Welding torch for robot with a built-in shock sensor | **MIG**

Coaxial power cable for robot

MTXA-2531 MTXCA-2531

MTXAW-5031 MTXCAW-5031

Instruction Manual

= Safety and Operation =

Instruction Manual No.

1L7060-E-1

First thoroughly read this manual to operate the machine correctly.

- Installation, maintenance, and repair of this welding machine should be made by qualified persons or persons who fully understand welding machines for extra safety.
- Operation of this welding machine should be made by persons who have knowledge and technical skill to understand the contents of this manual well and handle the machine safely for extra safety.
- 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 first, store it with the warranty in the place where the persons concerned can read at 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

1. Specifications of welding torch for robot

Table 1.1 Specifications

Model	MTXA-2531	MTXCA-2531	MTXAW-5031	MTXCAW-5031
Torch type	Straight	Curved	Straight	Curved
Welding process	MIG			
Max. operating current	250A		500A	
Rated duty cycle	70%		70%	
Applicable wire diameter	(ϕ1.0) , ϕ1.2		(ϕ1.2) , ϕ1.6	
Cooling system	Air cooling		Water cooling	
Wire used	Aluminum Welding wires			
Shock sensor	Built in			
Mass	1.5(kg)	1.6(kg)	1.6(kg)	1.7(kg)

Notes: 3. MTXAW-5031/MTXCAW-5031 should be used with feeding water with water pump (PU301).

4. Shock sensor: The welding torch of an arc welding robot may sometimes touch with a work or jigs to cause deformation of the torch or damage of the manipulator. To prevent such an accident, this welding torch is equipped with a built-in shock sensor. When the torch tip (nozzle) is pressed by external force beyond the specified value, the nozzle evades due to the external force with outputting the external force detection signal to stop the manipulator immediately.

2. Receiving inspection

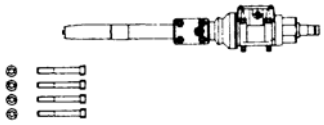
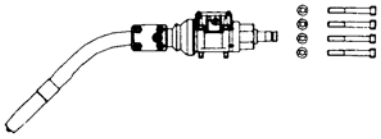
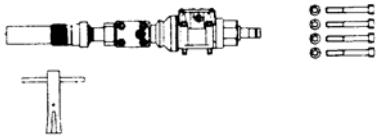
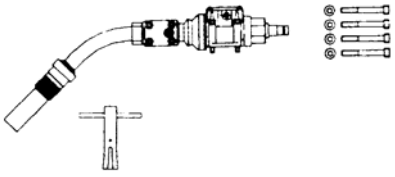
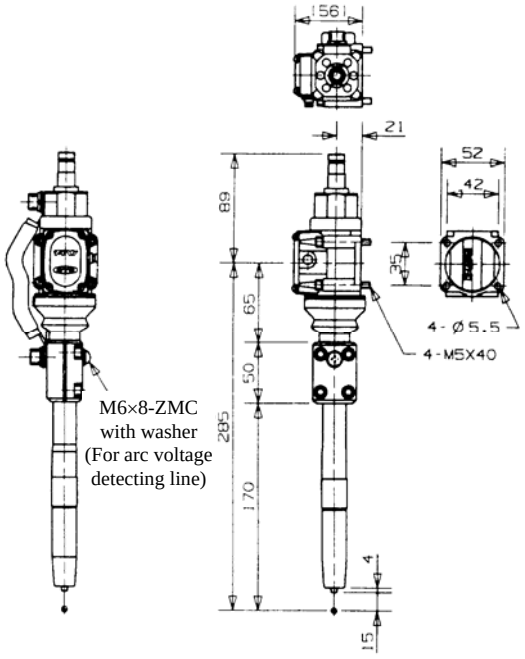
MTXA-2531	MTXCA-2531
 Welding torch main body Mounting bolt (M5×40) . 4 pieces Spring washer (M5) ..... 4 pieces	 Welding torch main body Mounting bolt (M5×40)..4 pieces Spring washer (M5).....4 pieces
MTXAW-5031	**MTXCAW-5031**
 Welding torch main body Mounting bolt (M5×40)..... 4 pieces Spring washer (M5)..... 4 pieces Wrench ..... 1 piece Cooling water hose(6m) ...2 pieces	 Welding torch main body Mounting bolt (M5×40)..... 4 pieces Spring washer (M5)..... 4 pieces Wrench ..... 1 piece Cooling water hose(6m) ...2 pieces

Fig. 2.1 Receiving inspection

Note 1: MTXAW-5031/MTXCAW-5031 water-cooled torch requires to operate with water pump. The water pump should be purchased separately.

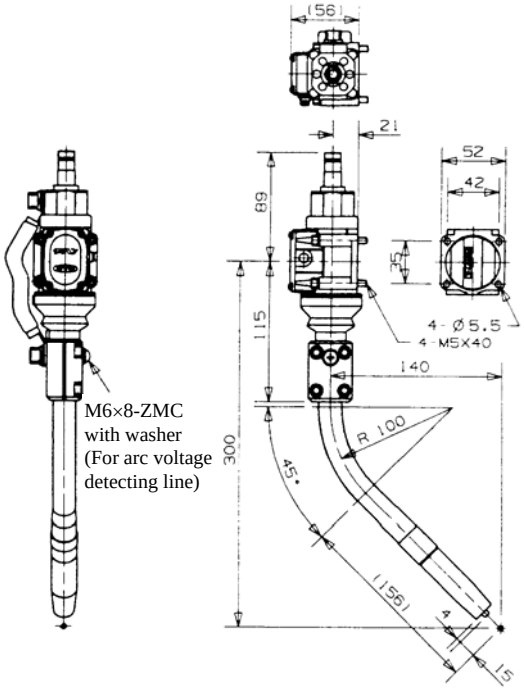
3. Outline drawing of welding torch for robot(for MIG welding)

