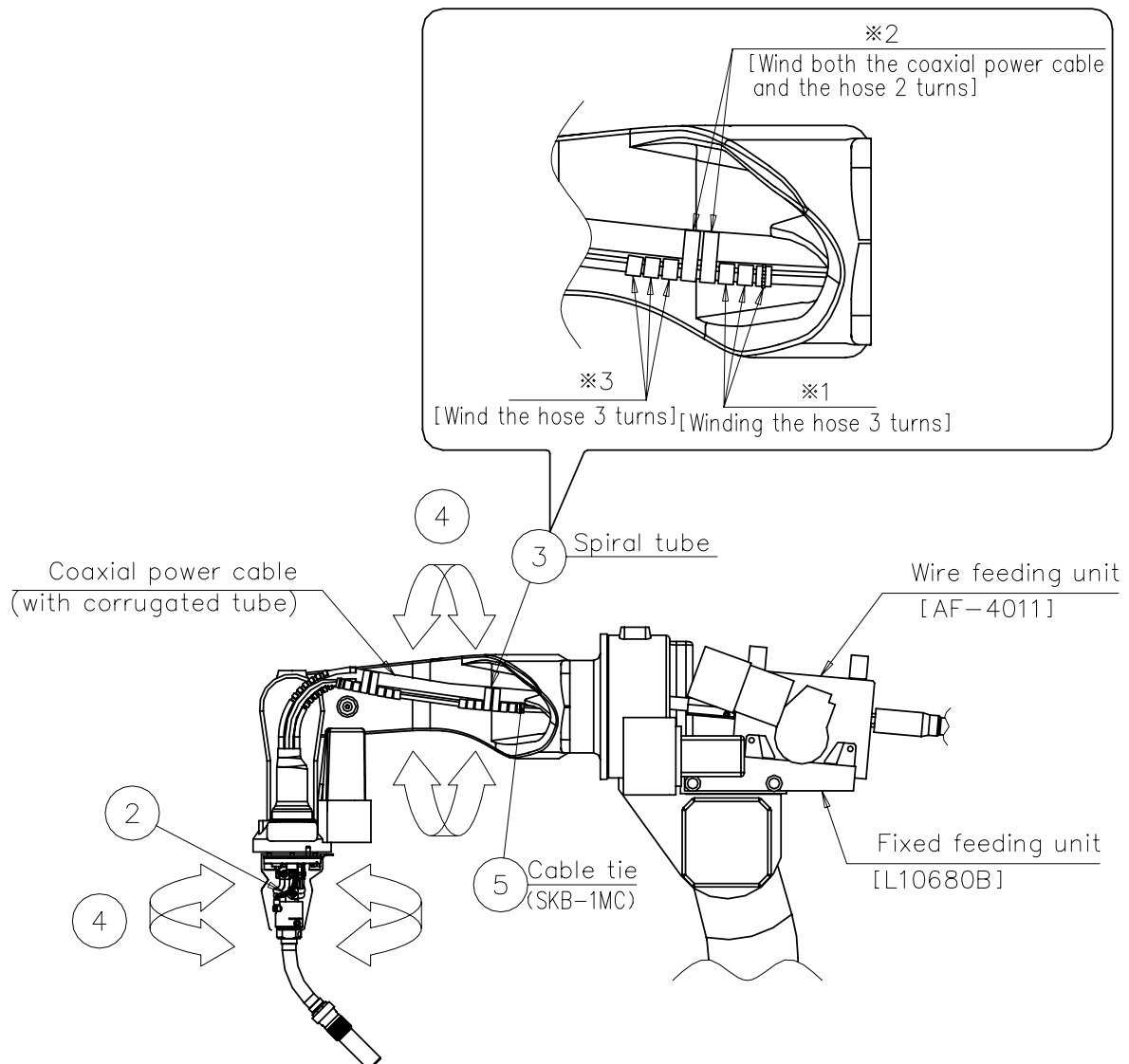


Fig.3.17 Connection of hose [All-B4]

3.5 Handling Instructions for RT series Torch

- (1) Be sure to install an orifice. Installation of the orifice is essential, which prevents the short circuit likely to happen between the nozzle and torch body, and also avoids turbulence of the shield gas.
- (2) Remove the spatter adhered to the nozzle and contact tip before it gets deposited.
- (3) Be sure to use the DAIHEN genuine tip. Use of a worn-out tip with an enlarged diameter causes conduction defect and wire deflection, which results in unstable Arc and aiming deviation. Therefore, replace the tip accordingly before it gets used up.
- (4) Gas flow shall be 15 l/min or more...
- (5) Clean up the inside of liner (included in the coaxial power cable) and of outlet guide with compressed air or others once in 10 days. Otherwise, deposit of sludge and dust will cause defective wire feeding, which leads to poor welding performance.
- (6) When the wire is stuck at the tip end, the wire will buckle in the liner or be cut in the feed roll. If keeping wire feed performance under such a condition, feeding failure or Arc shortage may occur. To prevent this, remove the wire between the feed roll and tip end first, and then insert a new wire.
- (7) For the teaching program that lets the torch evacuated from the workpiece after welding performance, teach it to pull up the torch obliquely upward so that the shock sensor can work even if the wire sticks on the workpiece.

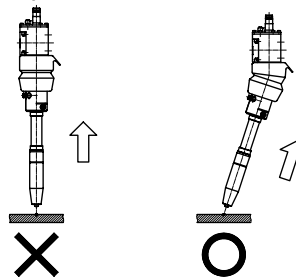


Fig.3.18 Evacuating direction

- (8) The shock sensor is the mechanism to protect the torch and manipulator in the case of collision between the torch and workpiece, but does not guarantee the accuracy of the torch tip teaching point (torch aiming point) afterward. After the shock sensor has worked, check the aiming point of torch again with the torch gauge.
- (9) When the screws (M5×20) fixing the torch are loose, the torch tip position will be off. Tighten the screws using the proper torque value. (See the pages 8, 9 and 13.)
- (10) When replacing the O-ring of liquid-cooled torch, take enough care not to hurt the O-ring inside the insulating bush by the screw part of tip body. (Refer to Fig.3.19)
(When mount the insulating bush, use the applicator. The applicator is attached component of liquid-cooled torch.)
Blemish made in the O-ring will cause water leaks.

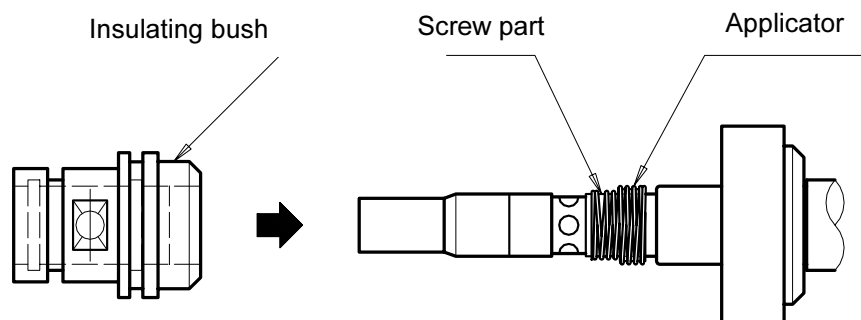


Fig.3.19 Replacement of O-ring

3.6 Handling Instructions for RZ series Torch

- (1) Remove spatters that adhered to the nozzle and tip holder before they accumulate there.
- (2) For the tip and tip holder, be sure to use the DAIHEN genuine parts.
Using a tip or tip holder with enlarged hole-diameter will cause faulty power supply or swaying weld wire, thus resulting unstable arcs or a deviation from the aiming point. To avoid that, replace the tip or tip holder where appropriate.
- (3) Provide a gas flow rate at least of 15 liters/minute.
- (4) Accumulation of wire chips or dust in the liner (Located in the coaxial power cable), outlet guide, or stop guide will cause faulty power supply to the weld wire, thus having adverse influence on welding. To avoid that, clean such parts at regular intervals with compressed air.
- (5) If weld wire gets stuck (deposited) at the tip holder end, the weld wire will buckle or be cut in the feed roll. Continuing to feed the wire under such condition may result in faulty wire feeding or arc shortage. To avoid that, remove the wire between the feed roll and the tip end, and then lead a new weld wire.
- (6) To lead the weld wire, unfasten the tip holder. Not doing so may cause the wire to buckle. After the completion of leading the wire, fasten the tip holder.
- (7) Cut the liner to the specified length (refer to information in 4.4 Cutting the Liner), and then fix it with liner clamp in order to prevent the liner from moving when assembling (refer to information in 4.5 Liner Clamp Function).

Furthermore, since too long liner will disable normal pressurization of the torch, check for the liner length according to the procedure described below. Dismount the tip holder, and then press the tip with fingers. If the tip smoothly travels approximately by 2 mm, then liner is in its normal position. If the tip does not smoothly travel or gets stuck to be hard to move, the liner is too long. In this case, cut the liner to the specified length. In addition, note that too short liner may buckle in the torch.

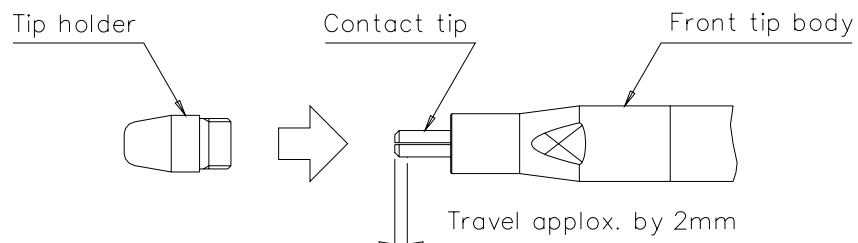


Fig.3.20 Checking the liner

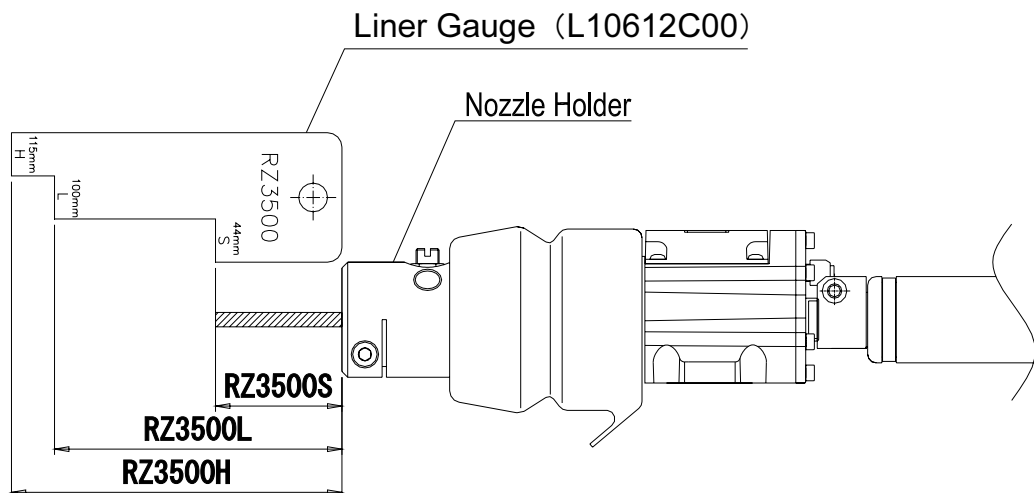


Fig.3.21 Use of liner gauge

- (8) To teach a program with the torch evacuated from the weld wire after the completion of welding, pull the torch obliquely upward so that the shock sensor will be activated even if the wire and base metal are deposited together.

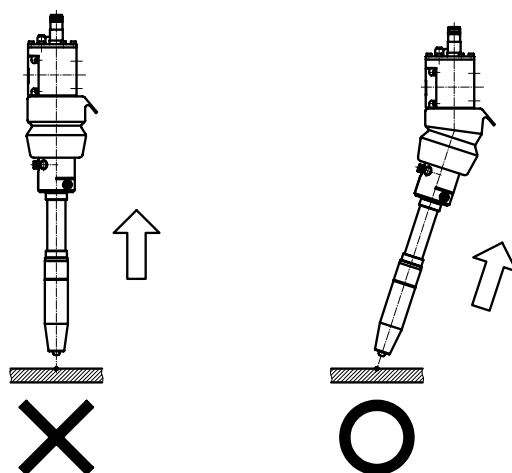


Fig.3.22 Evacuating direction

- (9) The shock sensor may cause a slight deviation from the teaching point at the torch tip (i.e., torch aiming point). (If the shock sensor gets activated, recheck for the torch aiming point with the torch gauge.)
- (10) On the RZ Series, the power supply points are located inside the tip holder. Consequently, note that, the power supply points become farther from the torch in comparison to conventional torch, thus resulting in lower welding current (in case of constant-voltage control) to cause changes in welding conditions.

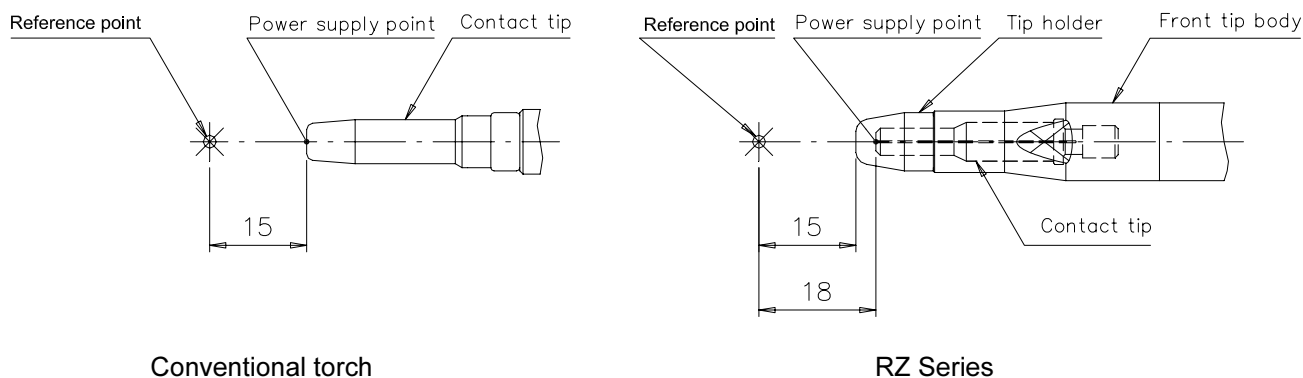


Fig.3.23 Power supply points

〈For reference〉

The RZ Series torches increase resistance heat generation due to farther power supply points, and thereby can melt more weld wire, thus making it possible to provide proper arc length (arc weld voltage) at low currents.

