RESISTANCE WELDING HEAD

MH-1201A

OPERATION MANUAL

AMADA®

Z09M0612E-07

Thank you for purchasing our Resistance Welding Head **MH-1201A**.

- This operation manual explains its method of operation and precautions for use.
- Before using, read this operation manual carefully; after reading, save it in a proper place where you can easily access.

Contents

1. Special Precautions

(1) Safety Precautions

Before using, read "Safety Precautions" carefully to understand the correct method of use.

- These precautions are shown for safe use of our products and for prevention of damage or injury to operators or others. Be sure to read each of them, since all of them are important for safety.
- The meaning of the words and symbols is as follows.

⚠ DANGER

Denotes operations and practices that may imminently result in serious injury or loss of life if not correctly followed.

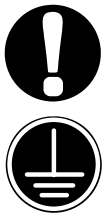
⚠ WARNING

Denotes operations and practices that may result in serious injury or loss of life if not correctly followed.

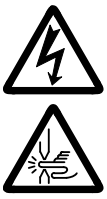
⚠ CAUTION

Denotes operations and practices that may result in personal injury or damage to the equipment if not correctly followed.

These symbols denote "prohibition".
They are warnings about actions out of the scope of the warranty of the product.



These symbols denote actions which operators must take.



Each symbol with a triangle denotes that the content gives notice of DANGER, WARNING or CAUTION to the operator.

⚠ DANGER

Never disassemble, repair or modify the Welding Head
These actions can cause electric shock and fire. Do not do anything other than the maintenance described in the operation manual.

Never burn, destroy, cut, crush or chemically decompose the Welding Head
This product incorporates parts containing gallium arsenide (GaAs).

⚠ WARNING

Do not put your hands between the electrodes

When welding, keep your fingers and hands away from the electrodes.

Do not touch any welded part or electrodes during welding and just after welding finished

The welded part of a workpiece, electrodes and electrode holder are very hot. Do not touch them; otherwise you may be burnt.

Do not touch electrode when supplying or exhausting high-pressure air

Upper electrode may move forcefully. Be careful not to have your finger and tool pinched.

Use proper tools (wire strippers, pressure wire connectors, etc) for termination of the connecting cables

Do not cut the conductor of wire. A flaw on it can cause fire and electric shock.

Do not damage the power cable and connecting cables

Do not tread on, twist or tense any cable. The power cable and connecting cables may be broken, and that can cause electric shock and fire.
When you need any repair or replacement, consult us or your distributor.

Connect the specified cables securely

Cables of insufficient current capacities and loose connections can cause fire and electric shock.

Stop the operation if any trouble occurs

Continuous operation after occurrence of a trouble such as burning smell, abnormal sound, abnormal heat, smoke, etc. can cause electric shock and fire. If such a trouble occurs, immediately consult us or your distributor.

Persons with pacemakers must stay clear of the welding machine

A person who uses a pacemaker must not approach the welding machine or walk around the welding shop while the welding machine is in operation, without being permitted by his/her doctor. The welding machine generates a magnetic field and has effects on the operation of the pacemaker while it is turned on.

Wear protective glasses

If you look at the surface flash and expulsion directly during welding, your eyes may be damaged.

⚠ CAUTION

Apply the specified source voltage

Application of a voltage out of the specified range can cause fire and electric shock.

Do not splash water on the Welding Head

Water splashed over the electric parts can cause electric shock and short circuits.

Install the Welding Head on firm, level surface.

If the Welding Head falls or drops, injury may result.

Keep combustible matter away from the welding machine.

Surface flash and expulsion can ignite combustible matter. If it is impossible to remove all combustible matter, cover them with non-combustible material.

Do not cover the Welding Head with a blanket, cloth, etc.

If such a cover is used, it may be overheated and burn.

Keep a fire extinguisher nearby.

Keep a fire extinguisher in the welding shop in case of fire.

Maintain and inspect the Welding Head periodically.

Maintain and inspect the Welding Head periodically, and repair any damage nearby before starting operation.

Protective gear must be worn

Put on protective gear such as protective gloves, long-sleeve jacket, leather apron, etc. Surface flash and expulsion can burn the skin if they touch the skin.

Do not use this Welding Head for purposes other than welding

Use of this Welding Head in a manner other than specified can cause electric shock and fire.

(2) Precautions for Handling

■ Do not install this Welding Head in the following:
- Damp places where humidity is 90% or higher,
- Dusty places,
- Places where chemicals are handled,
- Places near a high noise source,
- Hot or cold places where temperatures are above 40°C or below 5°C, and
- Places where water will be condensed.

■ Clean the outside of the Welding Head with a soft, dry cloth or one wet with a little water. If it is very dirty, use diluted neutral detergent or alcohol. Do not use paint thinner, benzine, etc., since they can discolor or deform the Welding Head.

■ Do not put anything other than a workpiece, e.g., a tool, a screw, etc., between the electrodes. It can cause serious trouble.

■ Do not put a screw, a coin, etc., in the Welding Head, since they can cause a malfunction.

■ Operate the Welding Head according to the method described in this operation manual.

(3) On Disposal

This product incorporates parts containing gallium arsenide (GaAs). At the time of disposal, separate it from general industrial waste or domestic waste and carry out the disposal in accordance with applicable laws and regulations.

2. Features

The **MH-1201A** Precision Resistance Welding Head has the following features:

- Since the electrode force can be adjusted continuously, parameter setting can be made finely.
- Since the response (follow-up) of the electrode is fast, explosive flashes and indentation are not produced, and the workpiece surfaces are finished clean.
- The durable construction provides high reliability and stable weld quality.
- 100 V AC- and 24 V DC-rated solenoid valve are available.

3. Specifications and Accessories

(1) Specifications

Items	MH-1201A -00	MH-1201A -41	MH-1201A -10	MH-1201A -20	MH-1201A -50
Electrode Force	300 to 1200 N (Approx. 30 to 120 kgf) (Continuously adjustable)				
Forcing Method	Spring				
Electrode	Provided				None
Electrode Diameter	φ8 mm				φ12 mm *1
Electrode Stroke	35 mm				
Throat Depth	74 mm			—	74 mm
Electrode-Driving Method	Air Cylinder				
Solenoid Valve Operating Voltage (Power Consumption)	100 V AC (0.9 W)	24 V DC (0.5 W)		— *2	100 V AC (0.9 W)
Welding Current	10000 A (at 2% Duty Cycle) *3				
Load Cell	Not mountable	Mounted	Not mountable		
Frame	Provided			None	Provided
Mass	30 kg			11 kg	30 kg
Air Supply Pressure	0.5 to 0.7 MPa (Fluid: Air)				

(2) Accessories

Check that all of the following accessories are provided.