MTXA-2531



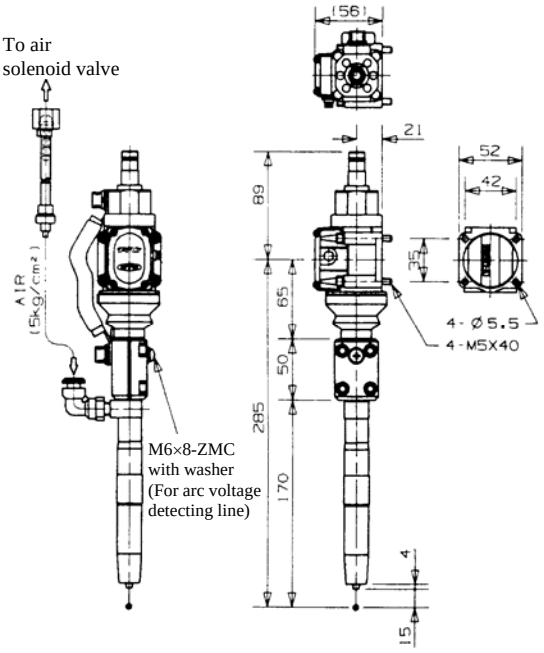
Mass 1.5[kg] 3.31[lb]
Air-cooled 250A MIG straight torch
MTXA-2531 with shock sensor

MTXCA-2531



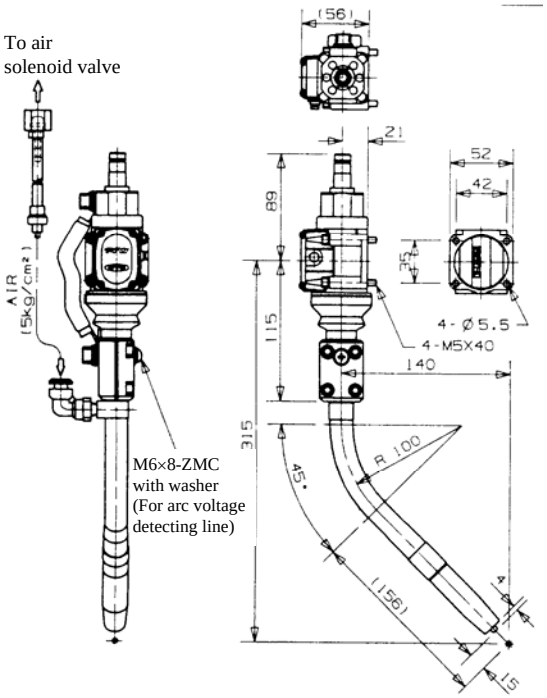
Mass 1.6[kg] 3.53[lb]
Air-cooled 250A MIG curved torch
MTXCA-2531 with shock sensor

MTXAW-5031



Mass 1.6[kg] 3.53[lb]
Water-cooled 500A MIG straight torch
MTXAW-5031 with shock sensor

MTXCAW-3531



Mass 1.7[kg] 3.75[lb]
Water-cooled 500A MIG curved torch
MTXCAW-5031 with shock sensor

Fig. 3.1 Outline drawing (1) Unit: mm

4. Mounting and adjusting welding torch

4.1 Mounting on DR-600,603,606,610,4000,4200,4200L,4300,4400

4.1.1 Mounting torch

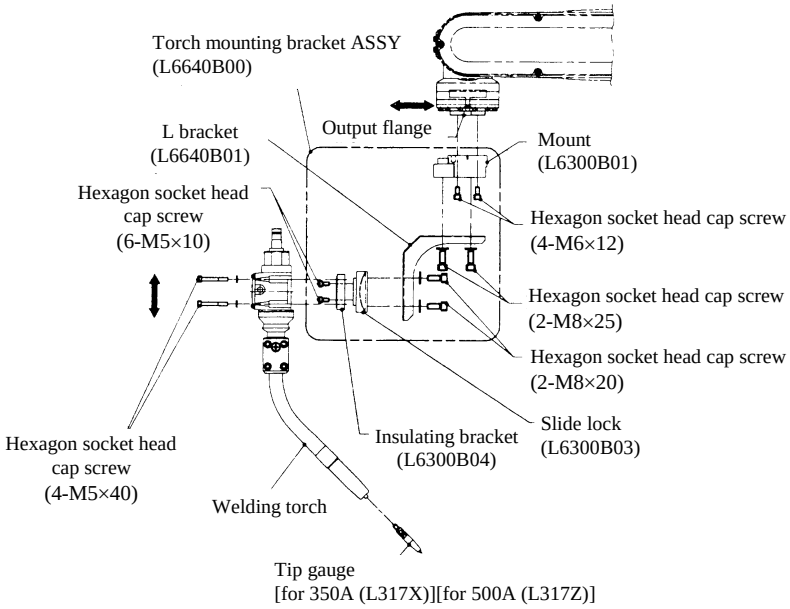


Fig. 4.1 Mounting curved torch

4.1.2 Mounting torch gauge

Tip gauge ASSY

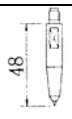
L317X (for 350A torch)	L317Z (for 500A torch)
Extension 15mm	Extension 20mm
	