- (11) Precautions for replacement of rear tip body, pressurizing shaft, and coil spring
to replace the rear tip body, pressurizing shaft, and coil spring, do not dismount these parts with the rear tip body pointing downward. Doing so may cause the coil spring to come off and be missing.

4. Coaxial Power Cable for Robot

4.1 Type of Coaxial Power Cables

The coaxial power cable is to lead the wire and shield gas from the wire feeding unit, shock sensor cable, and voltage detection cable (when DL W.P.S used) to the torch. Refer to the table below to choose the coaxial power cable according to the manipulator that you use.

Table 4.1 Type of coaxial power cables

| Type | Nominal cable length | Applicable manipulator | Remarks |
|---------|----------------------|------------------------------------|---------|
| L-10621 | 1.1 m | All-V6 | ● |
| L-10622 | 1.2 m | | ● |
| L-10623 | 1.3 m | All-V6(For 31° torch) | ● |
| L-10624 | 1.4 m | All-V6L | ● |
| L-10625 | 1.5 m | | ● |
| L-10626 | 1.6 m | All-V6L(For 31° torch) | ● |
| L-10627 | 1.7 m | | △ |
| L-10628 | 1.8 m | | ● |
| L-10629 | 1.9 m | | △ |
| L-10630 | 2.0 m | | △ |
| L-10631 | 2.1 m | | ● |
| L-10635 | 2.5 m | | ● |
| L-10638 | 0.8 m | For All-B4 exclusive use | ● |
| L-10641 | 1.2 m | For All-B4L exclusive use | ● |
| L-10648 | 0.8 m | For All-B4 DL W.P.S exclusive use | ● |
| L-10651 | 1.2 m | For All-B4L DL W.P.S exclusive use | ● |

●:Standard, △:Build-to-order

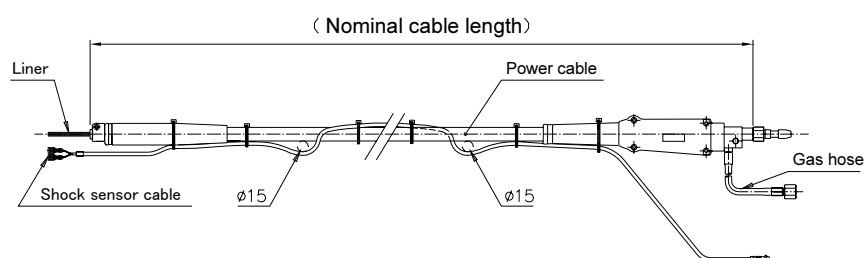


Fig.4.1 Outline drawing of the coaxial power cable (For All-V6/ All-V6L exclusive use)

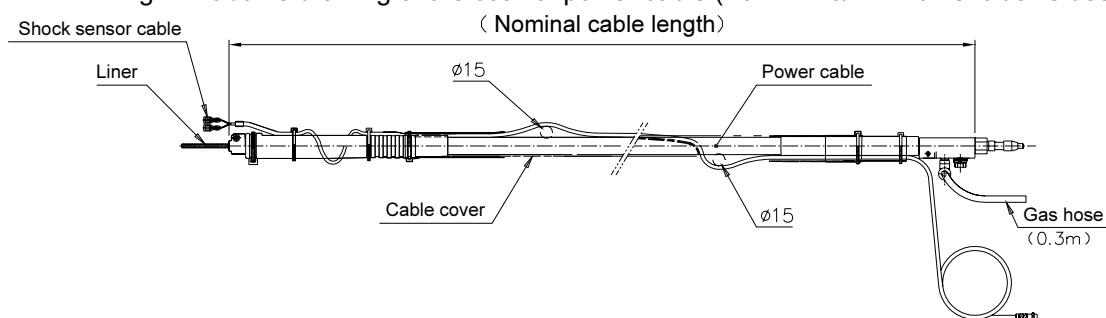


Fig.4.2 Outline drawing of the coaxial power cable (For All-B4/All-B4L exclusive use)

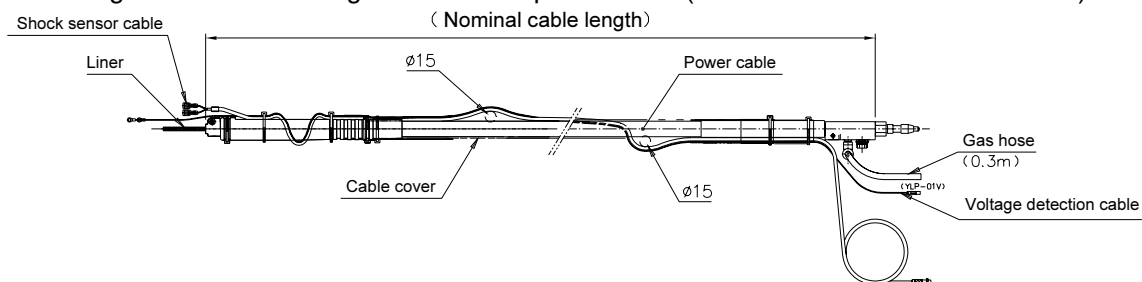


Fig.4.3 Outline drawing of the coaxial power cable (For All-B4/All-B4L DL W.P.S exclusive use)

4.2 When Using the DL Welding Power Supply

To use the DL welding power supply with the manipulator other than All-B4/All-B4L, the voltage detection cable is required in addition to the coaxial power cable as described in Table 4.1.

(If you use All-B4/All-B4L, see Table 4.1 and choose a suitable coaxial power cable (for DL W.P.S exclusive use) accordingly.)

4.2.1 Type of voltage detection cables

To use the DL welding power supply with the manipulator other than AX-V4AP/V4LAP, refer to the table below and separately purchase the DL-dedicated voltage detection cable suitable for each manipulator.

Table 4.2 Type of DL W.P.S-dedicated voltage detection cable

| No. | Nominal cable length | Applicable coaxial power cable | Applicable manipulator | Remarks |
|---------|----------------------|--------------------------------|------------------------|---------|
| L10667G | 1.6 m | L-10621 | All-V6 | |
| L10667H | 1.7 m | L-10622 | | |
| L10667K | 1.9 m | L-10624 | All-V6L | |
| L10667L | 2.0 m | L-10625 | | |
| L10667P | 2.3 m | L-10628 | | |
| L10667S | 2.6 m | L-10631 | | |
| L10667W | 3.0 m | L-10635 | | |

Note) Contact us for more of the voltage detection cables not listed in the above.

4.2.2 Assembling the voltage detection cable

A voltage detection cable shall be connected with the coaxial power cable laid along the shock sensor cable. Turn the shock sensor cable and voltage detection cable around the coaxial power cable, and then fix the cables with a cable tie, referring to Table 4.3 and Fig.4.4.

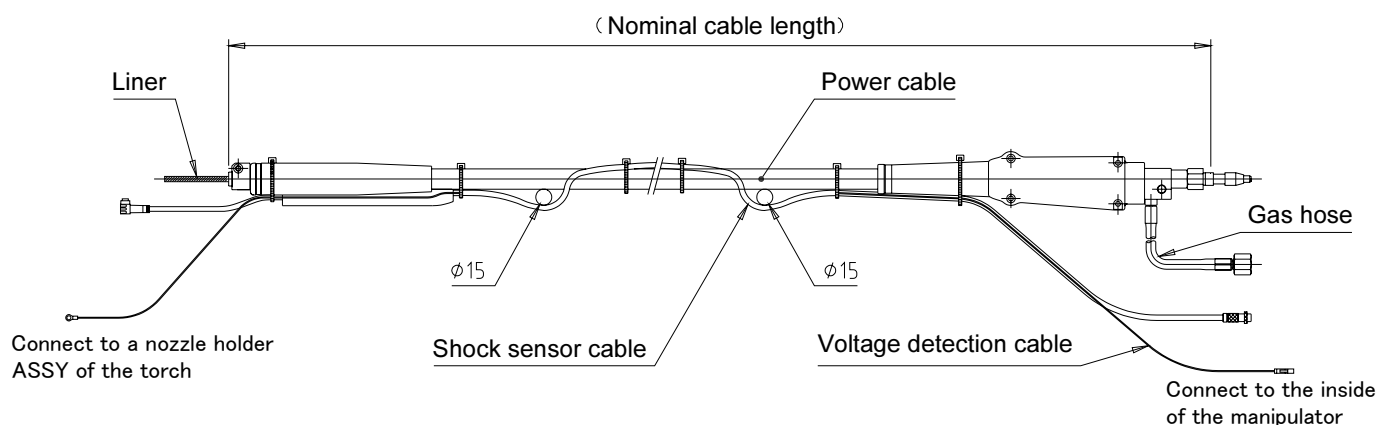


Fig. 4.4 Connection of voltage detection cable (for DL W.P.S)

Table 4.3 Turns of shock sensor cable/voltage detection cable

| Coaxial power cable | Turns and slack of φ15 | Remarks |
|---------------------|------------------------|---------|
| L-10621 | 2 turns | |
| L-10622 | 2 turns | |
| L-10624 | 3 turns | |
| L-10625 | 3 turns | |
| L-10628 | 3 turns | |
| L-10631 | 4 turns | |
| L-10635 | 4 turns | |

i IMPORTANT

When connecting the shock sensor cable and voltage detection cable to the coaxial power cable, be sure to follow the specified turns (See Table 4.3) and slack of φ15 (See Fig.4.4). Shortage of the turns or insufficient slack may lead to the snapping of shock sensor cable and voltage detection cable, resulting in poor welding performance.

4.2.3 Connecting the voltage detection cable to the shock sensor

Connect a voltage detection wire to the shock sensor as shown in the figure below. To connect a voltage detection wire to SSB, bundle the excess portion of the voltage detection wire together with the shock sensor cable, and then put it in the power cable cover. After that, fix the cover with cable ties.