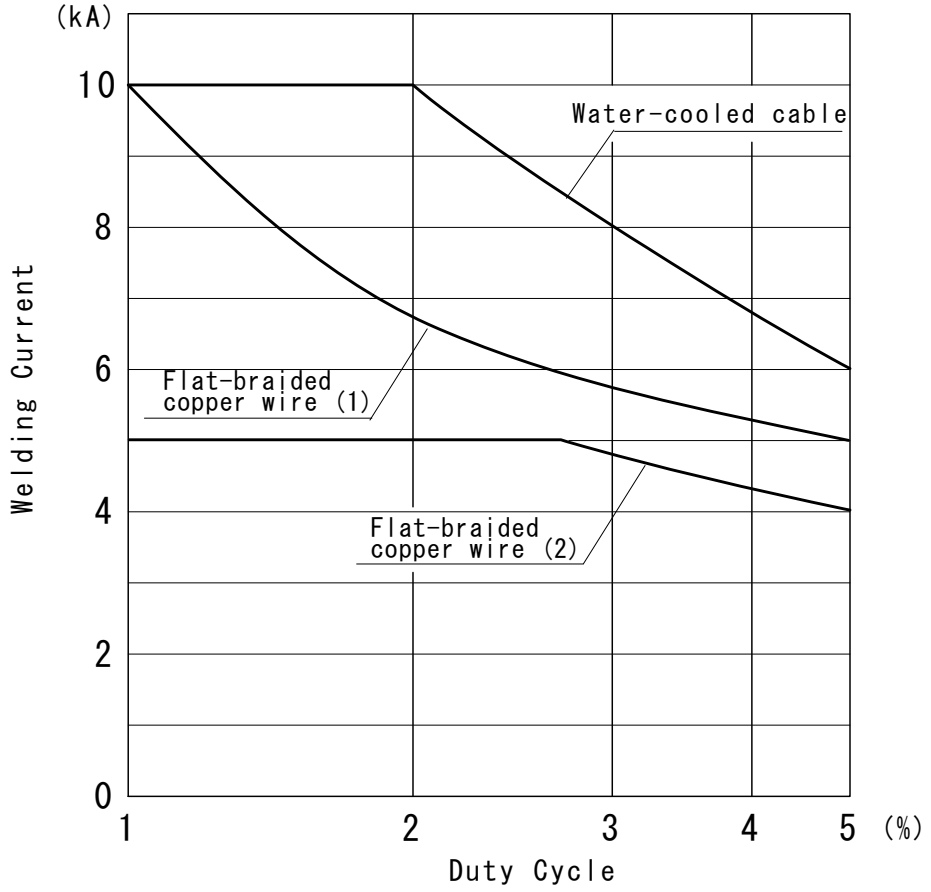
Accessory Name	Specification	MH-1201A -00	MH-1201A -41	MH-1201A -10	MH-1201A -20	MH-1201A -50
Electrode	φ8 mm	2 pcs			1 pc	None *1
Hexagon Socket Head Bolt	M8 x 35	4 pcs			None	4 pcs
Plain Washer	For M8	8 pcs			None	8 pcs
Spring Washer	For M8	4 pcs			None	4 pcs
T-Nut ST	TST8 (Imao Corp.-made)	4 pcs			None	4 pcs
Hexagon Socket Screw Key	For M8 (Nominal size 6)	1 pc				
Single Open-Ended Spanner	Nominal size 6	1 pc				None
Operation Manual	—	1 copy				
Digital Indicator	NTS-4231	None	1 pc	None		

*1: The Electrode of the **MH-1201A-50** is user provided.

*2: The solenoid and regulator of the **MH-1201A-20** are user provided. For the recommendation, see **6. Installation and Connection**.

*3: See “Welding Current vs. Duty Cycle” (p.3-2) for details of current and duty cycle.

(3) Welding Current vs. Duty Cycle



[Cable and copper wire]

- Air-cooled cable: 180 mm^2 x 1000 mm (1 cable)
- Flat-braided copper wire (1): 200 mm^2 x 1000 mm (2 wires)
- Flat-braided copper wire (2): 200 mm^2 x 1000 mm (1 wire)

[Measurement condition]

- Welding power supply: **IS-800A** (400 V AC power supply)
- Welding transformer: **ITH-1050C6W**
- Cooling water: 20°C (1 L/min.)