MTX-3531 MTXC-3531 MTXB-3531 MTXCB-3531	MTX-5031 MTXC-5031 MTXW-5031 MTXCW-5031

Fig. 4.2 Mounting torch gauge for curved torch

4.1.3 Adjusting torch

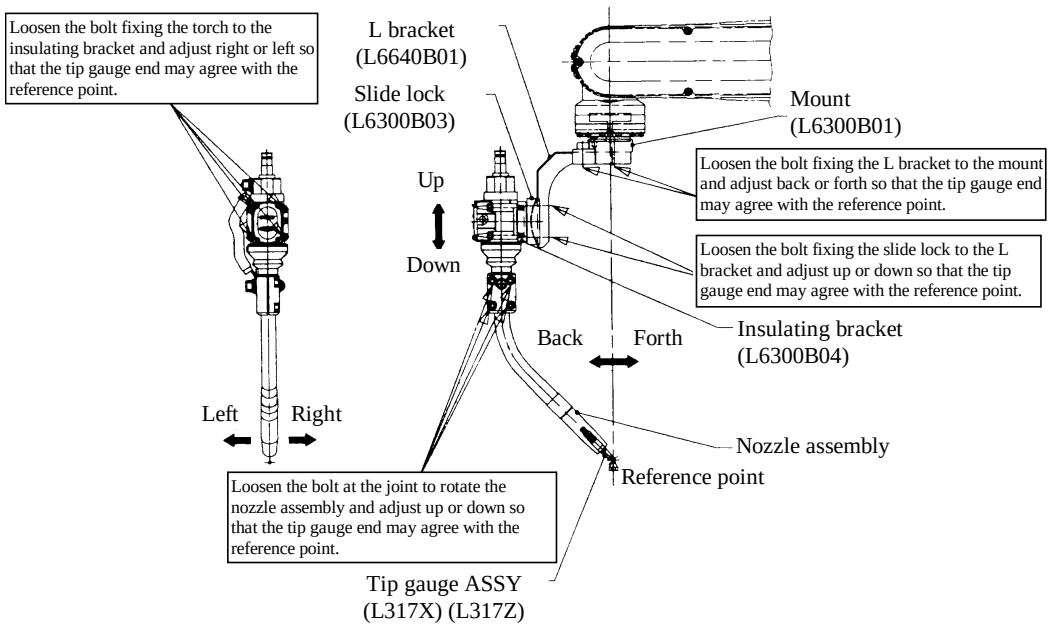


Fig. 4.3 Adjusting torch

4.2 Mounting on DR-3000,3200

4.2.1 Mounting torch

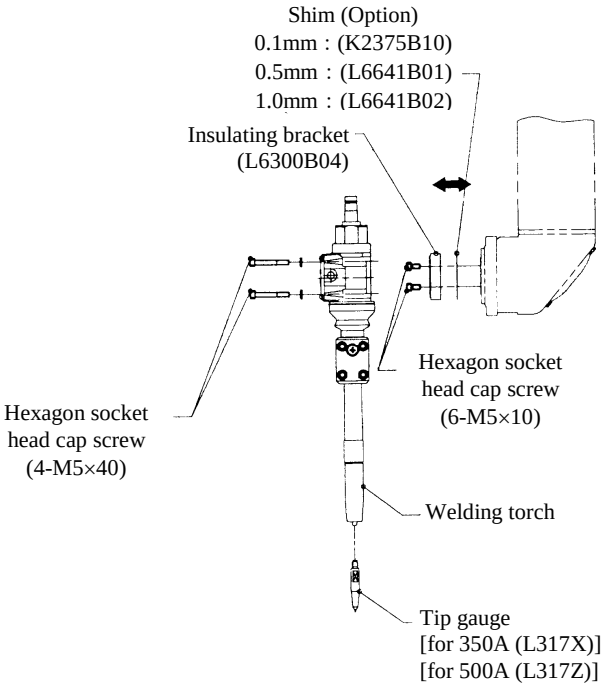
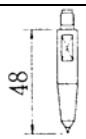
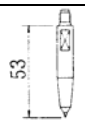