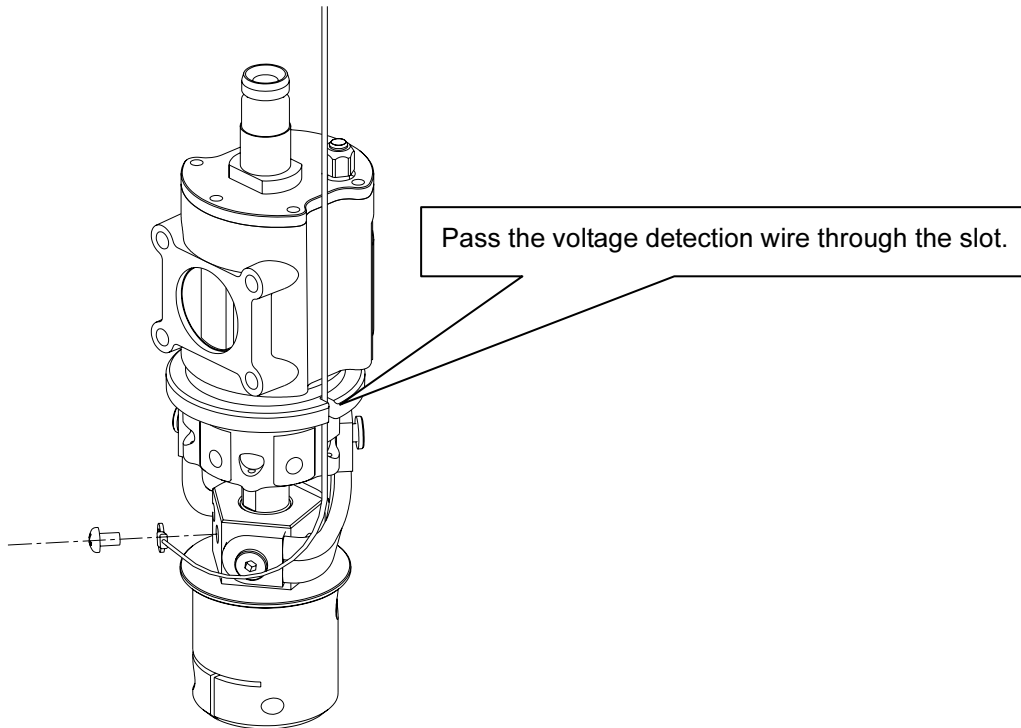


Fig.4.5 Connection the voltage detection cable to the SSV

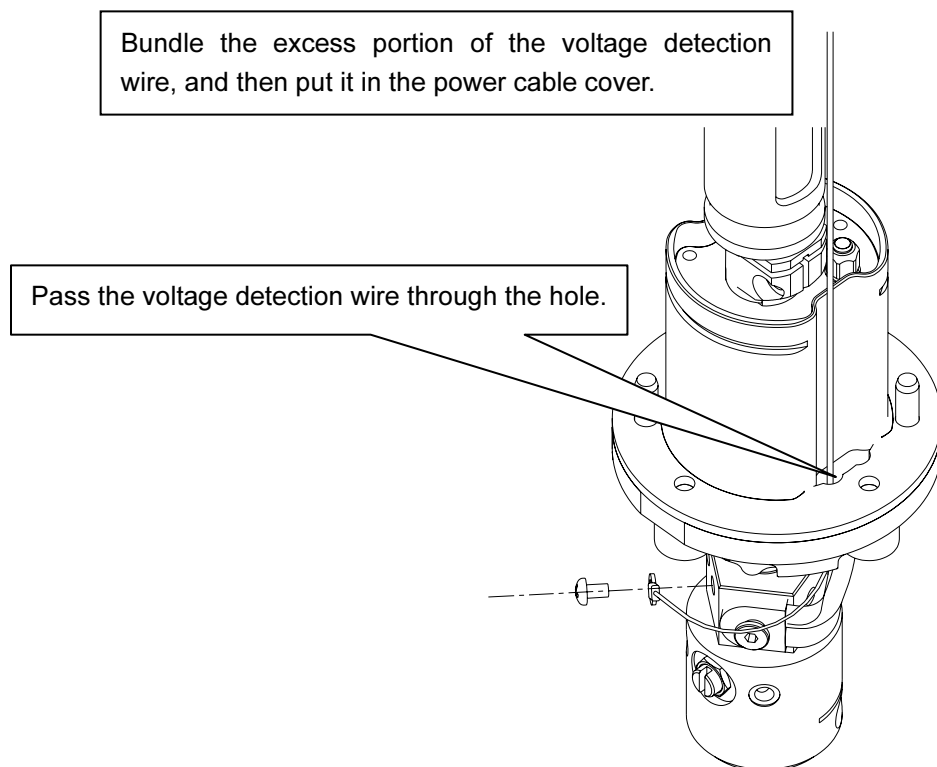


Fig.4.6 Connection the voltage detection cable to the SSB

4.3 Connection of Coaxial Power Cable

4.3.1 For All-V6 type

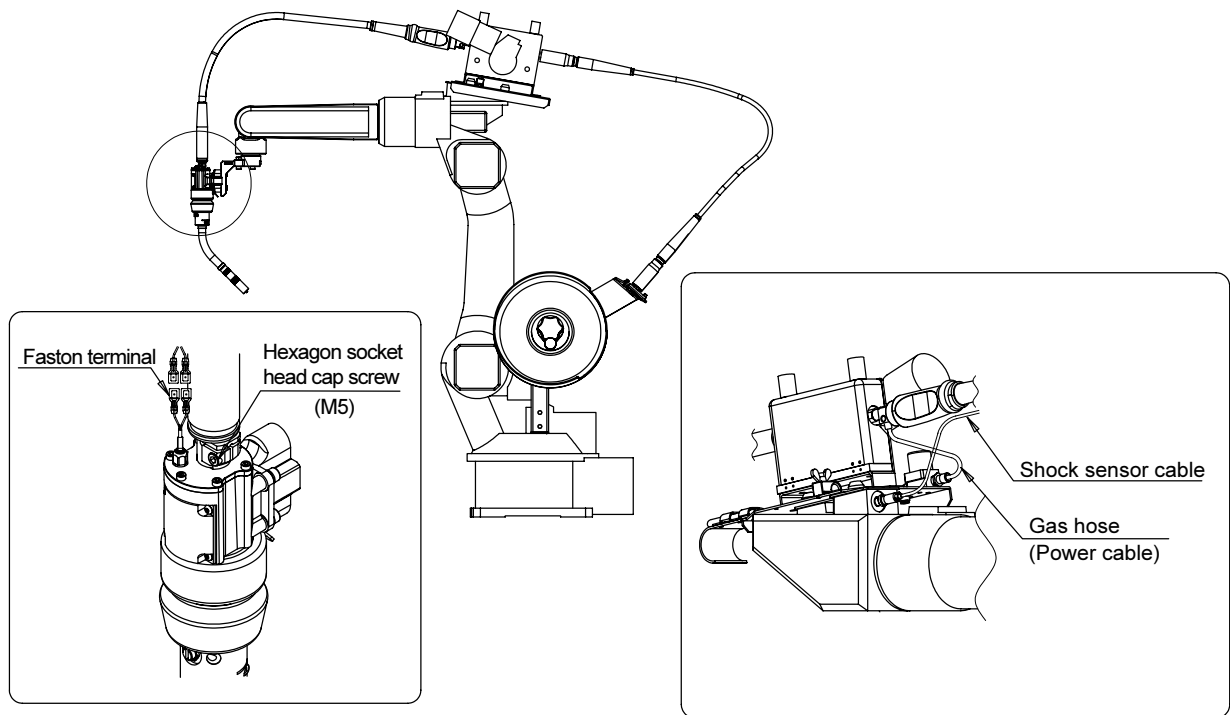


Fig.4.7 Connection of the coaxial power cable (For All-V6 type)

Protect the FASTON terminal of the shock sensor cable with the silicon tube that comes with the coaxial power cable, and then secure it to the coaxial power cable with the cable tie.

4.3.2 For All-B4

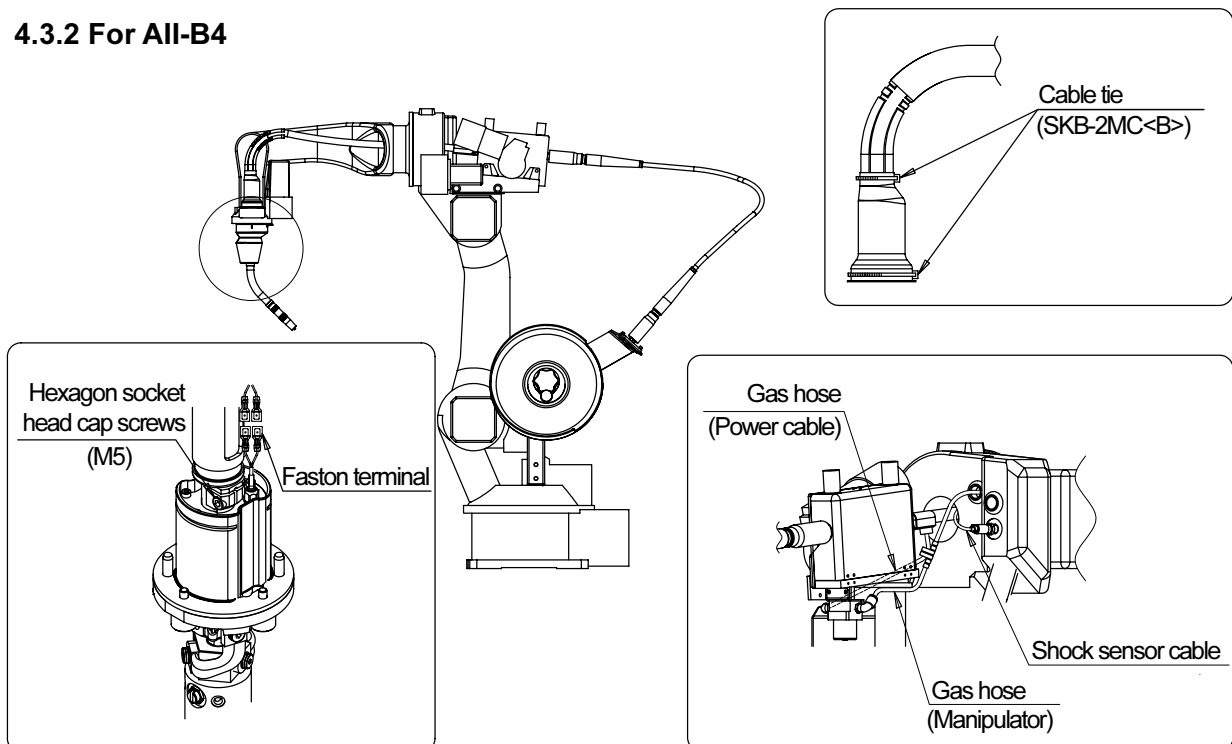


Fig.4.8 Connection of the coaxial power cable (For All-B4)

After shock sensor cable connection, to bundle the excess portion of the shock sensor cable, and then put it in the power cable cover. Then the secure it to the coaxial power cable with the cable tie.

4.3.3 Adjustment of the coaxial power cable (All-B4)

- (1) Mount a torch, wire feeding unit (fixing bracket), and coaxial power cable.
- (2) Operate the 5th axis to the maximum (soft limit) toward the manipulator's inner side as shown in Fig.4.9.
- (3) Operate the 6th axis to the maximum (soft limit). (Either in the + or – side.)
- (4) Adjust the fixing bracket in the above posture so that the coaxial power cable does not collide with the cover (see Fig.4.9).

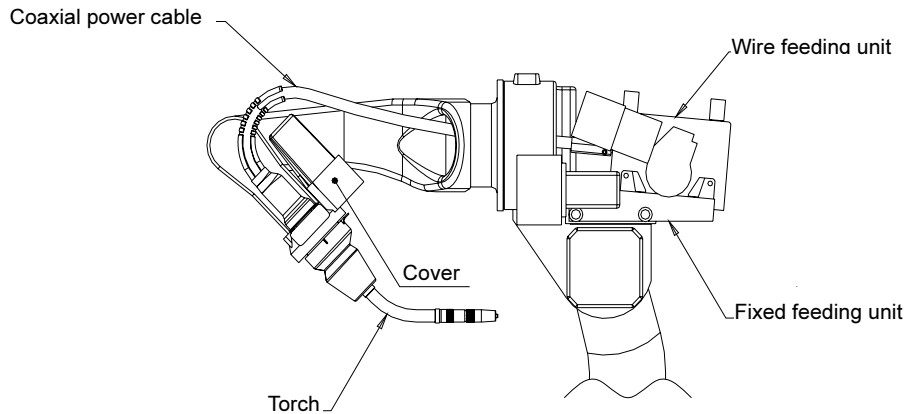


Fig.4.9 Adjustment of the coaxial power cable

4.4 Cutting the Liner

Cut the liner according to the length of each torch, referring to Fig. 4.10 and Table 4.4, Fig4.11 and Table 4.5.

Rasp the edge of the liner's cut section to eliminate burrs.

Also, take enough care not to bend a liner or burr the hole when cutting.

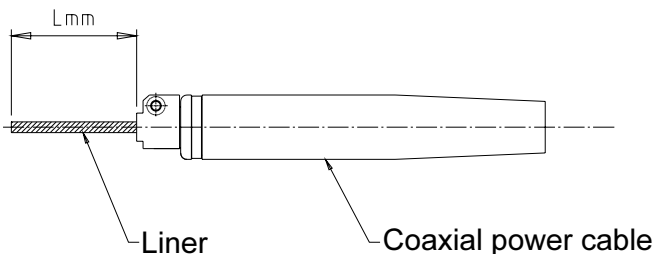


Fig.4.10 Cutting the liner

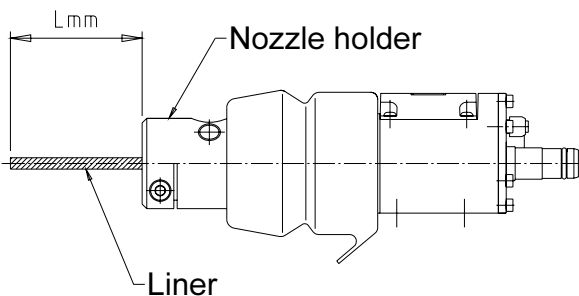


Fig.4.11 Cutting the liner

Note) The liner cutting length is common to All -B4 type and All -V6 type.

Table 4.4 Length of liner (Rough measure)

| Torch model | L (mm) |
|-------------|--------|
| RT3500S | 291 |
| RT3500H | 360 |
| RT3500L | 331 |
| RT5000S | 274 |
| RT5000H | 343 |
| RT5000L | 314 |
| RTW5000S | 288 |
| RTW5000H | 356 |
| RTW5000L | 338 |
| RZ3500S | 207 |
| RZ3500H | 277 |
| RZ3500L | 263 |

Table 4.5 Length of liner (Rough measure)

| Torch model | L (mm) |
|-------------|--------|
| RT3500S | 128 |
| RT3500H | 197 |
| RT3500L | 168 |
| RT5000S | 111 |
| RT5000H | 180 |
| RT5000L | 151 |
| RTW5000S | 124 |
| RTW5000H | 193 |
| RTW5000L | 174 |
| RZ3500S | 44 |
| RZ3500H | 115 |
| RZ3500L | 100 |

4.5 Liner Clamp Function

A liner clamp is equipped with the nozzle holder of each shock sensor.

During welding, weld wire may sway to cause unstable wire feeding due to clearance between the sensor and the liner in the coaxial power cable. This problem will result in faulty weld arc start or fluctuations in the protrusion length of weld wire.

The liner clamp unit has the effect of reducing the behavior of weld wire by binding the coil liner.

- (1) Unfasten the lock nut, and then thoroughly pull out the clamp screw.
- (2) Insert the coaxial power cable.
- (3) Gradually turn the clamp screw until it hits against the liner, and then make it 1/4 turns.
- (4) Clamp the liner with the lock nut.

Note) Turning the clamp screw excessively will crush the liner to disable weld wire feeding.

Note) To dismount the coaxial power cable or the liner, unclamp the liner clamp first.