4. Name and Functions of Each Section

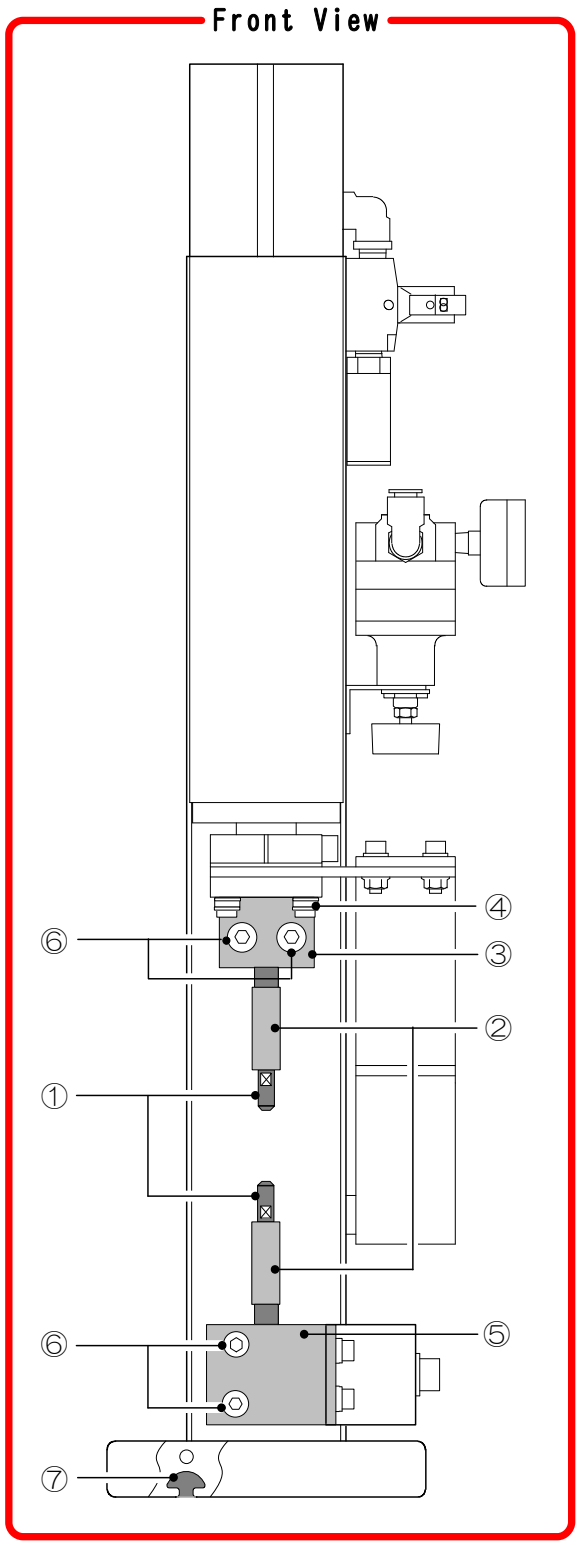


Figure 4-1

NOTE: Hose, tube, etc. are not shown in figures.

① **Electrode** (Material: CrCu)
For spot welding.

② **Water-Cooled Shank**
Water-cooled holder to secure the Electrode.

③ **Electrode Holder (A)**
Secures the Water-Cooled Shank.

④ **Fixing Screw for Electrode Holder (A)**
Secures the Electrode Holder (A).

⑤ **Electrode Holder (B)**
Secures the Water-Cooled Shank.

CAUTION

When operating, do not place any metallic items around the Welding Head. If a screwdriver, a wire, etc., touches the metallic parts of ① to ④ during operation, it may be welded to the Welding Head.

⑥ **Water-Cooled Shank-Fixing Screw**
Secures the Water-Cooled Shank. Loosen for Electrode height adjustment.

⑦ **Head-Fixing Channel**
For securing the **MH-1201A** onto workbench.

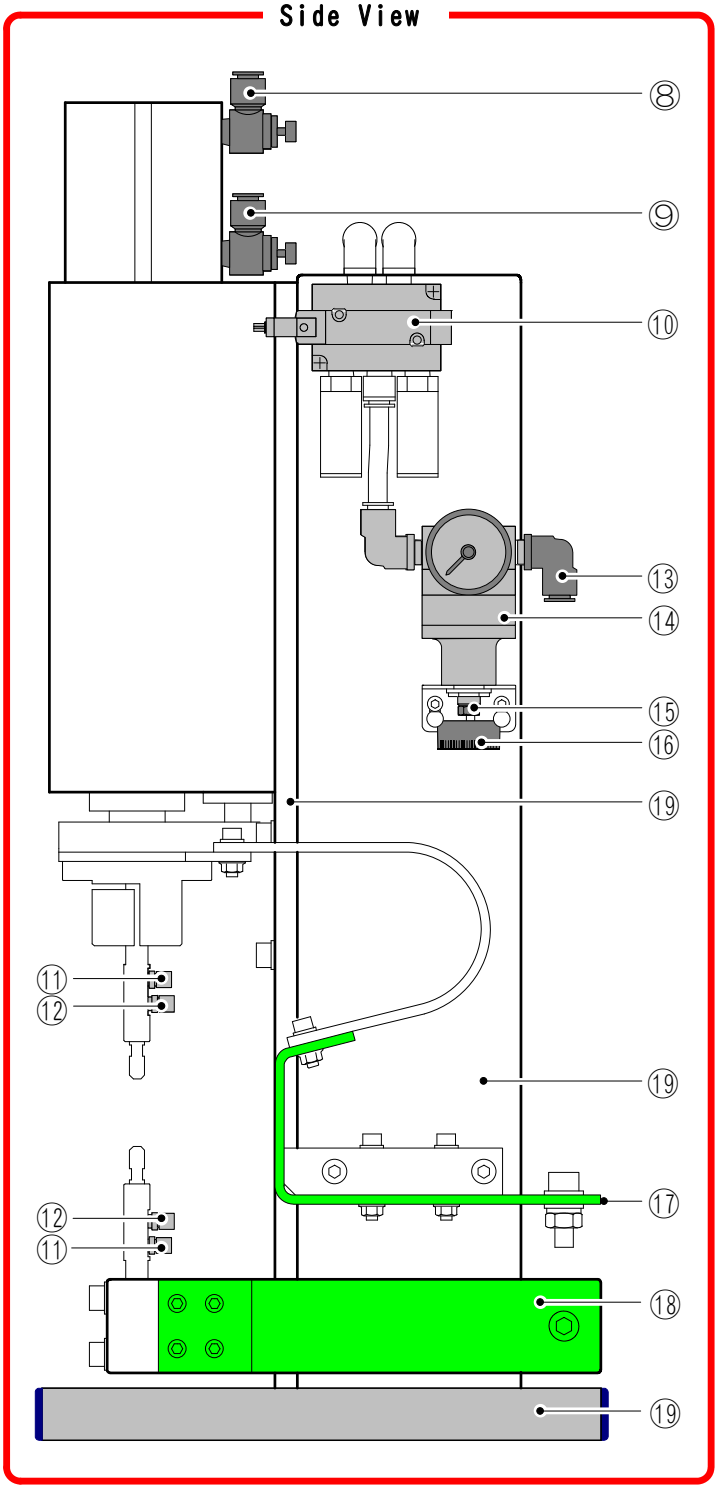


Figure 4-2

⑧ Speed Controller 1
Adjusts Electrode-Up speed.

⑨ Speed Controller 2
Adjusts Electrode-Down speed.

⑩ Solenoid Valve
Changeover valve to control the flow of air.

⑪ Cooling Water Intake
Accepts the cooling water.

Tube Specifications		
Model No.	**MH-1201A -00/-41/-10/ -20**	**MH-1201A -50**
Outer Dia.	φ6 mm	φ10 mm
Inner Dia.	φ4 mm	φ6.5 mm
Material	Nylon, Soft Nylon, Polyurethane	

⑫ Cooling Water Outlet
Exhausts the cooling water. (The tube specifications are same as ⑪)

⑬ [IN] Port
Intake of the high-pressure air. Connects the primary tubing.