Fig. 4.4 Mounting torch

4.2.2 Mounting torch gauge

Tip gauge ASSY

L317X (for 350A torch)	L317Z (for 500A torch)
Extension 15mm	Extension 20mm
	
MTX-3531 MTXC-3531 MTXB-3531 MTXCB-3531	MTX-5031 MTXC-5031 MTXW-5031 MTXCW-5031

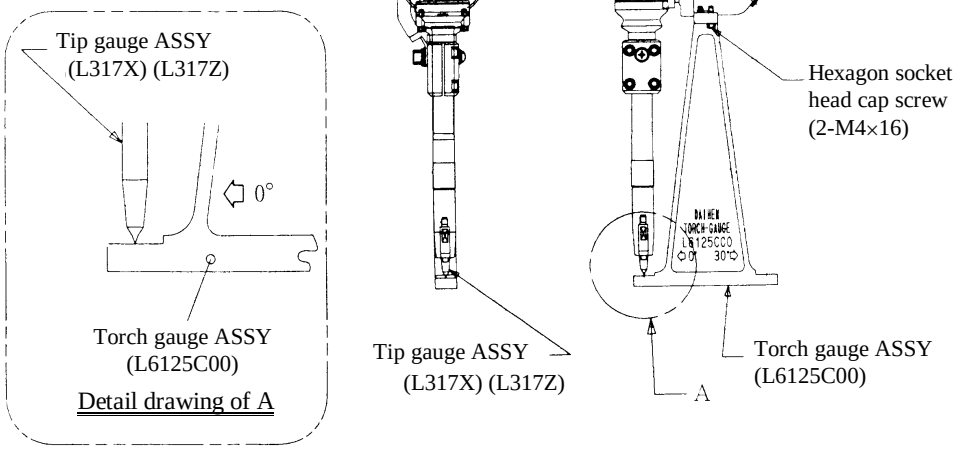


Fig. 4.5 Mounting torch gauge

4.2.3 Adjusting torch

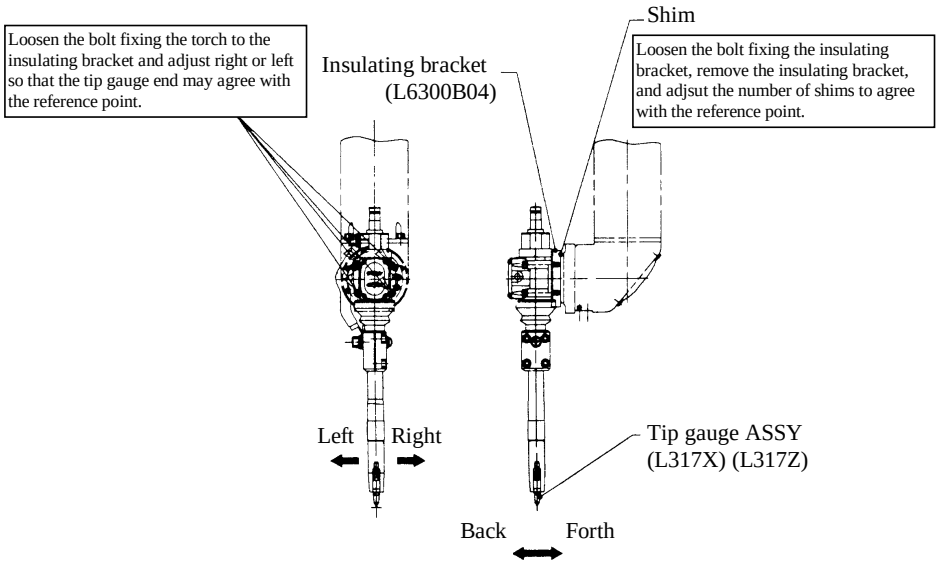


Fig. 4.6 Adjusting torch

4.4 Connecting water-cooled torch (for MTXAW-5031/MTXCAW-5031)

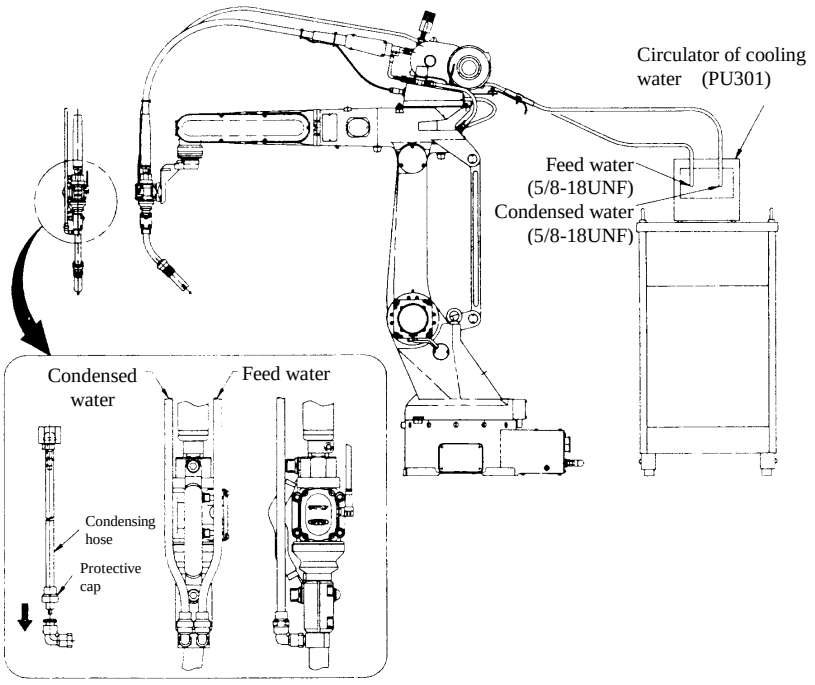


Fig. 4.8 Connecting water-cooled torch

4.4 Precautions in handling torch

(1) Spatter on the nozzle or contact tip should be removed earlier.

(2) DAIHEN special tip should be selected. Tip with a larger hole diameter may induce input power failure or wire deflection to cause unstable arc or target deviation. Replace it at an appropriate time.

(3) Gas flow rate should be min. 15 l/min or more.

(4) Wire cut dust or any other dust accumulated in the liner (in coaxial power cable),inner liner, tip nut may cause wire feeding failure and have a bad influence on welding. Clean it with compressed air every 10 days.

(5) Direction to install inner liner (MTXAW-5031,MTXCAW-5031)

Insert the inner liner into the tip nut so that the tip of the inner liner made of copper faces the tip nut.

However,do the replacement work after the circulator of cooling water (PU-301) has been completely stopped,otherwise water will leak to the outside when the nozzle is removed.

(6) If wire is caught at the tip end (wire stick), the wire may be buckled in the liner or cut at the feeding roll. If feeding wire is continued as it is, it may cause feeding failure or arc shortage. Remove the wire from the feeding roll to the tip end and renew the wire.

(7) When it is taught to evacuate the torch from the work after welding, teach to pull up on the slant so that the shock sensor may work even if the wire and the base metal stick.

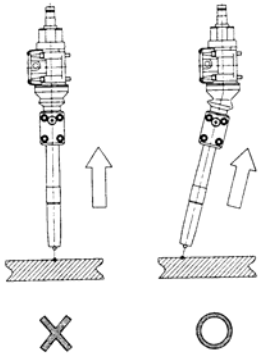


Fig. 4.9 Evacuating direction

(8) Precautions in replacing O-ring

Take care to replace O-ring of water-cooled torch (MTXAW-5031/MTXCAW-5031) as the O-ring in the insulator may be easily damaged by the tip body screw.

The O-ring damaged may cause water leakage.

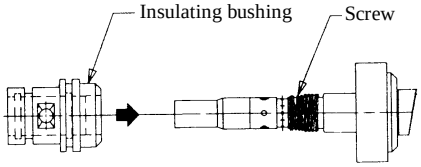


Fig. 4.10 Replacing O-ring

5. Coaxial power cable for robot

5.1 Types of coaxial power cables

Table 5.1 Types of coaxial power cables

Model	Nominal cable length	Robot applicable	Note
L-6611	1.1 m		△
L-6612	1.2 m	DR-4000,4200,4300,4400	●
L-6613	1.3 m		●
L-6614	1.4 m		△
L-6615	1.5 m	DR-606,610,4200L	●
L-6616	1.6 m		△
L-6618	1.8 m	DR-503P,R	●
L-6621	2.1 m	DR-3000,3200	●
L-6625	2.5 m	DR-503S,600,603	●

●Standard stock, △Make to order

Note:The liner and the outlet guide built in as standard are iron.

Arrange the liner and the outlet guide for aluminum.

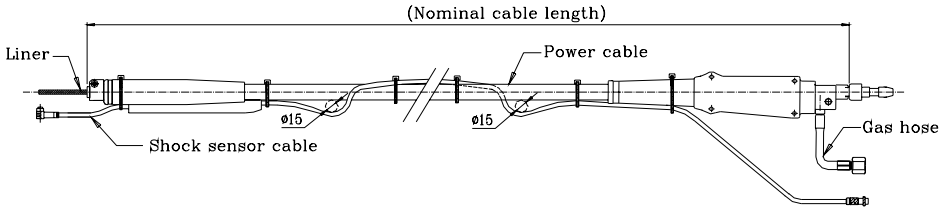


Fig. 5.1 Outline drawing of coaxial power cable

5.2 Connecting coaxial power cable

5.2.1 Cut length of liner

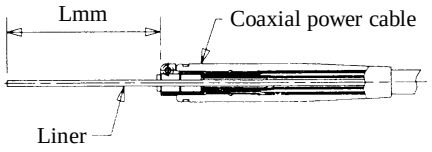


Table 5.2 Cut length of liner

Torch (type)	L (mm)
MTXA-2531	151
MTXCA-2531	
MTXAW-5031	158
MTXCAW-5031	

Fig. 5.2 Cutting liner

- Cut the liner of coaxial power cable to the L-dimension depending on each torch to use.
- After removing burrs from the liner's cut plane by filing,cut the edge of the plane as shown in the right-hand figure.
- Be careful not to bend the liner nor clash the hole.