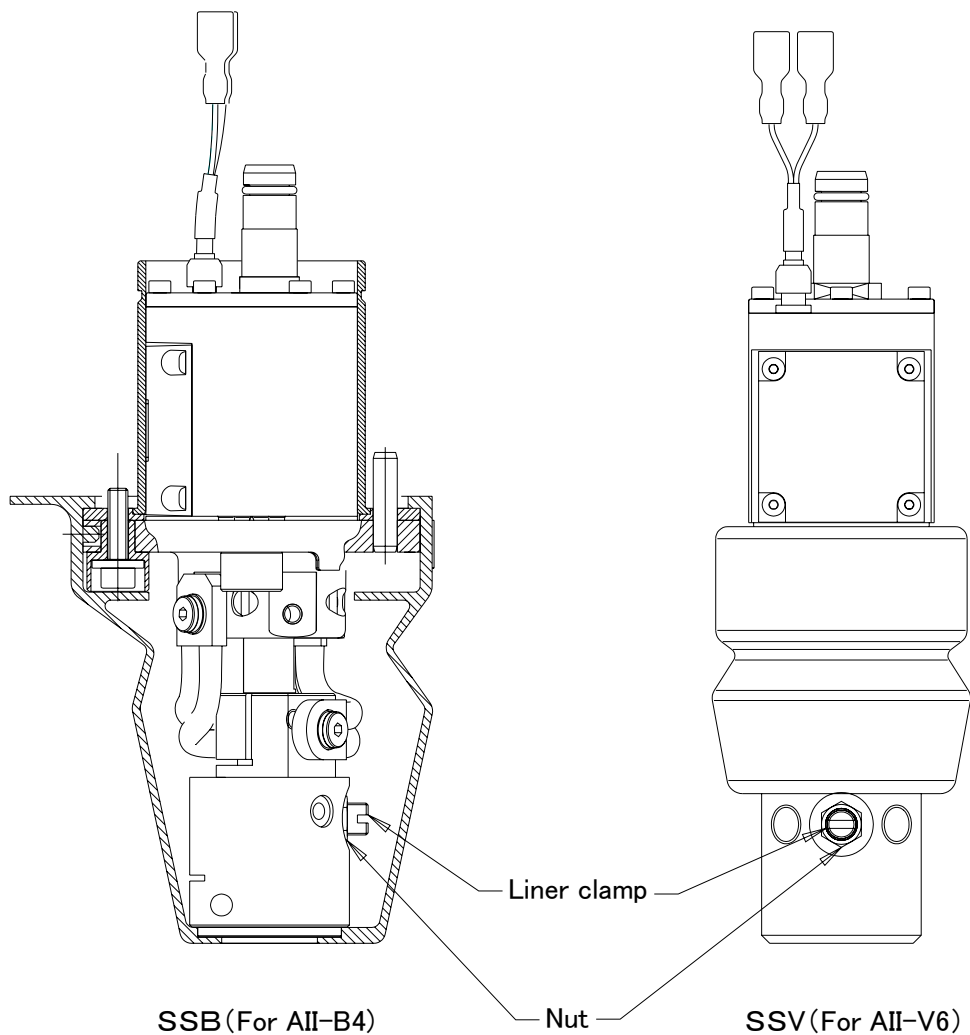


Fig.4.12 Liner clamp

5. Setting the Robot Controller

5.1 Checking the Tool Parameter

On delivery of the robot, the data of the welding torch (tool parameter) in use are not set. Then, specify the tool parameter depending on the type of robot and torch as described below.

For the installation posture of torch, see Fig. 5.1 in this page.

Table 5.1 Tool constants of arc welding torch (for V6 type) manufactured by Daihen

| N series - V type | Length | | | Angle | | | Center of G | | | Weight | Moment of inertia | | | Dia. | Reference drawing | | |
|----------------------|-----------|-----------|-----------|-------------|-------------|-------------|-------------|------------|------------|--------------|-------------------|-------------|-------------|---------|----------------------|--|--|
| | X [mm] | Y [mm] | Z [mm] | Rx [deg] | Ry [deg] | Rz [deg] | Gx [mm] | Gy [mm] | Gz [mm] | Mass [kg] | Ix kgm^2 | Iy kgm^2 | Iz kgm^2 | r mm | | | |
| RT3500S | 140.0 | 0.0 | 385.0 | 180.0 | 0.0 | 0.0 | 118.0 | 0.0 | 127.0 | 2.1 | 0.050 | 0.090 | 0.030 | 0.0 | (1) | | |
| RT5000S | | | | | | | | | 128.0 | 2.2 | | | | | | | |
| RTW5000S | | | | | | | 119.0 | | 129.0 | 2.3 | 0.060 | | 0.040 | | | | |
| RZ3500S | | | | | | | 118.0 | | 126.0 | 2.2 | | | | | | | |
| RT3500H | 0.0 | 0.0 | 400.0 | 180.0 | -45.0 | 0.0 | 107.0 | 0.0 | 140.0 | 2.3 | 0.070 | 0.100 | 0.030 | 0.0 | (2) | | |
| RT5000H | | | | | | | | | | | | | | | | | |
| RTW5000H | | | | | | | | | 142.0 | 2.4 | 0.080 | 0.110 | | | | | |
| RZ3500H | | | | | | | | | 141.0 | 2.3 | 0.070 | | | | | | |
| RT3500L | 0.0 | 0.0 | 400.0 | 180.0 | -45.0 | 0.0 | 119.0 | 0.0 | 148.0 | 2.4 | 0.080 | 0.120 | 0.040 | 0.0 | (3) | | |
| RT5000L | | | | | | | | | 149.0 | | | 0.130 | 0.050 | | | | |
| RTW5000L | | | | | | | 121.0 | | 146.0 | 2.6 | | | | | | | |
| RZ3500L | | | | | | | 126.0 | | 142.0 | 2.5 | | | | | | | |

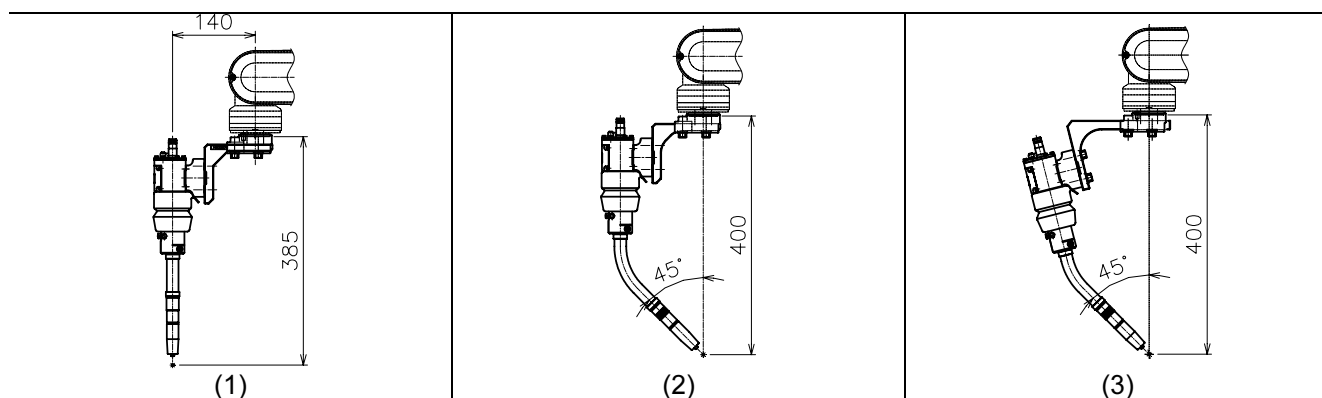


Fig.5.1 installation form of torch (for V6 type)

Note) The weigh shown in Table 5.1 includes the weight of the torch mounting bracket ASSY.

Refer to the instruction manual for each manipulator if the data in Table 5.1 have not been set.

| Type | Reference instruction manual |
|------------|--|
| All series | Chapter 4, INSTALLATION (1L20400A-E-*) |

Table 5.2 Tool constants of arc welding torch (for B4 type) manufactured by Daihen

| N series - B type | Length | | | Angle | | | Center of G | | | Weight | Moment of inertia | | | Dia. | Reference drawing |
|----------------------|-----------|-----------|-----------|-------------|-------------|-------------|-------------|------------|------------|--------------|-------------------|-------------|-------------|---------|-------------------|
| | X [mm] | Y [mm] | Z [mm] | Rx [deg] | Ry [deg] | Rz [deg] | Gx [mm] | Gy [mm] | Gz [mm] | Mass [kg] | Ix kgm^2 | Iy kgm^2 | Iz Kgm^2 | r mm | |
| RT3500H | -135.5 | 0.0 | 310.0 | 180.0 | -45.0 | 0.0 | -10.0 | 0.0 | 74.0 | 1.9 | 0.030 | 0.030 | 0.000 | 0.0 | (4) |
| RT5000H | | | | | | | -11.0 | | 76.0 | 2.0 | | | | | |
| RTW5000H | | | | | | | 320.0 | | | 85.0 | 2.1 | 0.040 | | | 0.040 |
| RZ3500H | -140.5 | | 315.0 | | | | -12.0 | | 79.0 | 2.0 | 0.030 | | | | (6) |
| RT3500L | -90.5 | 0.0 | 310.0 | 180.0 | -31.0 | 0.0 | -5.0 | 0.0 | 69.0 | 1.9 | 0.030 | 0.030 | 0.000 | 0.0 | (7) |
| RT5000L | | | | | | | 70.0 | | | | | | | | |
| RTW5000L | | | | | | | 82.0 | | 2.0 | 0.040 | 0.040 | | | | |
| RZ3500L | -95.5 | | 330.0 | | | | -7.0 | | 78.0 | 2.0 | 0.030 | 0.030 | | | (9) |

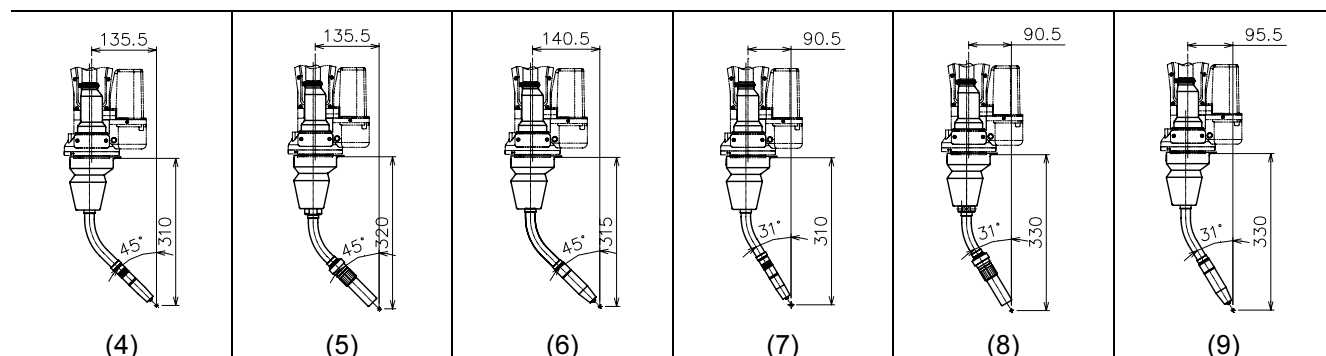


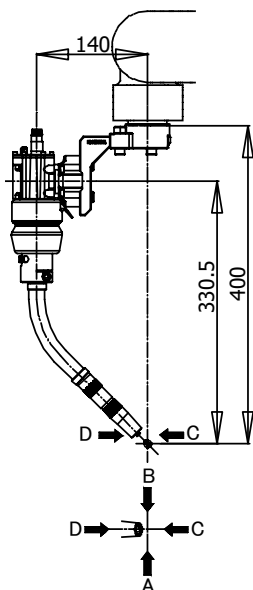
Fig.5.2 Installation form of torch (for B4 type)

Refer to the instruction manual for each manipulator if the data in Table 5.2 have not been set.

| Type | Reference instruction manual |
|------------|--|
| All series | Chapter 4, INSTALLATION (1L20400A-E-*) |

5.2 Checking the Shock Sensor Operation

5.2.1 External force for actuating the shock sensor



| Table 5.3 External force | |
|--------------------------|---------------------|
| Direction | External force (kg) |
| A | 3.0 |
| B | 3.0 |
| C | 3.0 |
| D | 3.0 |

The left table shows the rough standard load to actuate the shock sensor when the external force is applied on the torch tip. These values depend on the shape and length of the torch.

Fig.5.3 Direction of the external force

5.2.2 Checking the shock sensor operation

- All manipulator

Press the torch tip in by hand and check that the following message appears on

[2] Error monitor screen (See Fig.5.4).

Error category : Emergency stop error

Error code : A4920

The message will disappear by unhanding the torch.

If no message is displayed, the shock sensor cable might cause a short circuit. In contrast, if any message remains displayed, the shock sensor cable might not be connected or might have breaks.

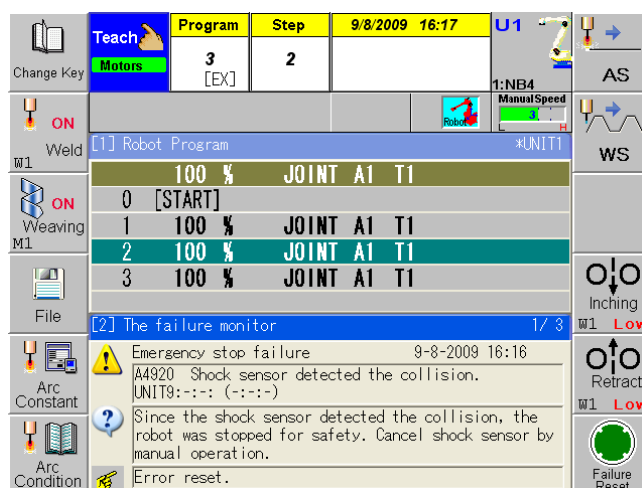


Fig. 5. 4 TP screen
(All manipulator)

* For details of the error monitor screen, refer to Chapter 8 in the Instruction Manual for Manipulator "BASIC OPERATION" (1L20400C-E-*).

6. Troubleshooting

| Phenomena | Possible cause |
|--|--|
| No arc generation | Contact failure or breaking of welding cable |
| No smooth wire feeding Unstable welding performance | <ul style="list-style-type: none"> ▪ Shortage of wire pressure in the feed roll ▪ Tip wear ▪ Outlet guide wear ▪ Wire waste powder has deposited in a wire feeding path. |
| Wire contact on tip | <ul style="list-style-type: none"> ▪ No smooth wire feeding ▪ The hole on the tip became larger. ▪ The distance between tip and workpiece is too short. |
| Shock sensor cannot be released. | <ul style="list-style-type: none"> ▪ Contact failure or breaking of shock sensor cable ▪ Nozzle is bent. <p>* When a contact accident occurs and the robot operation stops by the shock sensor's detection signal, first investigate the cause of the accident. Pay close attention while operating the robot or restoring the power without known cause. It may be hazardous.</p> <p>To release the contact, see the instruction manual for robot controller "BASIC OPERATIONS" and "TEACHING".</p> |
| Aim deviation | <ul style="list-style-type: none"> ▪ No orifice is mounted. * If an orifice is not mounted, spatter will be deposited inside to lead conduction between the nozzle and tip body. This will result in anomalous arc discharge and bending in the tip body. ▪ The torch fixing screws (M5×20) are loose, * Use the proper torque value to tighten them. (See the page 9 and 13.) ▪ The shock sensor has worked because of hitting the torch. * Move back the torch quickly so that the aiming point will be coincident with the original point. |
| Poor shielding | <ul style="list-style-type: none"> ▪ A designated tip and nozzle are not mounted. ▪ Breaking in the hose (with the air-blow torch). |
| <RZ Series torch> Unsmooth wire feeding Unstable welding | <ul style="list-style-type: none"> ▪ Spatter accumulation on tip holder * Spatter accumulation on tip holder makes power supply to wire very unstable and may cause the wire feeding resistance to increase. Remove spatter accordingly to keep the tip holder clean for good performance in welding. ▪ Inappropriate length of liner * When welding is performed with inappropriately longer liner, higher-than-necessary pressure is applied onto the collet tip and the wire feeding becomes unstable, causing unstable welding. Be sure to cut a liner correctly according to the length of each torch for correct operation. (See the page 27). ▪ Welding without liner clamp mounted * The movement of robot may cause the unfixed liner to move around violently inside the coaxial power cable. At this time, higher-than-necessary pressure is applied onto the collet tip and the wire feeding becomes unstable. |
| <RZ Series torch> | <ul style="list-style-type: none"> ▪ Wire caught at the collet tip. * When the wire is passed through the torch or retracted, the wire gets caught at the slit of the collet tip. Loosen the tip holder for proper feeding. |

7. Replacement Parts for Various Wire Diameters

7.1 Replacement Parts for Various Wire Diameters of Torch

Following parts shall be changed depending on the wire diameter in use.