Tube Specifications (Common to all models)	
Outer Dia.	φ10 mm
Inner Dia.	φ6.5 mm
Material	Nylon, Soft Nylon, Polyurethane

⑭ Regulator
Decreases the pressure to necessary value, adjusting the weld force.

⑮ Lock Nut
Secures the Knob.

⑯ Knob
Adjusts the air pressure, setting the necessary force.

⑰ Feeder Bar (Upper) (φ11 mm secondary-cable-connecting hole)
Terminal plate to connect the secondary cable. Feeds current to the upper electrode.

⑱ Feeder Bar (Lower) (φ11 mm secondary-cable-connecting hole)
Terminal plate to connect the secondary cable. Feeds current to the lower electrode.

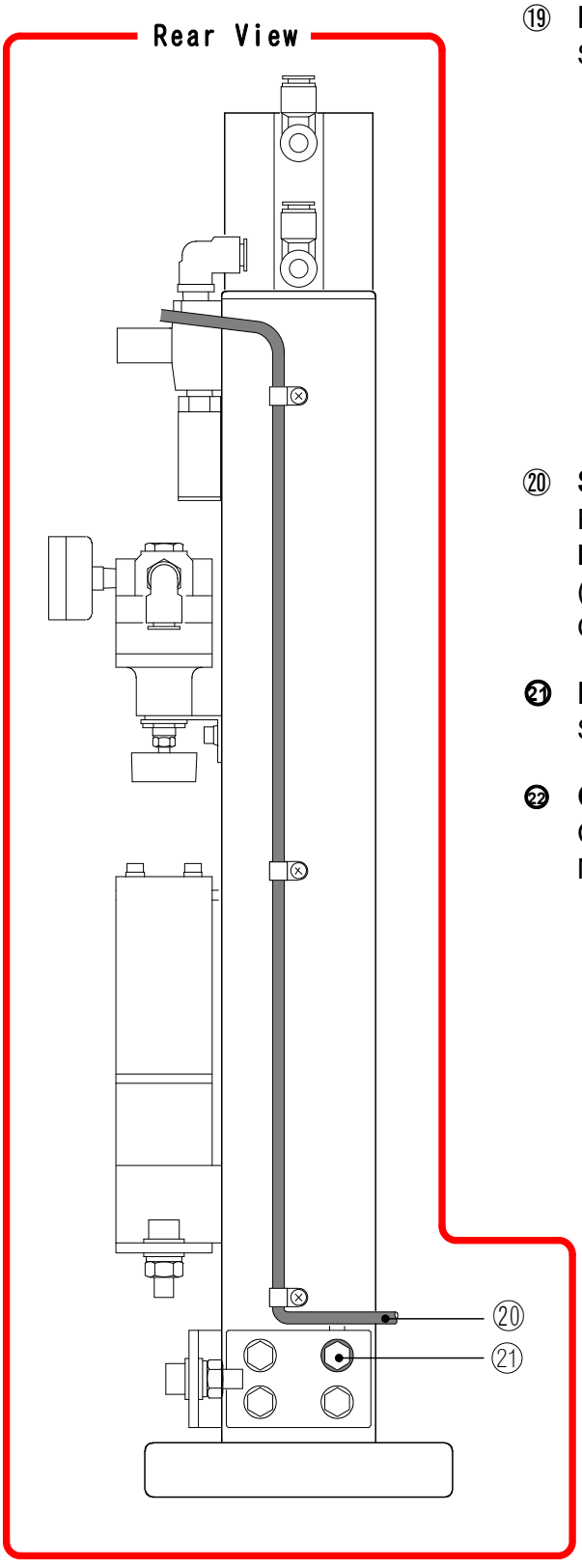


Figure 4-3

⑲ Frames

Support the Welding Head.

> **⚠ CAUTION**
>
> **The welding current flows through the Frames.** Do not place metallic items, such as watches, tools around the Frames during operation since they may be broken and may injure you.

⑳ Solenoid Valve Cable

Feeds power to the solenoid valve.
MH-1201A-10 has red cable (+) and black cable (-).
Other models have no polarity.

㉑ Fixing Screw for Electrode Holder (B)

Secures the Electrode Holder (B).

㉒ Connecting Threaded Holes

Connects Voltage-Detecting Cable (see p.6-3).
M3 and 8 mm in depth.