5.2.2 Connecting coaxial power cable

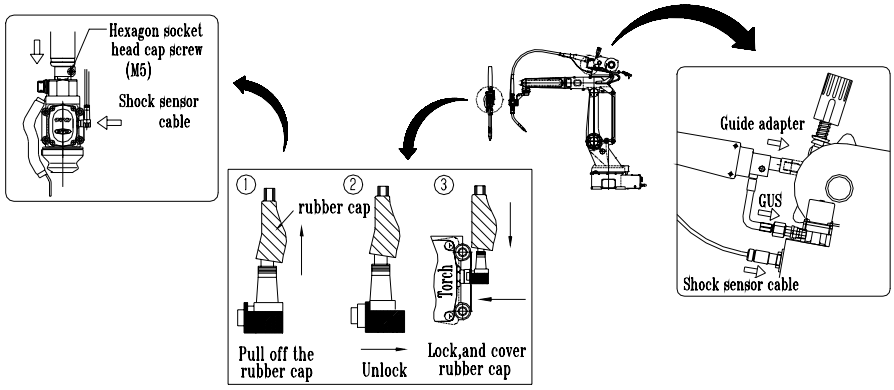


Fig. 5.3 Connecting

6. Setting robot control

6.1 Checking tool parameters

In delivering a robot, the welding data used (tool parameters) are already preset. These data do not have to be changed unless the torch or others are changed. Check if the following data are preset.

Table 6.1 Setting tool parameters

DR-4000,4200,4200L,4300,4400, DR-503,DR-600,603,606,610 series (DR CONTROL)

Model	MTXA-2531	MTXCA-2531	MTXAW-5031	MTXCAW-5031
Parameter 1	140.0	140.0	140.0	140.0
Parameter 2	0.0	0.0	0.0	0.0
Parameter 3	385.0	400.0	385.0	400.0
Parameter 4	0.0	0.0	0.0	0.0
Parameter 5	0.0	0.0	0.0	0.0
Parameter 6	180 (0)	180 (0)	180 (0)	180 (0)

* Values in ( ) for Parameter 6 applies to Controls OSACOMsuper8700 (C^2 ROBOT CONTROL)

DR-3000,3200 (DR CONTROL)

Model	MTXA-2531	MTXCA-2531	MTXAW-5031	MTXCAW-5031
Parameter 1	-285.0	-285.0	-285.0	-285.0
Parameter 2	0.0	0.0	0.0	0.0
Parameter 3	Note)29.0	Note)29.0	Note)29.0	Note)29.0
Parameter 4	-90	-90	-90	-90
Parameter 5	-90	-90	-90	-90
Parameter 6	180 (0)	180 (0)	180 (0)	180 (0)

* Values in ( ) for Parameter 6 applies to Controls α.ROBOT CONTROL

Important

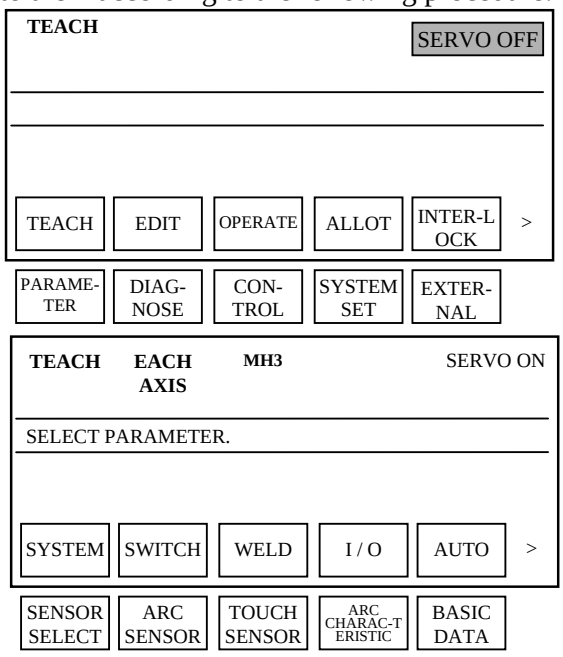
Even if you select the inch unit by user parameters,the torch parameters 1to 3 are set by millimeters.

If the data in Table 6.1 are not preset, change to them according to the following procedure.

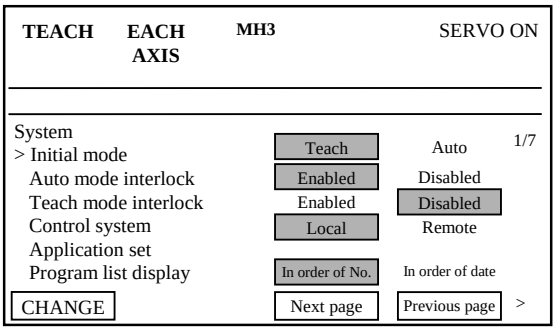
1. Put the breaker handle mounted on the robot control door to the ON position to supply power. After initial diagnosis completed, the right display appears.

2. Press the servo ON button on the teach pendant or on the operation box, and servo power is supplied.

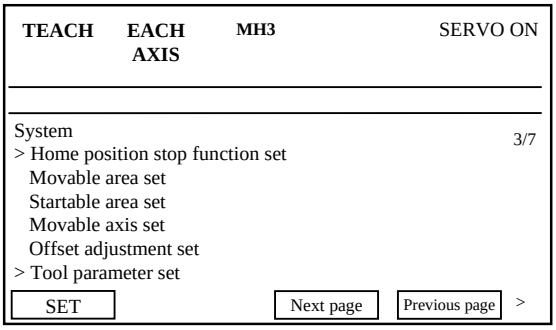
3. Press ▶ key and next Function 1 key (Parameter), and the right display appears.