【Torch related】

(1) Tip

【Coaxial power cable】

(2) Coil liner

(3) Outlet guide

【Wire feeding unit】

(4) Feeding roll

(5) Inlet guide

Use the parts suitable for each wire diameter when changing the welding wire.

The parts are listed as follows.

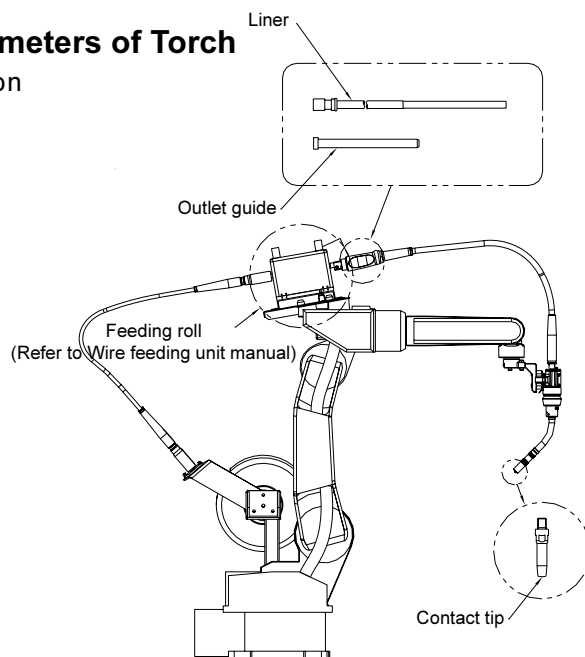


Fig.7.1 Replacement parts for various wire diameters of torch

Note) For the feeding roll, see the instruction manual for wire feeding unit.

We provide options for the nozzle. See the Table 7.3 for more details.

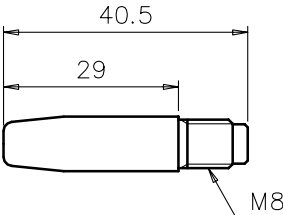
Table 7.1 Combination of contact tip

● Standard
△ Option

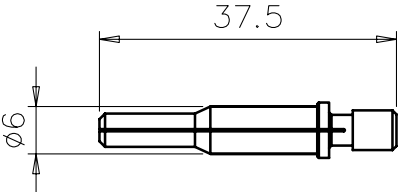
| Wire dia. Torch model | φ 0.8 | φ 0.9 | φ 1.0 | φ 1.2 | φ 1.4 | φ 1.6 |
|--------------------------|----------|----------|----------|----------|----------|----------|
| Design No. | L7250B01 | L7250B02 | L7250B03 | L7250B04 | L7250B05 | L7250B06 |
| Outline drawing | | | | | | |
| RT3500S | △ | △ | △ | ● | △ | △ |
| RT3500H | △ | △ | △ | ● | △ | △ |
| RT3500L | △ | △ | △ | ● | △ | △ |
| RT5000S | △ | △ | △ | ● | △ | △ |
| RT5000H | △ | △ | △ | ● | △ | △ |
| RT5000L | △ | △ | △ | ● | △ | △ |
| RTW5000S(*) | - | - | - | △ | △ | △ |
| RTW5000H(*) | - | - | - | △ | △ | △ |
| RTW5000L(*) | - | - | - | △ | △ | △ |

(*) Mounting of a M6 contact tip on the RTW5000 Series torch requires a M6 tip nut (L10302C02) separately.

● Standard
△ Option

| Table 7.2 Combination of contact tip (M8) | | | |
|---|--|-----------|-----------|
| Wire dia. Torch model | φ 1.2 | φ 1.4 | φ 1.6 |
| Design No. | L10361B04 | L10361B05 | L10361B06 |
| Outline drawing |  | | |
| RTW5000S | △ | △ | ● |
| RTW5000H | △ | △ | ● |
| RTW5000L | △ | △ | ● |

● Standard
△ Option

| Table 7.3 Combination of collet tip | | | | | |
|-------------------------------------|--|-----------|-----------|-----------|-----------|
| Wire dia. Torch model | φ 0.9 | φ 1.0 | φ 1.2 | φ 1.4 | φ 1.6 |
| Design No. | L10669C02 | L10669C03 | L10669C04 | L10669C05 | L10669C06 |
| Outline drawing |  | | | | |
| RZ3500S | △ | △ | ● | △ | △ |
| RZ3500H | △ | △ | ● | △ | △ |
| RZ3500L | △ | △ | ● | △ | △ |

● Standard
△ Option

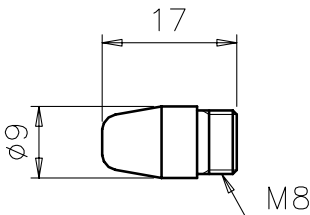
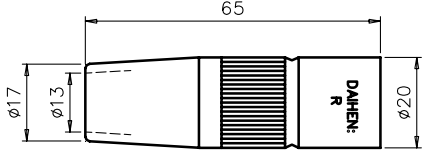
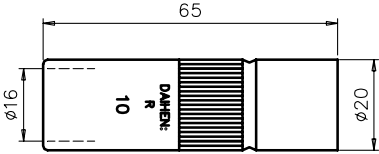

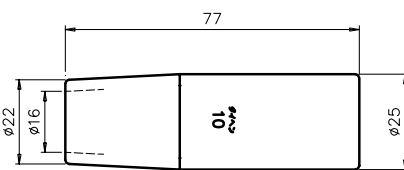
| Table 7.4 Combination of tip holder | | | | |
|-------------------------------------|--|-----------|-----------|-----------|
| Wire dia. Torch model | φ 0.9~1.0 | φ 1.2 | φ 1.4 | φ 1.6 |
| Design No. | L10669F01 | L10669F02 | L10669F03 | L10669F04 |
| Outline drawing |  | | | |
| RZ3500S | △ | ● | △ | △ |
| RZ3500H | △ | ● | △ | △ |
| RZ3500L | △ | ● | △ | △ |

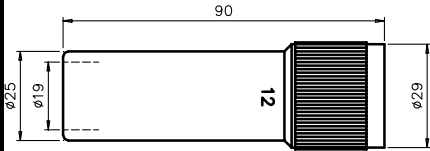
Table 7.5 Combination of nozzles

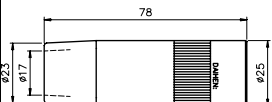
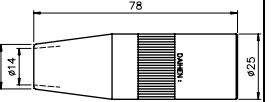
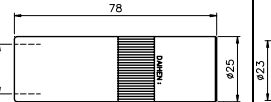
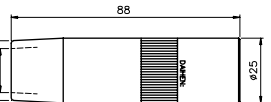
● Standard

△ Option

| Nozzle dia. Torch model | φ 17 | φ 20 |
|----------------------------|---|--|
| Design No. | L10603C02 | L10603C03 |
| Outline drawing |  |  |
| RT3500S | ● | △ |
| RT3500H | ● | △ |
| RT3500L | ● | △ |

| Nozzle dia. Torch model | φ 25 | φ 22 |
|----------------------------|---|--|
| Design No. | U2774E01 | U2774E04 |
| Outline drawing |  |  |
| RT5000S | ● | △ |
| RT5000H | ● | △ |
| RT5000L | ● | △ |

| Nozzle dia. Torch model | φ 25 |
|----------------------------|---|
| Design No. | U724E01 |
| Outline drawing |  |
| RTW5000S | ● |
| RTW5000H | ● |
| RTW5000L | ● |

| Nozzle dia. Torch model | φ 19 | φ 17 | φ 25 | φ 23 |
|----------------------------|---|---|--|---|
| Design No. | L10612C06 | L10612C04 | L10612C05 | U5377G01 |
| Outline drawing |  |  |  |  |
| RZ3500S | ● | △ | △ | △ |
| RZ3500H | ● | △ | △ | △ |
| RZ3500L | ● | △ | △ | △ |

7.2 Replacement Parts for Various Wire Diameters of Coaxial Power Cable

Table 7.6 Combination of the outlet guide

● Standard

△ Option

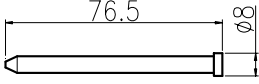
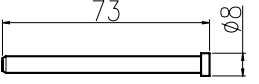
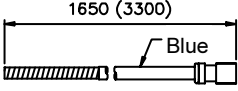
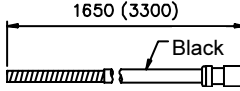
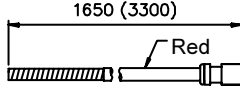
| Wire dia. Coaxial power cable | φ 0.8 | φ 0.9~1.2 | φ 1.2~1.6 |
|----------------------------------|---|--|-----------|
| Design No. | U2770K01 | U69B34 | U69B35 |
| Outline drawing |  |  | |
| L-10621/1.1M | △ | ● | △ |
| L-10622/1.2M | △ | ● | △ |
| L-10623/1.3M | △ | ● | △ |
| L-10624/1.4M | △ | ● | △ |
| L-10625/1.5M | △ | ● | △ |
| L-10626/1.6M | △ | ● | △ |
| L-10627/1.7M | △ | ● | △ |
| L-10628/1.8M | △ | ● | △ |
| L-10631/2.1M | △ | ● | △ |
| L-10635/2.5M | △ | ● | △ |
| L-10638/0.8M | △ | ● | △ |
| L-10641/1.2M | △ | ● | △ |
| L-10648/0.8M | △ | ● | △ |
| L-10651/1.2M | △ | ● | △ |

Table 7.7 Combination of the liners

● Standard

△ Option

| Wire dia. Coaxial power cable | φ 0.8~0.9 | | φ 0.9~1.2 | | φ 1.2~1.6 | |
|----------------------------------|---|----------|--|----------|---|----------|
| Design No. | L6611D03 | U4353G01 | L6611D02 | U4170H02 | L6611D01 | U4173G04 |
| Outline drawing |  | |  | |  | |
| L-10621/1.1M | △ | | ● | | △ | |
| L-10622/1.2M | △ | | ● | | △ | |
| L-10623/1.3M | △ | | ● | | △ | |
| L-10624/1.4M | | △ | | ● | | △ |
| L-10625/1.5M | | △ | | ● | | △ |
| L-10626/1.6M | | △ | | ● | | △ |
| L-10627/1.7M | | △ | | ● | | △ |
| L-10628/1.8M | | △ | | ● | | △ |
| L-10631/2.1M | | △ | | ● | | △ |
| L-10635/2.5M | | △ | | ● | | △ |
| L-10638/0.8M | △ | | ● | | △ | |
| L-10641/1.2M | △ | | ● | | △ | |
| L-10648/0.8M | △ | | ● | | △ | |
| L-10651/1.2M | △ | | ● | | △ | |

Note) The liner (length:3300mm) is used when the coaxial power cable (L-10621 – L-10635) is 1.4m or longer.

8. Parts List

For this torch, a shock sensor unit, hood ASSY, nozzle holder, and power-feeding cable are the common parts. A nozzle fitting part is interchangeable for all the models.

- Note) 1. When interchanging the nozzle ASSY, also change the torch gauge, tool parameter and others.
2. Note that the built-in parts (liner, tip, etc.) may also need to be interchanged.

If the components are worn out or damaged while using this torch, see the following table and contact our sales agent. When ordering, be sure to provide the item name and part No. (or the specification).