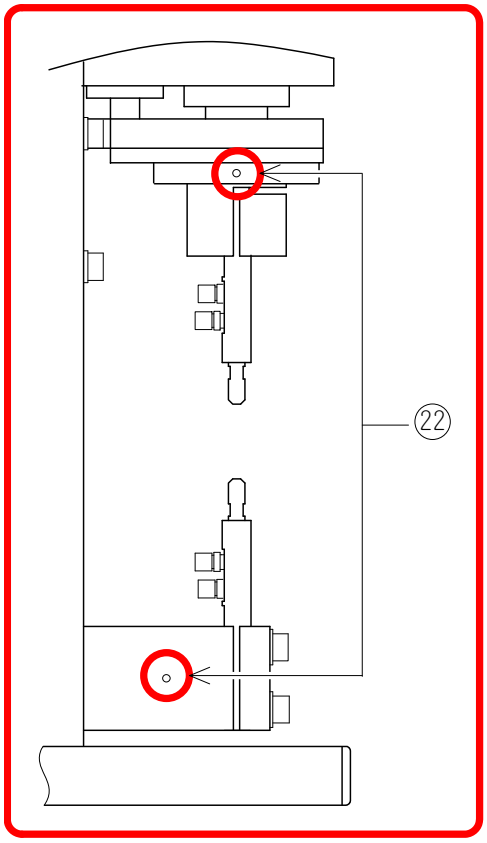


Figure 4-4

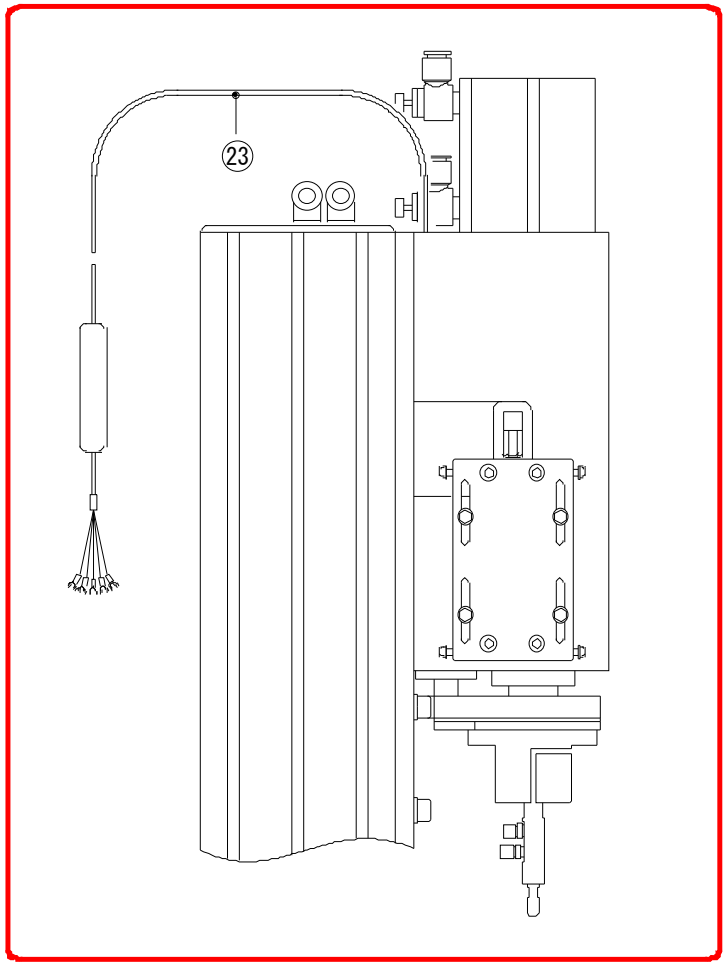


Figure 4-5

㉓ Load Cell Cable

Connects to the indicator.
This is attached to the **MH-1201A-41**.

㉔ **Head-Mounting Hole**
M6 and 15 mm in depth.

㉕ **Feeder Terminal**
Connects the secondary cable.

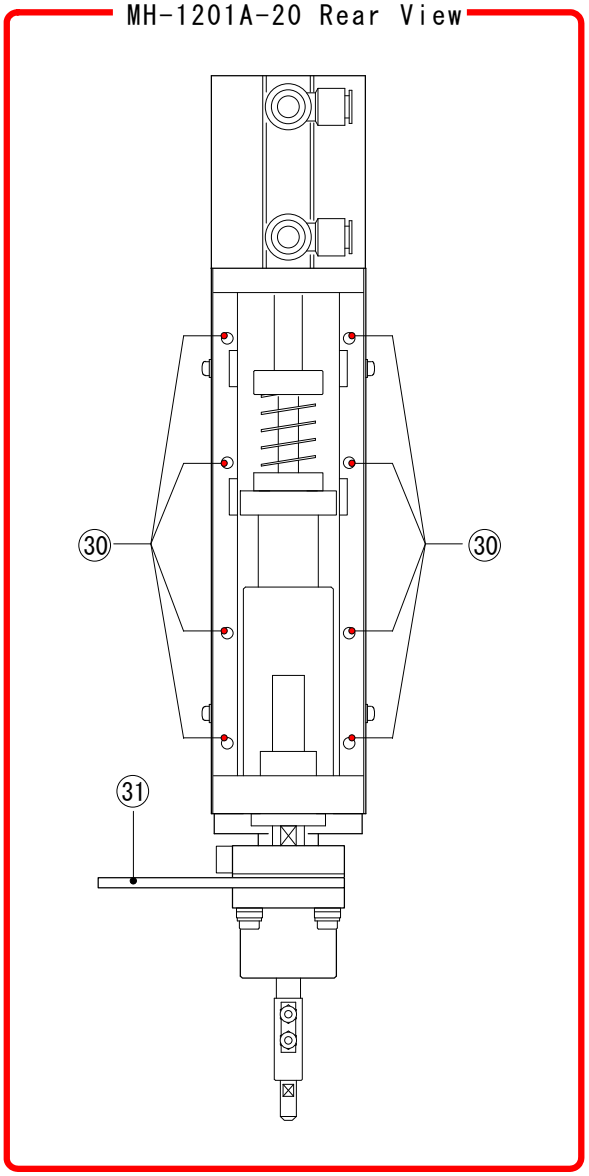
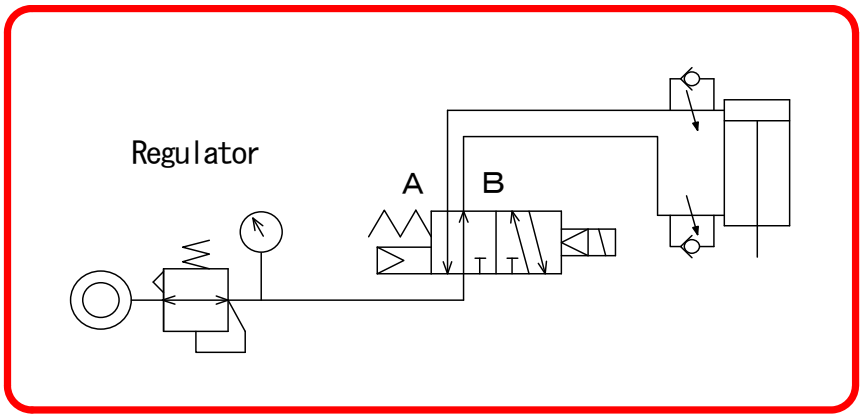


Figure 4-6

5. Piping System Diagrams

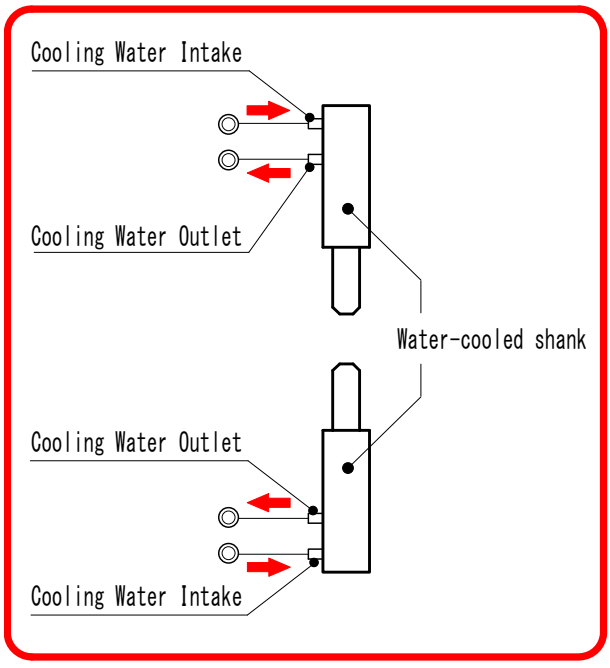
Air Piping System Diagram



⚠ CAUTION

Do not touch the Electrode when feeding and exhausting high-pressure air
The upper electrode may move forcefully; be careful not to have your hand and tools pinched.