4. Press Function 1 key (System), and the right display appears.

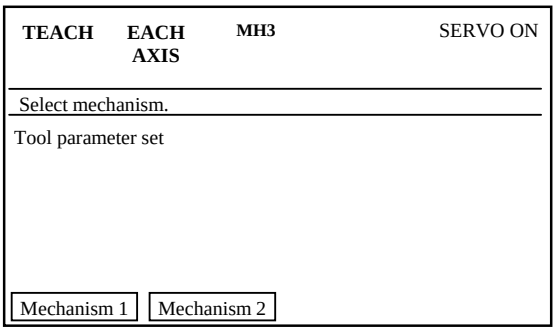


5. Press Function 4 key (Next page) twice to move to the right display (Page 3/7).

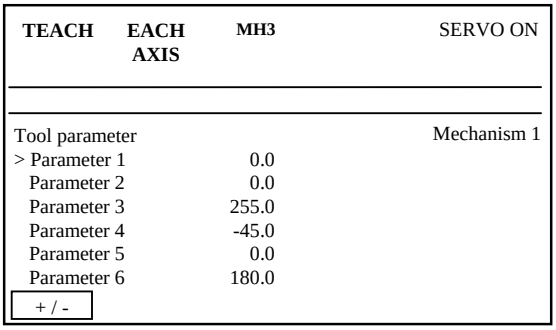


6. Press cursor keys ⇧ ⇩ to move the cursor to Tool Parameter Set.

7. Press Function 1 key (Set).

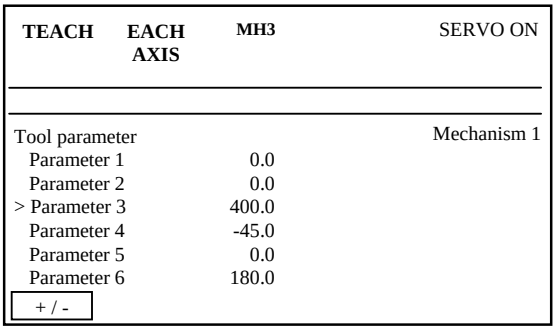


8. Press Function 1 key (Mechanism 1).

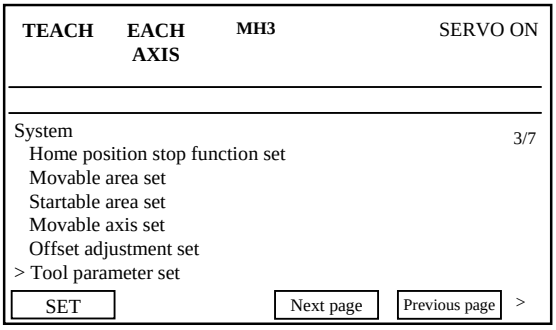


9. Check if the values in Table 6.1 are set. If the setting is correct, press RESET key to end operating. If the setting is different, correct according to the procedure on the next page.

10. Move the cursor to the data to change. Change the sign with [Function 1] key (+/-) and numerical values with Numerical key.



11. When setting is ended, press [Memory] key.



Important

If ended without pressing [Memory] key, the changed data are not stored to be disabled.

6.2 Checking shock sensor for operation

6.2.1 External force to operate shock sensor

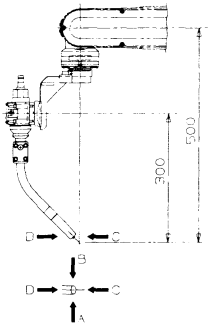


Fig. 6.1
Direction of operating external force

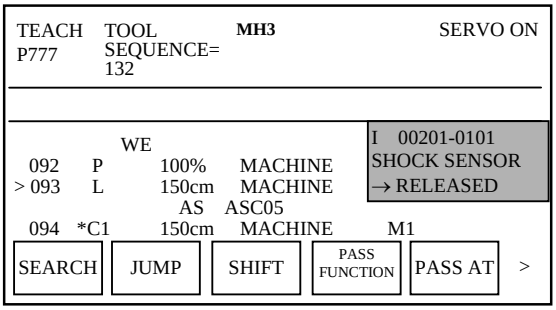
Table 6.2
Operating external force

Direction	External force (kg)
A	3.0
B	3.0
C	3.0
D	3.0

The left table shows the standard load to operate shock sensor when external force is applied to the torch tip. They may vary a little depending on torch type and torch length.

6.2.2 Checking shock sensor for operation

Push the torch tip by hand in Teach mode to check if the message as shown on the right appears. When the torch is unhanded, the message disappears. If no message appears, the cable may not be connected. Check it again.

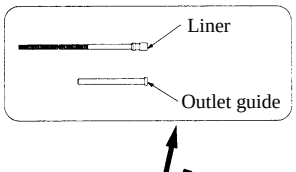


7. Trouble shooting

Table 7.1

Troubles	Causes
No arc.	Contact failure or break of welding cable.
No smooth wire feeding.	Lack of wire pressuring at feeding roll. Wear of tip. Wear of liner. Wear of inner liner. The straigtener has not been mounted
Wire stick on the tip.	No smooth wire feeding. Tip hole becomes larger. Too short distance between tip and base metal.
Shock sensor cannot be released.	Contact failure or break of the shock sensor code. Nozzle is bent. * When an contact accident occurs to stop the robot due to the detection signal of the shock sensor, first inspect the cause of the accident. If the robot is operated or the power is turned ON again without finding the cause, there may be danger. Take enough care. For releasing the contact, refer to the Instruction Manuals of Robot Control (Operation and Teaching).
The widths of the cleaning on both sides are not the same.	The tip body is eccentric with respect to the nozzle. (The eccentricity at the point of the tip exceeds ±0.5mm.)
The shield is bad.	The specified tip has not been mounted

8. Parts for replacement in changing welding wire diameter



The following parts may be required to change according to the wire diameter.

1. Tip
2. Inner Liner
3. Liner
4. Outlet guide

When the welding wire diameter is changed, correct parts should be selected according to the wire diameter. The following list shows the parts.

Note) For feeding roll, refer to the Instruction Manual of Wire Feeding Unit.