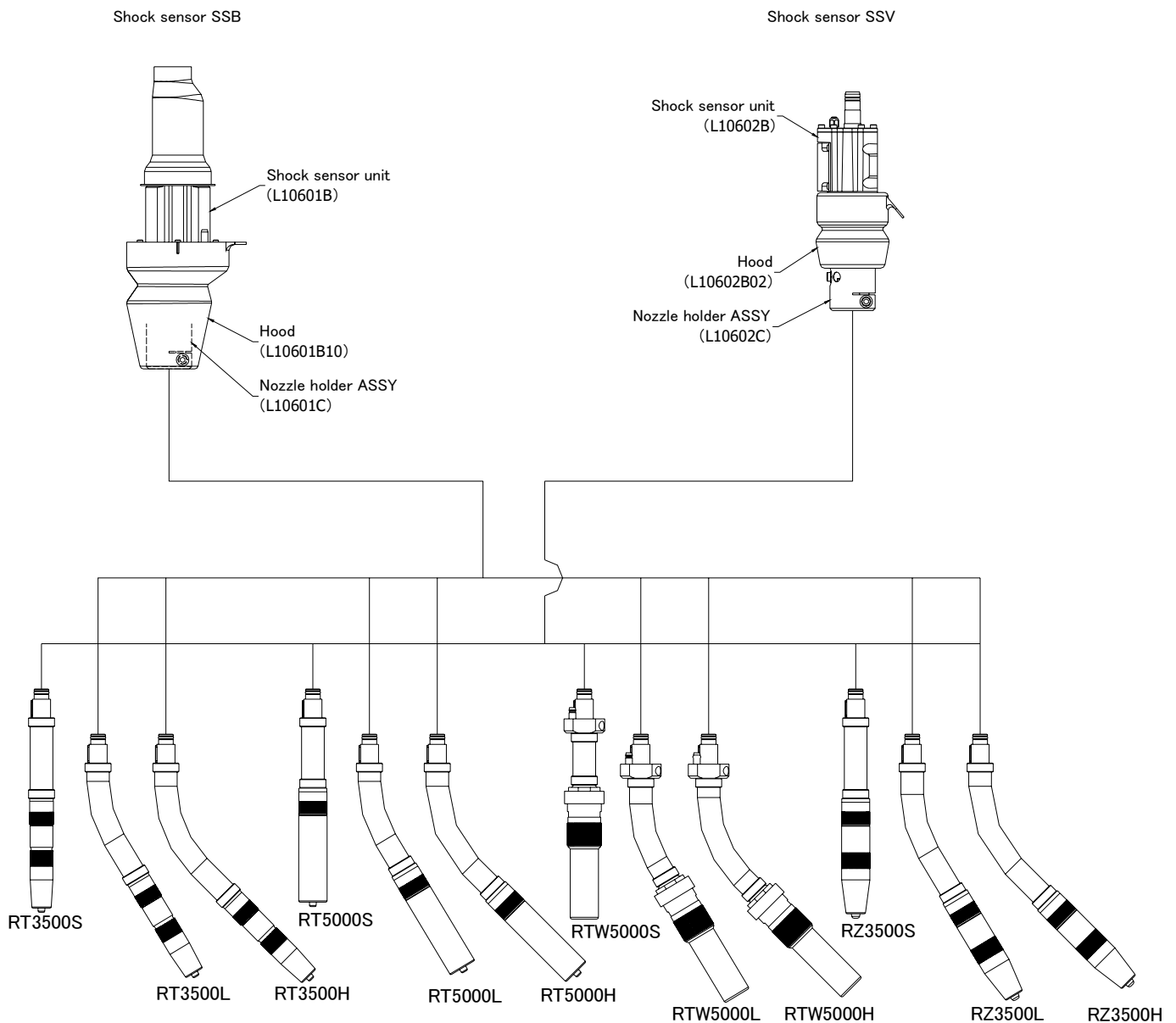


Fig.8.1 Combination of the shock sensor and nozzle fitting part

Table 8.1 Parts list for RT3500S, RT3500H, RT3500L

| No | Part No. | Item | Qt. | Remarks |
|----|-----------|--------------------------|-----|-----------------------|
| 1 | L10603B | Torch body ASSY | 1 | For straight torch |
| 2 | L10605B | Torch body ASSY | (1) | For 45° curved torch |
| 3 | L10604B | Torch body ASSY | (1) | For 31° curved torch |
| 4 | 3574-017 | " O " - R I N G | 1 | |
| 5 | 100-0602 | Parallel key | 1 | |
| 6 | L10603B04 | Teflon bushing | 2 | |
| 7 | L10603C01 | T i p b o d y | 1 | |
| 8 | L10603D | I n s u l a t o r | 1 | |
| 9 | L6380F01 | Spring Washer | (1) | Include the insulator |
| 10 | U4167G02 | O r i f i c e | 1 | |
| 11 | L7250B04 | Contact tip 1.2 | 1 | |
| 12 | L7250B01 | Contact tip 0.8 | (1) | Option |
| 13 | L7250B02 | Contact tip 0.9 | (1) | Option |
| 14 | L7250B03 | Contact tip 1.0 | (1) | Option |
| 15 | L7250B05 | Contact tip 1.4 | (1) | Option |
| 16 | L7250B06 | Contact tip 1.6 | (1) | Option |
| 17 | L10603C02 | N o z z l e (N o . 8) | 1 | |
| 18 | L10603C03 | N o z z l e (N o . 10) | (1) | Option |

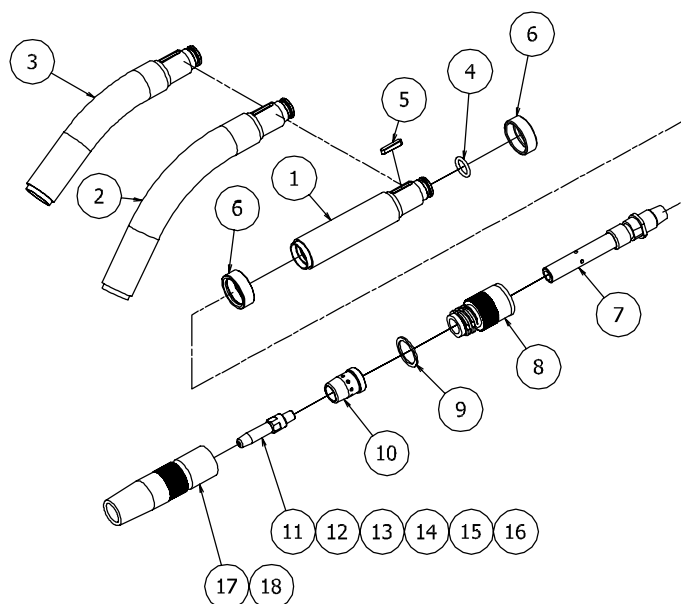


Fig.8.2 Exploded diagram for RT3500S, RT3500H, RT3500L

Table 8.2 Parts list for RT3500S, RT3500H, RT3500L (For MTX(C)-3531)

| No | Part No. | Item | Qt. | Remarks |
|-------------------------|-----------|---------------------------|-----|-----------------------|
| 1 | L10603F01 | T i p b o d y | 1 | Conversion parts |
| MTX(C)–3531 consumables | | | | |
| 2 | U 6 0 8 T | I n s u l a t o r | 1 | |
| 3 | L6380F01 | Spring Washer | (1) | Include the insulator |
| 4 | U2437H01 | O r i f i c e | 1 | |
| 5 | L7250B04 | Contact tip 1.2 | 1 | |
| 6 | L7250B01 | Contact tip 0.8 | (1) | Option |
| 7 | L7250B02 | Contact tip 0.9 | (1) | Option |
| 8 | L7250B03 | Contact tip 1.0 | (1) | Option |
| 9 | L7250B05 | Contact tip 1.4 | (1) | Option |
| 10 | L7250B06 | Contact tip 1.6 | (1) | Option |
| 11 | L6380F03 | N o z z l e (N o . 8) | 1 | |
| 12 | L6380F04 | N o z z l e (N o . 10) | (1) | Option |
| 13 | L6380F05 | N o z z l e (N o . 8 S) | (1) | Option |

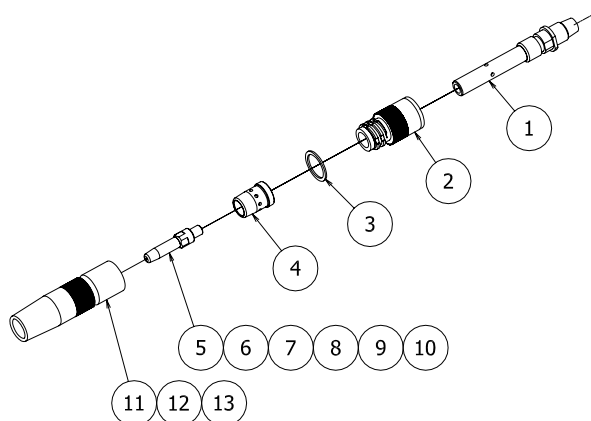


Fig.8.3 Exploded diagram for RT3500S, RT3500H, RT3500L

Note) Activity ratio becomes equal to MTX(C)-3531, as for CO₂ welding as for 350A 50% and MAG welding as for 250A 50%.

Table 8.3 Parts list for RT5000S, RT5000H, RT5000L

| No | Part No. | Item | Qt. | Remarks |
|----|-----------|---------------------|-----|-----------------------|
| 1 | L10606B | Torch body ASSY | 1 | For straight torch |
| 2 | L10608B | Torch body ASSY | (1) | For 45° curved torch |
| 3 | L10607B | Torch body ASSY | (1) | For 31° curved torch |
| 4 | 3574-017 | " O " - R I N G | 1 | |
| 5 | 100-0602 | Parallel key | 1 | |
| 6 | L10603B04 | Teflon bushing | 2 | |
| 7 | L10606C01 | T i p b o d y | 1 | |
| 8 | L6218C01 | T i p h o l d e r | 1 | |
| 9 | U5377L | I n s u l a t o r | 1 | |
| 10 | L6573C02 | Spring Washer | (1) | Include the insulator |
| 11 | U2774E03 | O r i f i c e | 1 | |
| 12 | L7250B04 | Contact tip 1.2 | 1 | |
| 13 | L7250B01 | Contact tip 0.8 | (1) | Option |
| 14 | L7250B02 | Contact tip 0.9 | (1) | Option |
| 15 | L7250B03 | Contact tip 1.0 | (1) | Option |
| 16 | L7250B05 | Contact tip 1.4 | (1) | Option |
| 17 | L7250B06 | Contact tip 1.6 | (1) | Option |
| 18 | U2774E01 | Nozzle (No. 12) | 1 | |
| 19 | U2774E04 | Nozzle (No. 10) | (1) | Option |

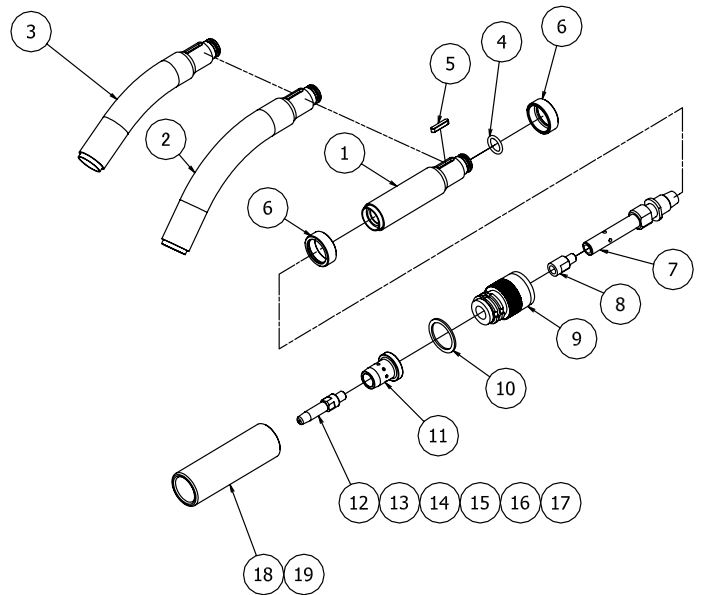


Fig.8.4 Exploded diagram for RT5000S, RT5000H, RT5000L

Table 8.4 Parts list for RTW5000S, RTW5000H, RTW5000L

| No | Part No. | Item | Qt. | Remarks |
|----|-----------|-----------------------|-----|----------------------|
| 1 | L10609B | Torch body ASSY | 1 | For straight torch |
| 2 | L10611B | Torch body ASSY | (1) | For 45° curved torch |
| 3 | L10610B | Torch body ASSY | (1) | For 31° curved torch |
| 4 | 3574-017 | " O " - R I N G | 1 | |
| 5 | 100-0602 | Parallel key | 1 | |
| 6 | 100-0652 | " O " - R I N G | 2 | |
| 7 | L10609B08 | Rubber bush | 2 | |
| 8 | U2969K03 | C a p n u t | 1 | |
| 9 | 3574-003 | " O " - R I N G | 1 | |
| 10 | 3574-002 | " O " - R I N G | 2 | |
| 11 | L6571C01 | Insulating bush | 1 | |
| 12 | 3574-006 | " O " - R I N G | 1 | |
| 13 | L6571C02 | F r o n t b o d y | 1 | |
| 14 | L6571C03 | N u t | 1 | |
| 15 | U3766K01 | O r i f i c e | 1 | |
| 16 | L10302C01 | T i p N u t | 1 | |
| 17 | L10361B04 | T i p 1 . 2 R | (1) | Option |
| 18 | L10361B05 | T i p 1 . 4 R | (1) | Option |
| 19 | L10361B06 | T i p 1 . 6 R | 1 | |
| 20 | L10302C02 | T i p N u t (M 6) | (1) | Option |
| 21 | L7250B04 | Contact tip 1.2 | (1) | Option |
| 22 | L7250B05 | Contact tip 1.4 | (1) | Option |
| 23 | L7250B06 | Contact tip 1.6 | (1) | Option |
| 24 | U724E01 | Nozzle (No. 12) | 1 | |