Cooling Water Piping System Diagram



6. Installation and Connection

Before using your **MH-1201A**, install it according to the following procedures.

⚠ CAUTION

When using, secure the Welding Head firmly.
If you use it not secured, it may cause injury due to its fall and degraded weld quality.

(1) Determining Where to Install

Determine where to install the **MH-1201A**, welding power supply and welding transformer.

(2) Drilling Mounting Holes

Drill mounting holes on the workbench to secure the **MH-1201A**. When drilling, see the Head-Mounting Dimensions (Figure 6-2).

(3) Positioning T-Nuts

Place the T-Nuts at the determined positions referring to the drawing below.

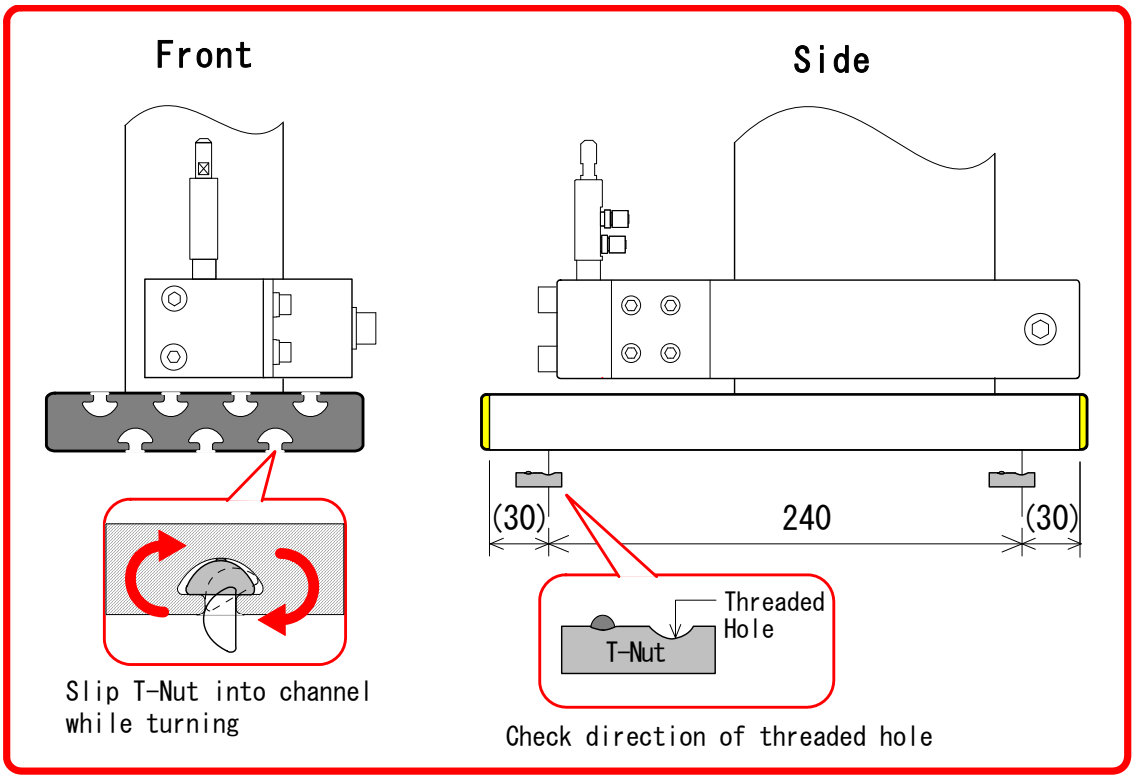


Figure 6-1

(4) Installing the MH-1201A

Install the **MH-1201A** to the workbench with the attached hexagon socket head bolts, plain washers and spring washers. Use a proper tool suitable for the bolts to secure the Head.

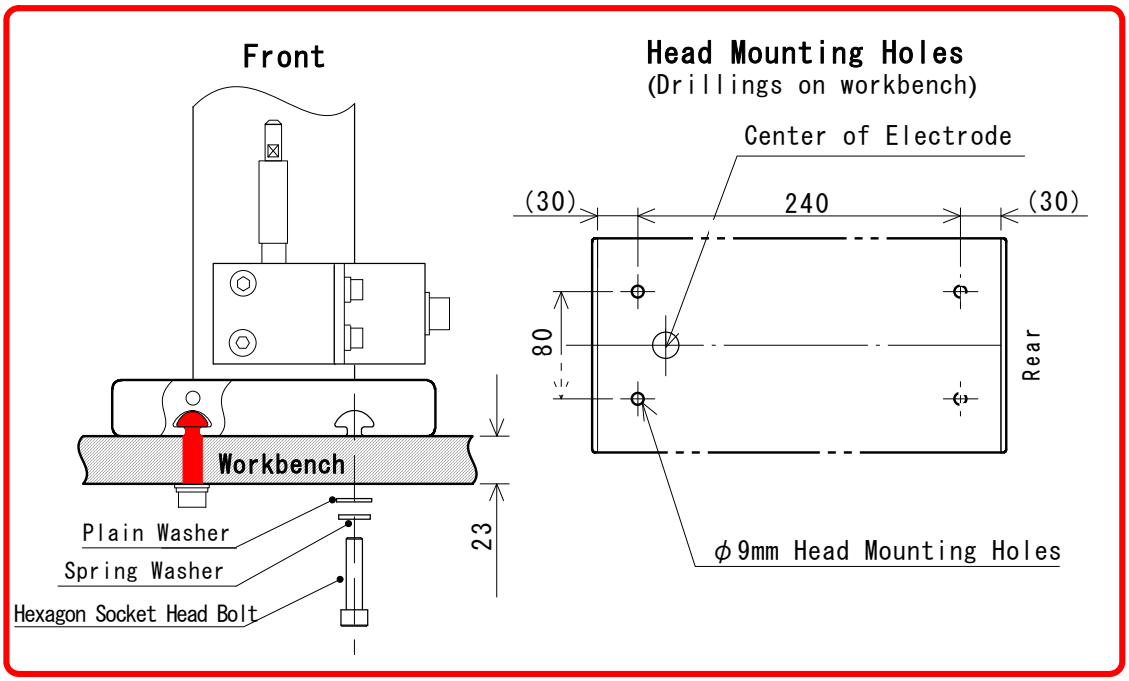


Figure 6-2

ATTENTION

The attached bolts are for installing the **MH-1201A** on our Workbench **MA-11A**. When using another workbench, prepare bolts suitable for it.