Fig. 8.1
Parts for replacement in changing wire diameter

Table 8.1 Combination Table of MIG tip

●Standard, △Option

Wire diameter / Torch model	ϕ1.0	ϕ1.2
Parts No.	U4167H13	U4167H12
Outline drawing		
MTXA-2531	△	●
MTXCA-2531	△	●

●Standard, △Option

Wire diameter / Torch model	ϕ1.2	ϕ1.6
Parts No.	K980B86	K980B88
Outline drawing		
MTXAW-5031	△	●
MTXCAW-5031	△	●

Table 8.2 Combination Table of MIG inner liner

●Standard, △Option

Wire diameter / Torch model	ϕ1.0 - ϕ1.2		ϕ1.6	
Parts No.	L7062D00	L7063C00	L7062E00	L7063D00
Outline drawing				
MTXAW-5031	△	-	●	-
MTXCAW-5031	-	△	-	●

Table 8.3 Combination Table of MIG liner

●Standard, △Option

Wire diameter / Torch model	ϕ1.0 - ϕ1.2	ϕ1.6
Parts No.	U4432G02	L7062F01
Outline drawing		
MTXA-2531	●	△
MTXCA-2531	●	△
MTXAW-5031	△	●
MTXCAW-5031	△	●

Table 8.4 Combination Table of MIG outlet guide

●Standard, △Option

Wire diameter / Torch model	ϕ1.0 - ϕ1.2	ϕ1.6
Parts No.	U2586F01	U2586F02
Outline drawing		
MTXA-2531	●	△
MTXCA-2531	●	△
MTXAW-5031	△	●
MTXCAW-5031	△	●

9. Parts list

Shock sensor unit, Hood ASSY, Nozzle holder, Power supply wire ASSY of the torch are common. Nozzle fitting element is interchangeable for all the models. It can be replaced.

Note) In replacing, torch gauge and tool Parameters should be changed.

When the parts of the torch are worn or Damaged in operating, order from our offices or representatives with referring to the following lists.

When ordering, specify parts name and parts No.(or specifications).

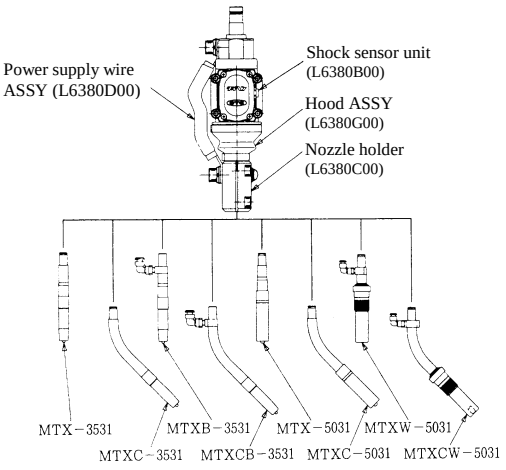


Fig. 9.1
Combination table of shock sensor and torch

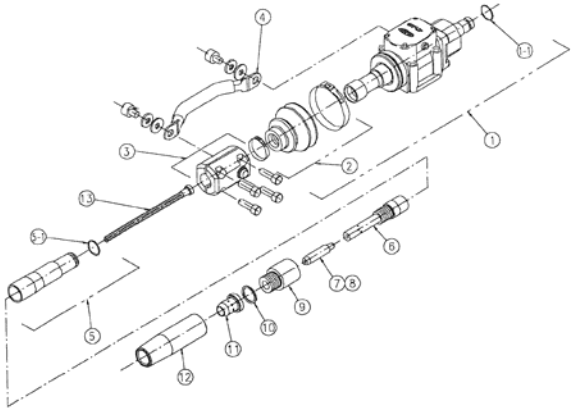


Fig. 9.2 MTXA-2531 Parts drawing

Table 9.1 MTXA-2531 Parts list

No.	Parts No.	Parts name	Quantity required	
1	L6380B00	Shock sensor unit	1	
1-1	3574-017	O-ring	(1)	
2	L6380G00	Hood ASSY	1	
3	L6380C00	Nozzle holder ASSY	1	
4	L6380D00	Power supply wire ASSY	1	
5	L7060B00	Torch body ASSY	1	
5-1	3574-007	O-ring	(1)	
6	U4400G01	Tip body	1	
7	U4167H12	Tip (1.2)	1	
8	U4167H13	Tip (1.0)	1	Option
9	U4173L00	Insulator	1	
10	L6573C02	Spring washer	1	
11	U2774E03	Orifice	1	
12	U4432G01	Nozzle(No.10)	1	
13	L7060D01	Inner liner	1	

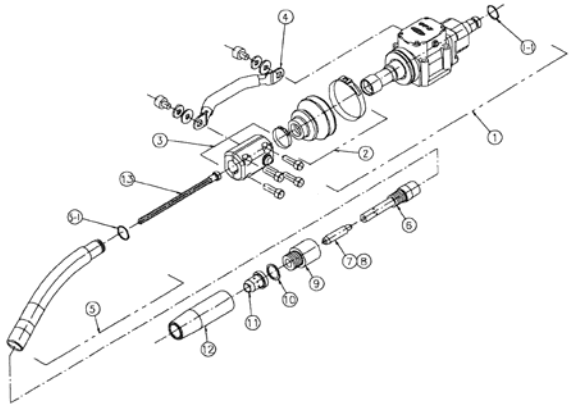


Fig. 9.3 MTXCA-2531 Parts drawing

Table 9.2 MTXCA-2531 Parts list

No.	Parts No.	Parts name	Quantity required	
1	L6380B00	Shock sensor unit	1	
1-1	3574-017	O-ring	(1)	
2	L6380G00	Hood ASSY	1	
3	L6380C00	Nozzle holder ASSY	1	
4	L6380D00	Power supply wire ASSY	1	
5	L7061B00	Torch body ASSY	1	
5-1	3574-007	O-ring	(1)	
6	U4400G01	Tip body	1	
7	U4167H12	Tip (1.2)	1	
8	U4167H13	Tip (1.0)	1	Option
9	U4173L00	Insulator	1	
10	L6573C02	Spring washer	1	
11	U2774E03	Orifice	1	
12	U4432G01	Nozzle(No.10)	1	
13	L7061C01	Inner liner	1	