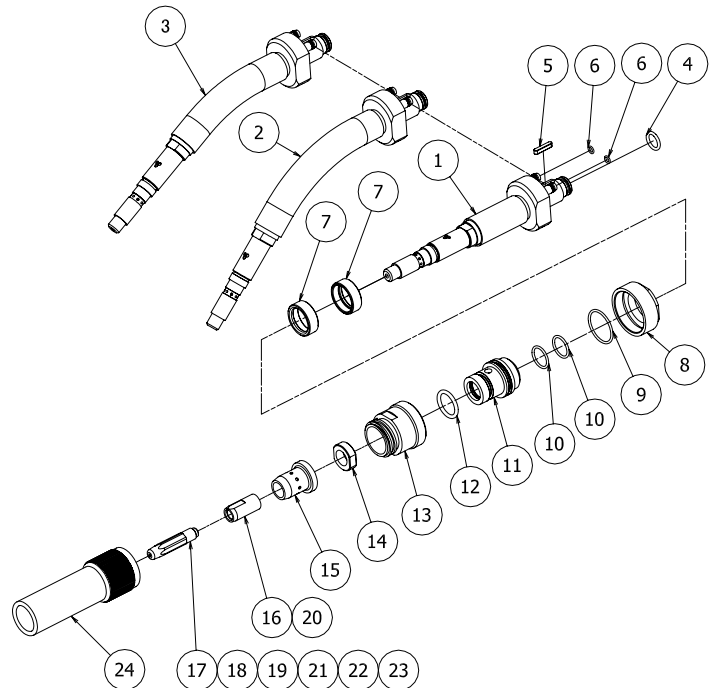


Fig.8.5 Exploded diagram for RTW5000S, RTW5000H, RTW5000L

Table 8.5 Parts list for RZ3500S, RZ3500H, RZ3500L

| No | Part No. | Item | 数量 | Remarks |
|----|-----------|--------------------|-----|-----------------------|
| 1 | L10612B | Torch body ASSY | 1 | For straight torch |
| 2 | L10614B | Torch body ASSY | (1) | For 45° curved torch |
| 3 | L10613B | Torch body ASSY | (1) | For 31° curved torch |
| 4 | 3574-017 | " O " - R I N G | 1 | |
| 5 | 100-0602 | Parallel key | 1 | |
| 6 | L10603B04 | Teflon bushing | 2 | |
| 7 | 4739-469 | Coil spring | 1 | |
| 8 | L10612C03 | Pressuring shaft | 1 | |
| 9 | L10612C02 | Rear tip body | 1 | |
| 10 | U5626X | Insulator | 1 | |
| 11 | L6573C02 | Spring Washer | (1) | Include the insulator |
| 12 | U5685M02 | O r i f i c e | 1 | |
| 13 | L10669C02 | Collet tip 0.9 | (1) | Option |
| 14 | L10669C03 | Collet tip 1.0 | (1) | Option |
| 15 | L10669C04 | Collet tip 1.2 | 1 | |
| 16 | L10669C05 | Collet tip 1.4 | (1) | Option |
| 17 | L10669C06 | Collet tip 1.6 | (1) | Option |
| 18 | L10612C01 | Front tip body | 1 | |
| 19 | L10669F01 | Tip holder 0.9-1.0 | (1) | Option |
| 20 | L10669F02 | Tip holder 1.2 | 1 | |
| 21 | L10669F03 | Tip holder 1.4 | (1) | Option |
| 22 | L10669F04 | Tip holder 1.6 | (1) | Option |
| 23 | L10612C06 | Nozzle(No.10) | 1 | |
| 24 | L10612C04 | Nozzle(No.8) | (1) | Option |
| 25 | L10612C05 | Nozzle(No.12) | (1) | Option |

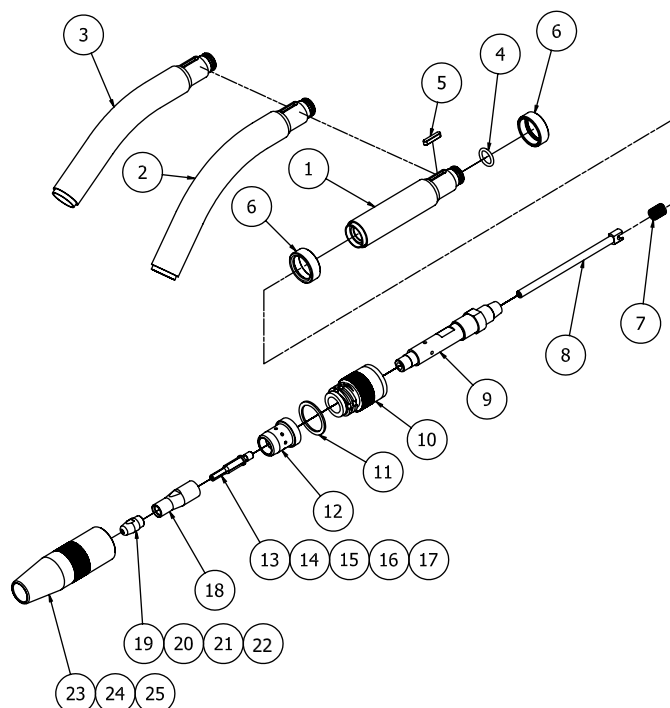


Fig.8.6 Exploded diagram for RZ3500S, RZ3500L, RZ3500H

Table 8.6 Parts list for SSB

| No | Part No. | Item | 数量 | Remarks |
|----|-----------|--------------------------|----|---------|
| 1 | L10601D | Power-feeding cable ASSY | 2 | |
| 2 | L10601C | Nozzle holder ASSY | 1 | |
| 3 | L10601B10 | H o o d | 1 | |
| 4 | 3574-017 | " O " - R I N G | 1 | |
| 5 | L10601B13 | Power cable cover | 1 | |
| 6 | L10601B09 | Insulating bushing | 4 | |
| 7 | 100-0650 | W a s h e r | 4 | |
| 8 | 100-0651 | Insulating dowel pin | 2 | |

4259-024 Micro Switch

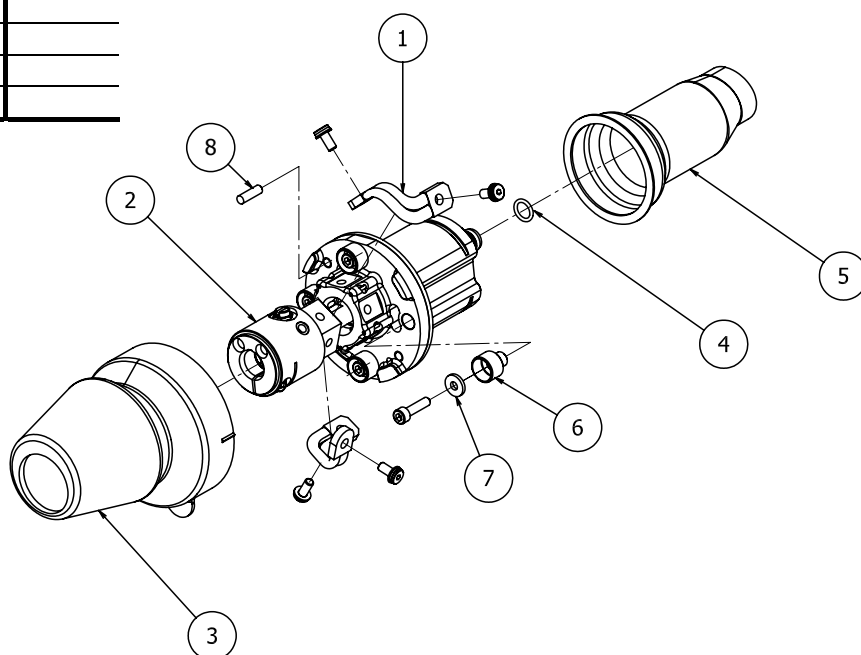


Fig.8.7 Exploded diagram for SSB

Table 8.7 Parts list for SSV

| No | Part No. | Item | 数量 | Remarks |
|----|-----------|--------------------------|----|---------|
| 1 | L10601D | Power-feeding cable ASSY | 2 | |
| 2 | L10602C | Nozzle holder ASSY | 1 | |
| 3 | L10602B02 | H o o d | 1 | |
| 4 | 3574-017 | " O " - r i n g | 1 | |

4259-024 Micro Switch

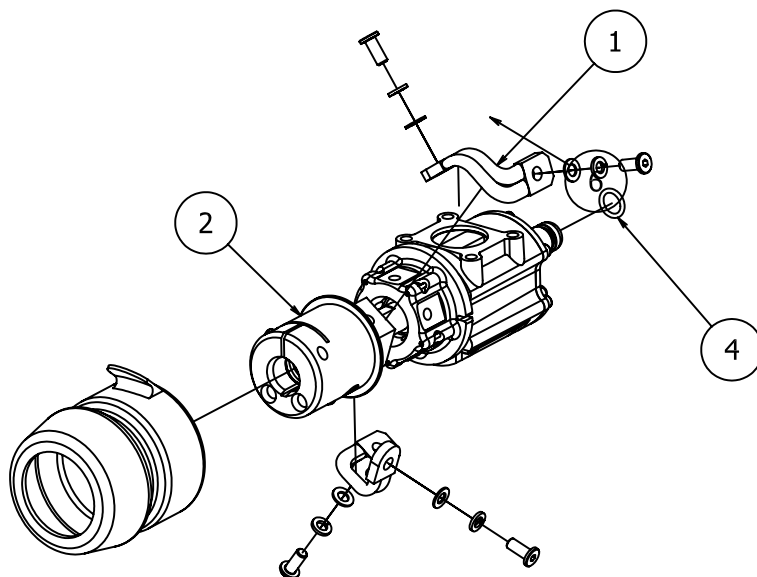


Fig.8.8 Exploded diagram for SSV

Table 8.8 Parts list for the coaxial power cable

| No | Part No. | Item | Qt. | Remarks | No | Part No. | Item | Qt. | Remarks |
|----|-------------------|------------------------|-----|---------------------|------------------------------|-------------------------|------|-------------|---------|
| 1 | See Table. below. | Power cable ASSY | 1st | | 【List of Power cable ASSY】 | | | | |
| 2 | See Table. below. | Shock sensor cable | 1st | | L6580B | Power cable ASSY (1.1M) | 1st | For L-10621 | |
| 3 | L6611B | Gas hose ASSY | 1st | | L6580C | Power cable ASSY (1.2M) | 1st | For L-10622 | |
| 4 | L6611C01 | Power adaptor | 1 | | L6580D | Power cable ASSY (1.3M) | 1st | For L-10623 | |
| 5 | U5035K | Cable clamp | 1 | | L6580E | Power cable ASSY (1.4M) | 1st | For L-10624 | |
| 6 | L7810D05 | Guide adaptor | 1 | | L6580F | Power cable ASSY (1.5M) | 1st | For L-10625 | |
| 7 | U69B34 | Outlet guide (0.9~1.2) | 1 | | L6580G | Power cable ASSY (1.6M) | 1st | For L-10626 | |
| 8 | U69B35 | Outlet guide (1.2~1.6) | (1) | Option | L6580H | Power cable ASSY (1.8M) | 1st | For L-10628 | |
| 9 | U2770K01 | Outlet guide (0.8) | (1) | Option | L6580J | Power cable ASSY (2.1M) | 1st | For L-10631 | |
| 10 | L6611D02 | Liner (0.9~1.2) | 1 | For L-10621~L-10623 | L6580K | Power cable ASSY (2.5M) | 1st | For L-10635 | |
| 11 | U4170H02 | Liner (0.9~1.2) | 1 | For L-10624~L-10635 | 【List of Shock sensor cable】 | | | | |
| 12 | L6611D01 | Liner (1.2~1.6) | (1) | For L-10621~L-10623 | L10666J | Shock sensor cable (8) | 1st | For L-10621 | |
| 13 | U4173G04 | Liner (1.2~1.6) | (1) | For L-10624~L-10635 | L10666K | Shock sensor cable (9) | 1st | For L-10622 | |
| 14 | L6611D03 | Liner (0.8~0.9) | (1) | For L-10621~L-10623 | L10666L | Shock sensor cable (10) | 1st | For L-10623 | |
| 15 | U4353G01 | Liner (0.8~0.9) | (1) | For L-10624~L-10635 | L10666M | Shock sensor cable (11) | 1st | For L-10624 | |
| | | | | | L10666N | Shock sensor cable (12) | 1st | For L-10625 | |
| | | | | | L10666P | Shock sensor cable (13) | 1st | For L-10626 | |
| | | | | | L10666R | Shock sensor cable (15) | 1st | For L-10628 | |
| | | | | | L10666U | Shock sensor cable (18) | 1st | For L-10631 | |
| | | | | | L10666Y | Shock sensor cable (22) | 1st | For L-10635 | |

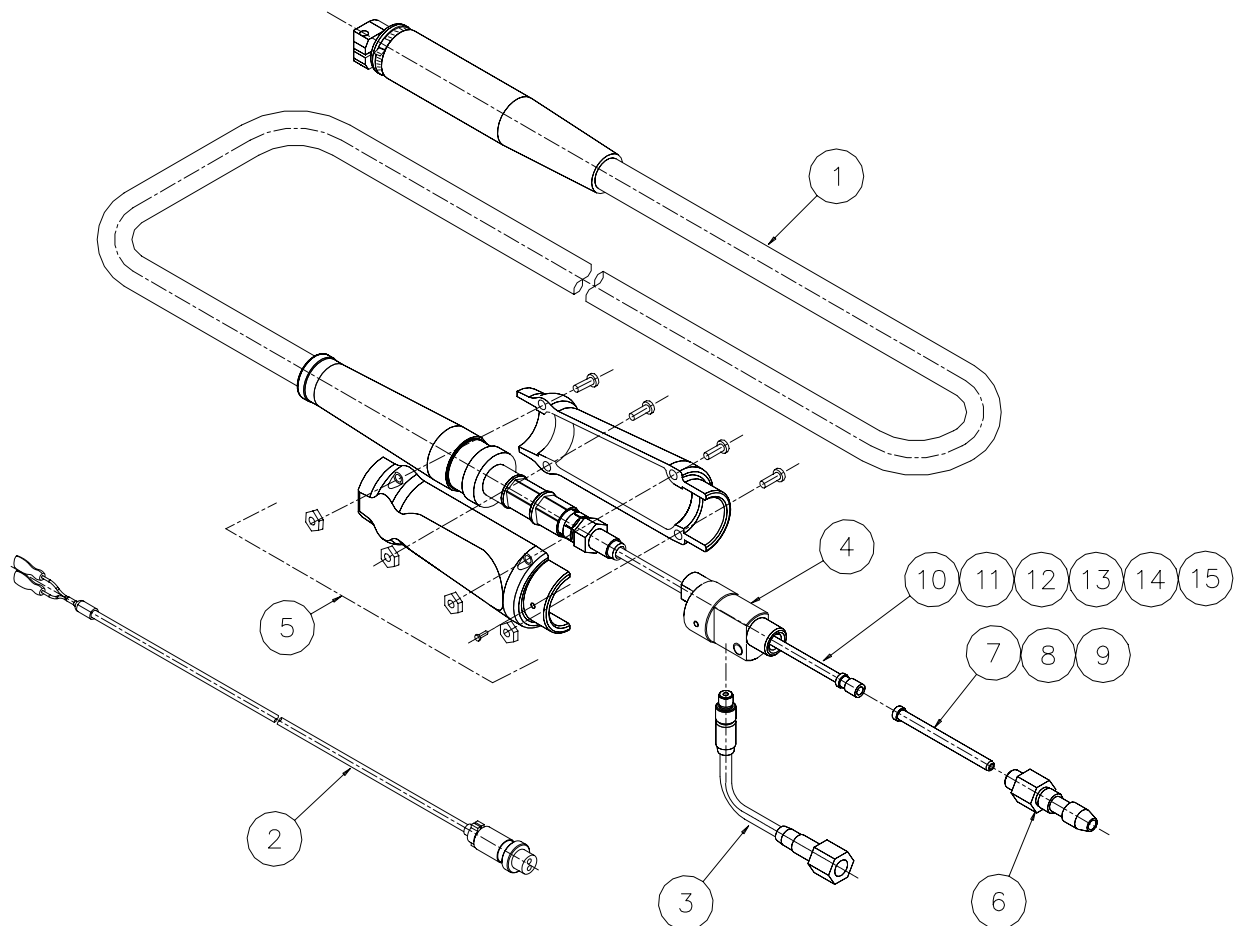


Fig.8.9 Exploded diagram for the coaxial power cable

Table 8.9 Parts list for the coaxial power cable (For All-B4/B4L exclusive)