(5) Connecting the Welding Power Supply and Welding Transformer

After finishing the installation above, connect the Welding Power Supply and Welding Transformer, and connect the transformer secondary cable to the **MH-1201A** (see Figure 6-3).

The Feeder Bars do not have polarities; connect either one of the transformer secondary cables to either Feeder Bar.

When connecting, use tools of correct sizes for the screws, bolts and nuts to secure cables.

(6) Connecting the Solenoid Valve Cables

After connecting the Welding Power Supply and Welding Transformer, connect the **MH-1201A** Solenoid Valve Cables (see Figure 6-3).

MH-1201A-00/-41/-02/-43/-50: Solenoid Valve Cables have no polarities.
MH-1201A-10: Connect the RED cable to positive (+) pole; BLACK to minus (-).

When connecting, use tools of correct sizes for the screws to secure cables.

ATTENTION

The Secondary Cables are sold separately. Please provide them.
See operation manuals for power supply, transformer and secondary cable connections, respectively.

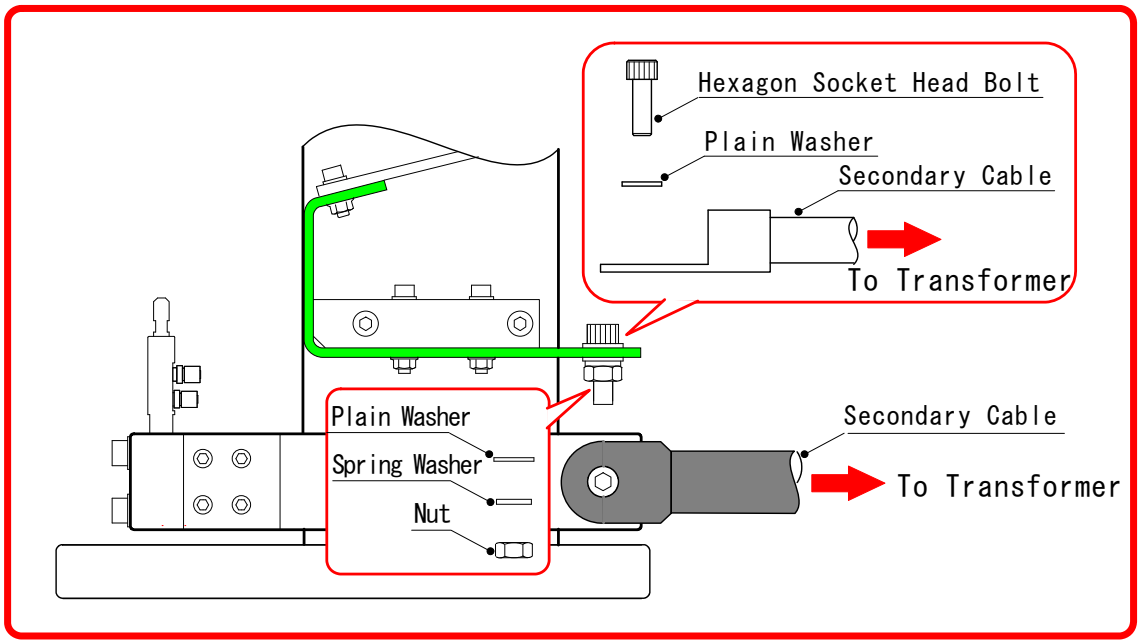


Figure 6-3

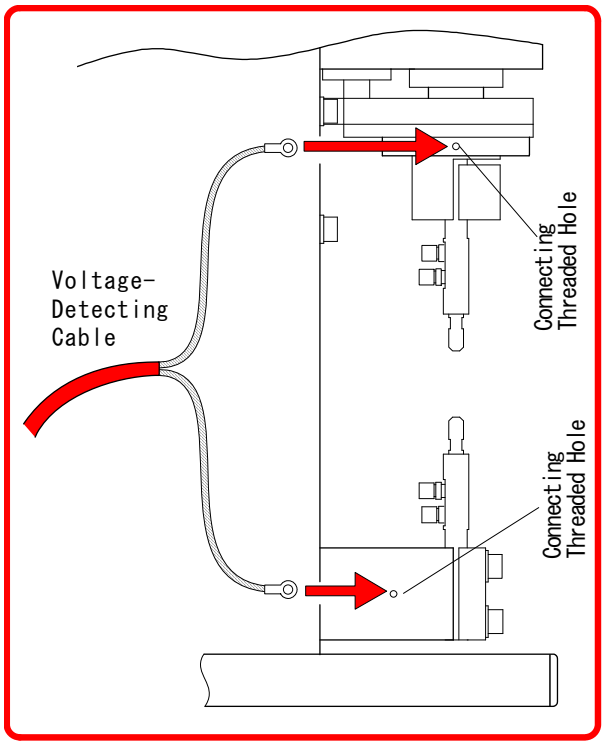


Figure 6-4

(7) Connecting the Voltage-Detecting Cables

When using the voltage-detecting function of Transistor Welding Power Supply **MD-A4000A**, Weld Checker, etc., connect the Voltage-Detecting Cables ([SENS] cable) using the Connecting Threaded Holes.

ATTENTION

The Voltage-Detecting Cables ([SENS] cable) are not attached to the **MH-1201A**.
Please provide them.