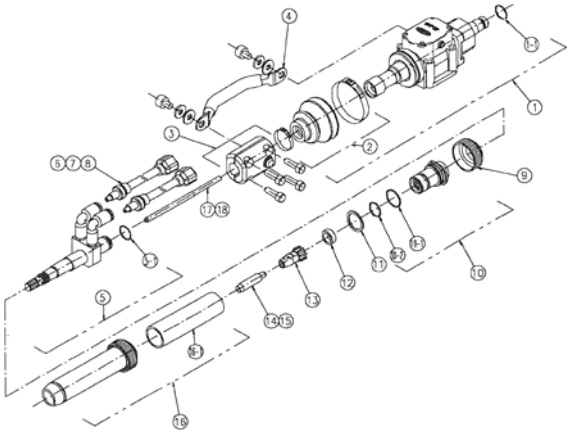


Fig. 9.4 MTXAW-5031 Parts drawing

Table 9.3 MTXAW-5031 Parts list

No.	Parts No.	Parts name	Quantity required	
1	L6380B00	Shock sensor unit	1	
1-1	3574-017	O-ring	(1)	
2	L6380G00	Hood ASSY	1	
3	L6380C00	Nozzle holder ASSY	1	
4	L6380D00	Power supply wire ASSY	1	
5	L7062B00	Torch body ASSY	1	
5-1	3574-007	O-ring	(1)	
6	L6571D00	Cooling water hose(1)	1	6m
7	L6571E00	Cooling water hose(2)	1	8m, Option
8	L6571F00	Cooling water hose(3)	1	10m, Option
9	U4430P04	Cap nut	1	
10	U4430N00	Insulator includes 11&12	1	
10-1	3574-003	O-ring	1	
10-2	3574-006	O-ring	1	
11	BWW-625	Wave washer	1	
12	U4430P01	Nut	1	
13	U4430P02	Tip nut	1	
14	K980B88	Tip(1.6)	1	
15	K980B86	Tip(1.2)	1	Option
16	U4430H00	Nozzle ASSY	1	
16-1	U4430H06	Insulating sleeve	(1)	
17	L7062D00	Inner liner(1.2)	1	Option
18	L7062E00	Inner liner(1.6)	1	

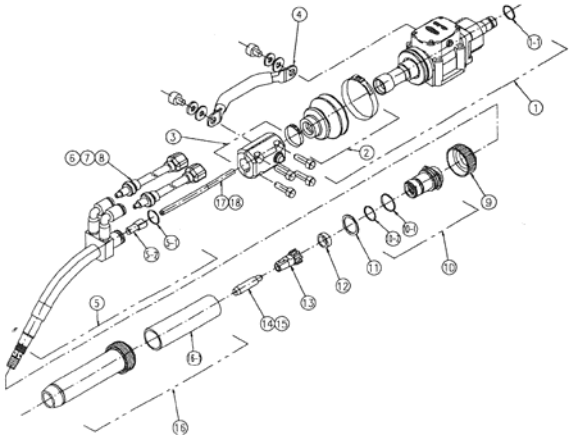


Fig. 9.5 MTXCAW-5031 Parts drawing

Table 9.4 MTXCAW-5031 Parts list

No.	Parts No.	Parts name	Quantity required	
1	L6380B00	Shock sensor unit	1	
1-1	3574-017	O-ring	(1)	
2	L6380G00	Hood ASSY	1	
3	L6380C00	Nozzle holder ASSY	1	
4	L6380D00	Power supply wire ASSY	1	
5	L7063B00	Torch body ASSY	1	
5-1	3574-007	O-ring	(1)	
6	L6571D00	Cooling water hose(1)	1	6m
7	L6571E00	Cooling water hose(2)	1	8m, Option
8	L6571F00	Cooling water hose(3)	1	10m, Option
9	U4430P04	Cap nut	1	
10	U4430N00	Insulator	1	
10-1	3574-003	O-ring	1	
10-2	3574-006	O-ring	1	
11	BWW-625	Wave washer	1	
12	U4430P01	Nut	1	
13	U4430P02	Tip nut	1	
14	K980B88	Tip(1.6)	1	
15	K980B86	Tip(1.2)	1	Option
16	U4430H00	Nozzle ASSY	1	
16-1	U4430H06	Insulating sleeve	(1)	
17	L7063C00	Inner liner(1.2)	1	Option
18	L7063D00	Inner liner(1.6)	1	

Table 9.5 Coaxial power cable parts list

No.	Parts No.	Part Name	Q'ty Required	Remarks
1		**Power Cable Assembly**	1	
2	Refer to the right table.	Shock sensor cable	1	
3	L6611B00	Gas hose ASSY	1	
4	L6611C01	Power adapter	1	
5	U4167F01	Cable clamp (1)	1	
6	U4167F02	Cable clamp (2)	1	
7	M4 × 16	Cross recessed round head screw	4	
8	M4 × 16	Hexagon nut	4	
9	M4 × 8	Cross recessed round head screw	1	
10	L6611D04	Guide adapter	1	
11	U69B34	Outlet guide (0.9~1.2)	1	
12	U69B35	Outlet guide (1.2~1.6)	(1)	
13	U2770K01	Outlet guide (0.8)	(1)	
14	L6611D02	Liner (0.9~1.2)	1	L-6611~L-6613 Use
15	U4170H02	Liner (0.9~1.2)	1	L-6614~L-6625 Use
16	L6611D01	Liner (1.2~1.6)	(1)	L-6611~L-6613 Use
17	U4173G04	Liner (1.2~1.6)	(1)	L-6614~L-6625 Use
18	L6611D03	Liner (0.8~0.9)	(1)	L-6611~L-6613 Use
19	U5353G01	Liner (0.8~0.9)	(1)	L-6614~L-6625 Use
20	L6577B01	Cap	1	

No.	Parts No.	Part Name	Q'ty Required	Remarks
※21	L7062F	Insert Parts (1)	1	Alum. Wire ϕ1.0~ϕ1.2 Use
21-1	U2586F02	Outlet Guide (1)	(1)	
21-2	L7062F01	Plastic Liner (1.6)	(1)	
※22	L7062G	Insert Parts (2)	1	Alum. Wire ϕ1.2~ϕ1.6 Use
22-1	U2586F01	Outlet Guide (1)	(1)	
22-2	U4432G02	Plastic Liner	(1)	

Shock Sensor Cable List

No.	Parts No.	Part Name	Q'ty Required	Remarks
2	L6577B00	Shock sensor cable (1.1M)	1	
	L6577C00	Shock sensor cable (1.2M)	1	
	L6577D00	Shock sensor cable (1.3M)	1	
	L6577E00	Shock sensor cable (1.4M)	1	
	L6577F00	Shock sensor cable (1.5M)	1	
	L6577G00	Shock sensor cable (1.6M)	1	
	L6577H00	Shock sensor cable (1.8M)	1	
	L6577J00	Shock sensor cable (2.1M)	1	
	L6577K00	Shock sensor cable (2.5M)	1	

NOTE: The liner and outlet guide for the standard configuration are for steel use.

The liners and outlet guides listed next to the ※ mark must be ordered separately

Fig. 9.6 Coaxial power cable parts drawing