| No | Part No. | Item | Qt. | Remarks | No | Part No. | Item | Qt. | Remarks |
|-----|---------------------|------------------------|-----|-----------------|---|---------------|-----------------------|---------|---------|
| 1 | See Table. below. | Power cable ASSY | 1st | | 【List of Power cable ASSY】 | | | | |
| 2 | L 1 0 1 1 0 C | Connection ASSY | 1st | | 1 | L 1 0 6 3 8 B | Power cable ASSY | 1st | For B4 |
| 2-1 | L 1 0 1 1 0 C 0 1 | Connection | (1) | | | L 1 0 6 4 1 B | Power cable ASSY | 1st | For B4L |
| 2-2 | KQ2L08-01S | E l b o w | (1) | (SMC) | 【List of Shock sensor cable】 | | | | |
| 3 | L 1 0 6 3 8 D | Cable cover ASSY | 1st | For B4 | 11 | L 1 0 6 6 6 F | Shock sensor cable(5) | 1st | For B4 |
| | L 1 0 6 4 1 D | Cable cover ASSY | 1st | For B4L | | L 1 0 6 6 6 K | Shock sensor cable(9) | 1st | For B4L |
| 4 | L7810D05 | Guide adaptor | 1st | | 【For the maintenance of Shock sensor cable】 | | | | |
| 5 | U 6 9 B 3 4 | Outlet guide (0.9~1.2) | 1st | | For B4 | L 1 0 6 3 8 F | Shock sensor cable | 1st | |
| 6 | U 6 9 B 3 5 | Outlet guide (1.2~1.6) | (1) | Option | | L 1 0 6 6 6 F | Shock sensor cable(5) | (1) | |
| 7 | U2770K01 | Outlet guide (0.8) | (1) | Option | For B4L | 4 0 x 0 . 5 | SUMITUBE F | (0.26m) | |
| 8 | L6611D02 | Liner (0.9~1.2) | 1st | For B4 | | L 1 0 6 4 1 F | Shock sensor cable | 1st | |
| | U4170H02 | Liner (0.9~1.2) | 1st | For B4L | | L 1 0 6 6 6 K | Shock sensor cable(9) | (1) | |
| 9 | L6611D01 | Liner (1.2~1.6) | (1) | Option/ For B4 | | 4 0 x 0 . 5 | SUMITUBE F | (0.26m) | |
| | U4173G04 | Liner (1.2~1.6) | (1) | Option/ For B4L | | | | | |
| 10 | L6611D03 | Liner (0.8~0.9) | (1) | Option/ For B4 | | | | | |
| | U4353G01 | Liner (0.8~0.9) | (1) | Option/ For B4L | | | | | |
| 11 | See the label below | Shock sensor cable | 1st | | | | | | |

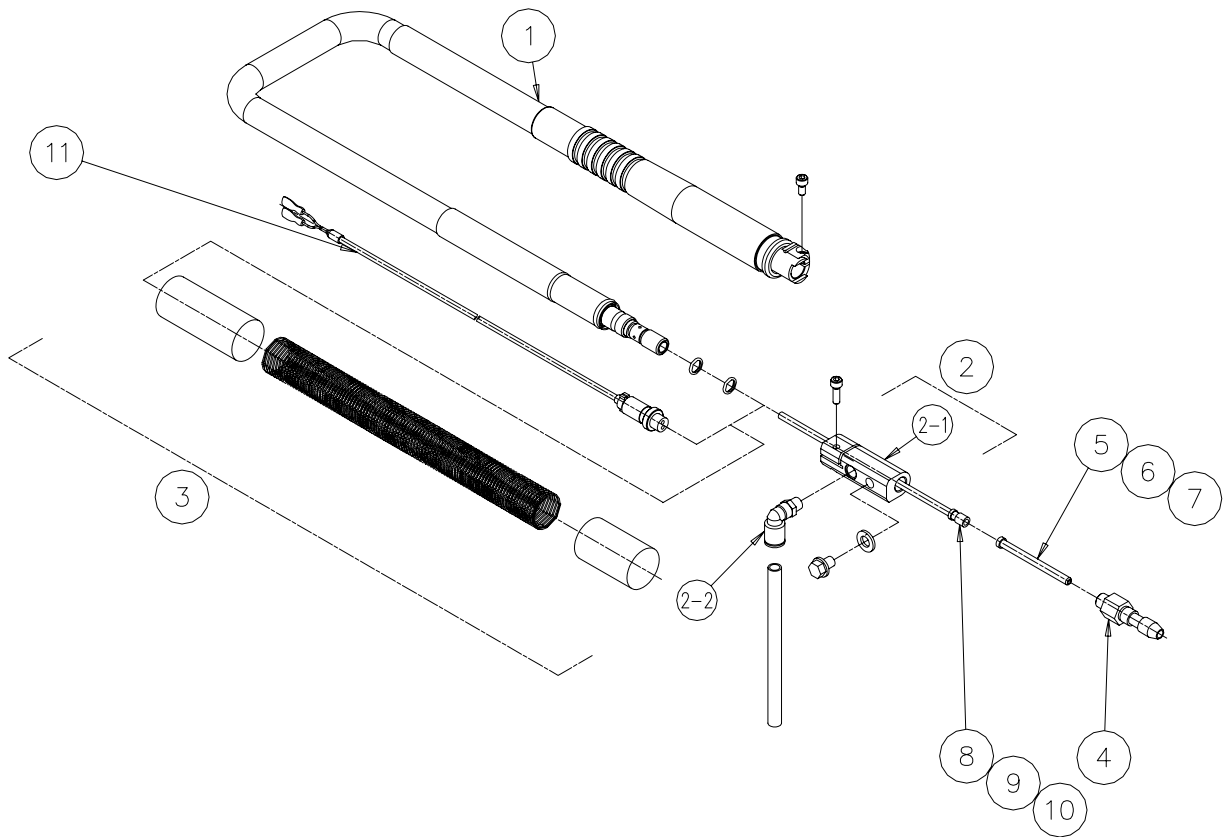


Fig.8.10 Exploded diagram for the coaxial power cable (For All-B4/B4L exclusive)

Table 8.10 Parts list for the coaxial power cable (For All-B4/B4L exclusive [DL W.P.S])

| No | Part No. | Item | Qt. | Remarks | No | Part No. | Item | Qt. | Remarks | |
|-----|-----------------|-------------------------|-----|-----------------|--|-----------------------------------|-------------------------|-------------------------|---------|--|
| 1 | See Fig. below. | Power cable ASSY | 1st | | 【List of Power cable ASSY】 | | | | | |
| 2 | L 1 0 1 1 0 C | Connection ASSY | 1st | | 1 | L 1 0 6 3 8 B | Power cable ASSY | 1st | For B4 | |
| 2-1 | L10110C01 | Connection | (1) | | | L 1 0 6 4 1 B | Power cable ASSY | 1st | For B4L | |
| 2-2 | KQ2L08-01S | E l b o w | (1) | (SMC) | | 【List of Shock sensor cable】 | | | | |
| 3 | L 1 0 6 3 8 D | Cable cover ASSY | 1st | For B4 | 11 | L10666F | Shock sensor cable(5) | 1st | For B4 | |
| | L 1 0 6 4 1 D | Cable cover ASSY | 1st | For B4L | | L10666K | Shock sensor cable(9) | 1st | For B4L | |
| 4 | L7810D05 | Guide adaptor | 1st | | | 【List of voltage detection cable】 | | | | |
| 5 | U 6 9 B 3 4 | Outlet guide (0.9~1.2) | 1st | | 12 | L10667D | voltage detection cable | 1st | For B4 | |
| 6 | U 6 9 B 3 5 | Outlet guide (1.2~1.6) | (1) | Option | | L10667J | voltage detection cable | 1st | For B4L | |
| 7 | U2770K01 | Outlet guide (0.8) | (1) | Option | 【For the maintenance of shock sensor cable】 | | | | | |
| 8 | L6611D02 | Liner (0.9~1.2) | 1st | For B4 | For B4 | L10638F | Shock sensor cable | 1st | | |
| | U4170H02 | Liner (0.9~1.2) | 1st | For B4L | | L10666F | Shock sensor cable(5) | (1) | | |
| 9 | L6611D01 | Liner (1.2~1.6) | (1) | Option/ For B4 | For B4L | 40 X 0.5 | SUMITUBE F | (0.26m) | | |
| | U4173G04 | Liner (1.2~1.6) | (1) | Option/ For B4L | | L10641F | Shock sensor cable | 1st | | |
| 10 | L6611D03 | Liner (0.8~0.9) | (1) | Option/ For B4 | For B4L | L10666K | Shock sensor cable(9) | (1) | | |
| | U4353G01 | Liner (0.8~0.9) | (1) | Option/ For B4L | | 40 X 0.5 | SUMITUBE F | (0.26m) | | |
| 11 | See Fig. below. | Shock sensor cable | 1st | | 【For the maintenance of voltage detection cable】 | | | | | |
| 12 | See Fig. below. | voltage detection cable | 1st | | For B4 | L10648G | voltage detection cable | 1st | | |
| | | | | | | L10667D | voltage detection cable | (1) | | |
| | | | | | | 40 x 0.5 | SUMITUBE F | (0.26m) | | |
| | | | | | | For B4L | L10651G | voltage detection cable | 1st | |
| | | | | | | | L10667J | voltage detection cable | (1) | |
| | | | | | | | 40 x 0.5 | SUMITUBE F | (0.26m) | |

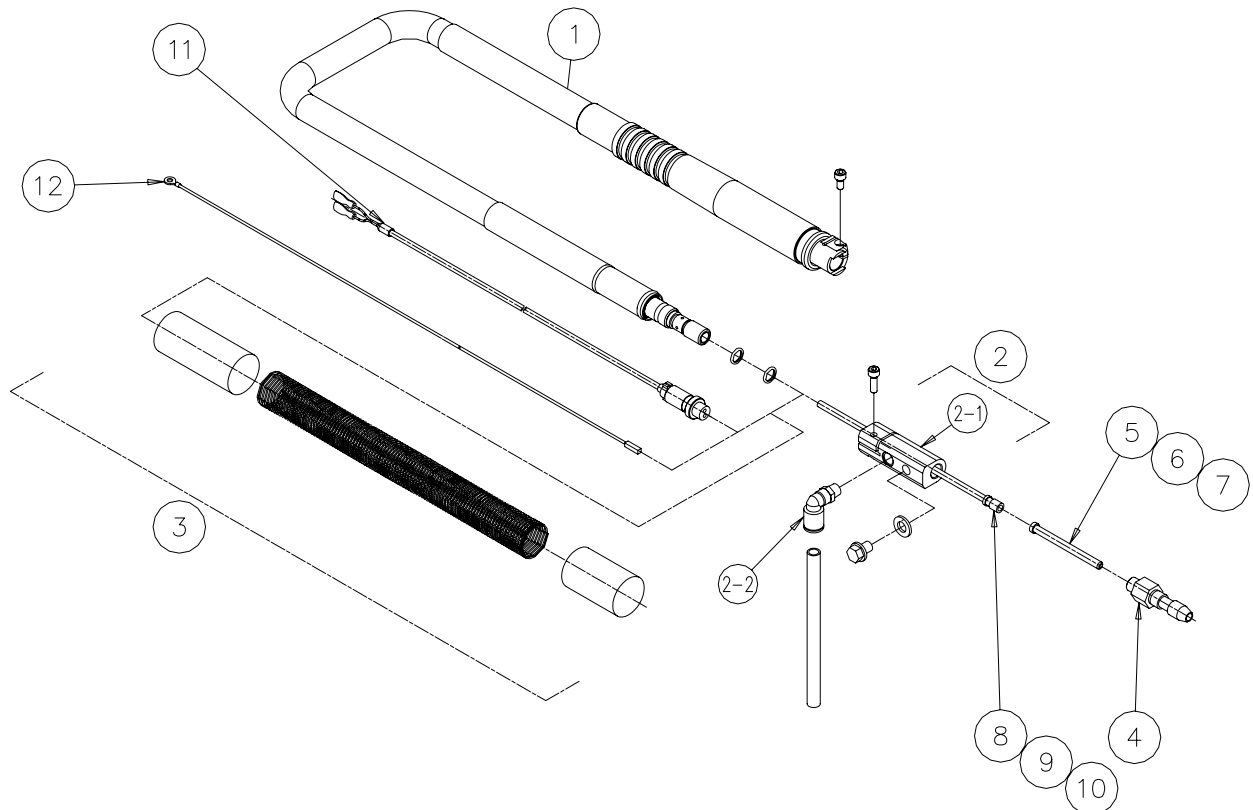


Fig.8.11 Exploded diagram for the coaxial power cable (For All-B4/B4L exclusive [DL W.P.S])

Instruction Manual for CO₂/MAG Welding Torch

RT3500S/H/L RT5000S/H/L

RTW5000S/H/L RZ3500S/H/L

N o . 1 L 1 0 6 0 3 - 1 September. , 2008

1st edition 1st copy

N o . 1 L 1 0 6 0 3 - 2 October. , 2009

2nd edition 2nd copy