(8) Connecting the Cooling Water Hoses and Air Tubes

[Cooling Water Hose Connection]

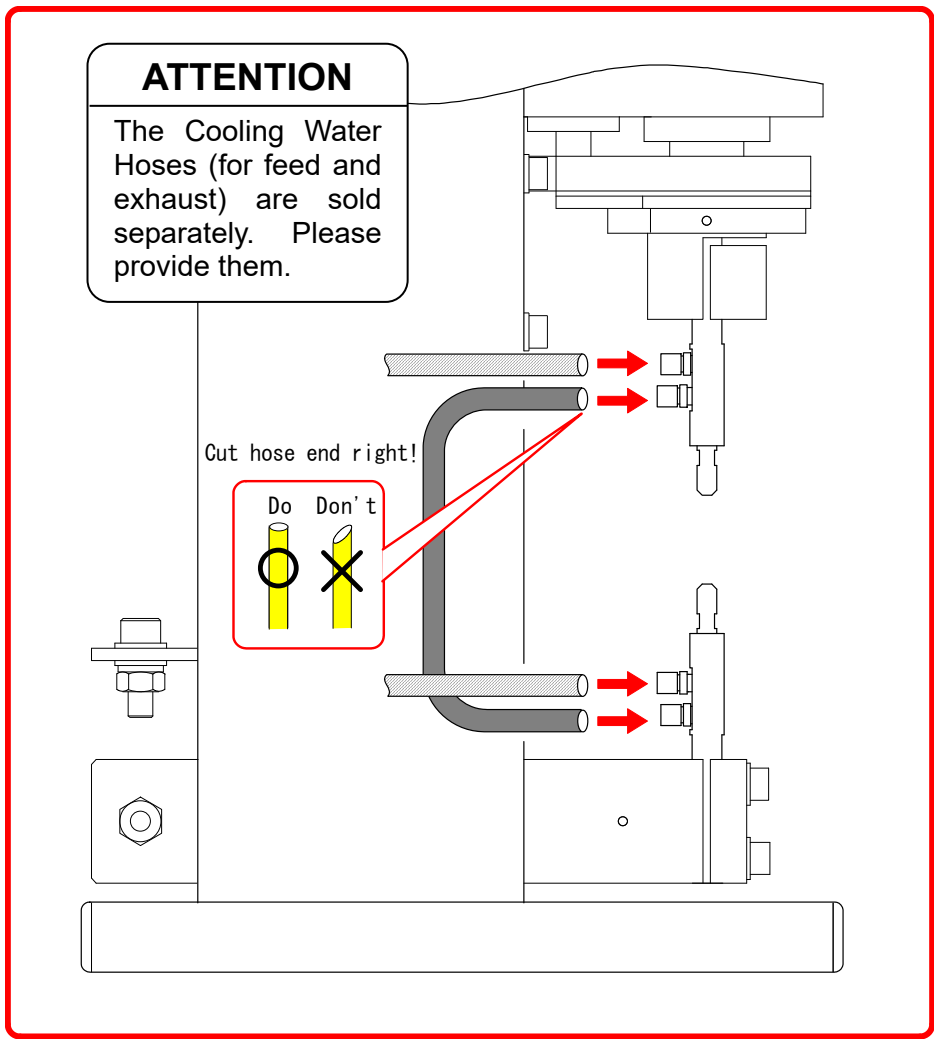


Figure 6-5

[Air Tube Connection]

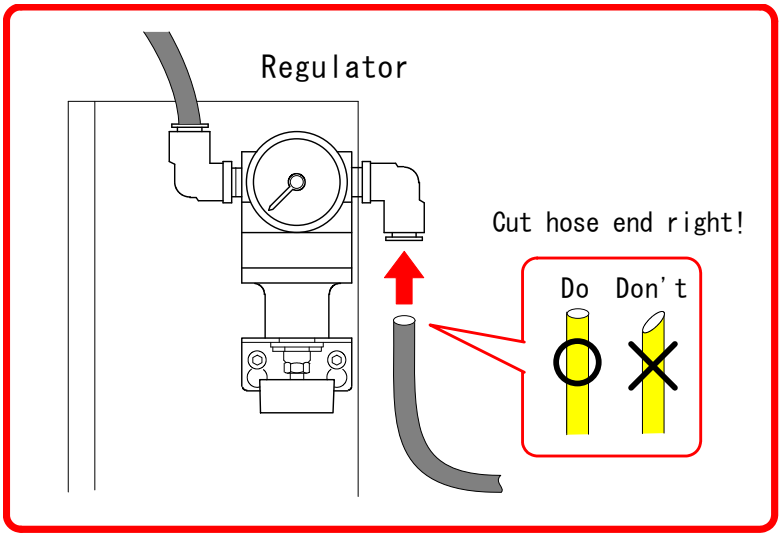


Figure 6-6

⚠ CAUTION

- If the high-pressure air contains residue or dust, the regulator will malfunction. Clean the air using an air filter or a mist separator.

  [Recommendation]
  Air filter: AF3000 (SMC CORPORATION-made)
  Mist separator: AFM3000 (SMC CORPORATION-made)

- **Do not use a lubricator;** it will cause regulator to malfunction.

⚠ WARNING

When inspecting, decrease the pressure setting to zero and shut off the air supply completely. When feeding and exhausting high-pressure air, the upper electrode may move forcefully; take care not to have your hand and tools pinched.

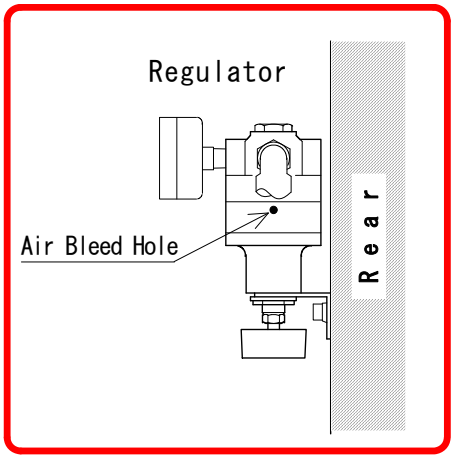


Figure 6-7

⚠ CAUTION

- It is normal that air exhausts all the time from the Air Bleed Hole (Figure 6-7).
- After adjusting the pressure, be sure to tighten the lock nut.

Description on pages 6-6 and -7 is for the **MH-1201A-20**.
Users who are not using it don't need to read these pages.

(9) Mounting the MH-1201A-20 to the Frame

Mount the **MH-1201A-20** to the frame. Use a firm frame. When mounting, secure the screws into all Head-Mounting Holes on the rear (8 pcs).

ATTENTION

Mounting screw, solenoid and regulator are not included in the **MH-1201A**.
Refer to the table below and provide them.

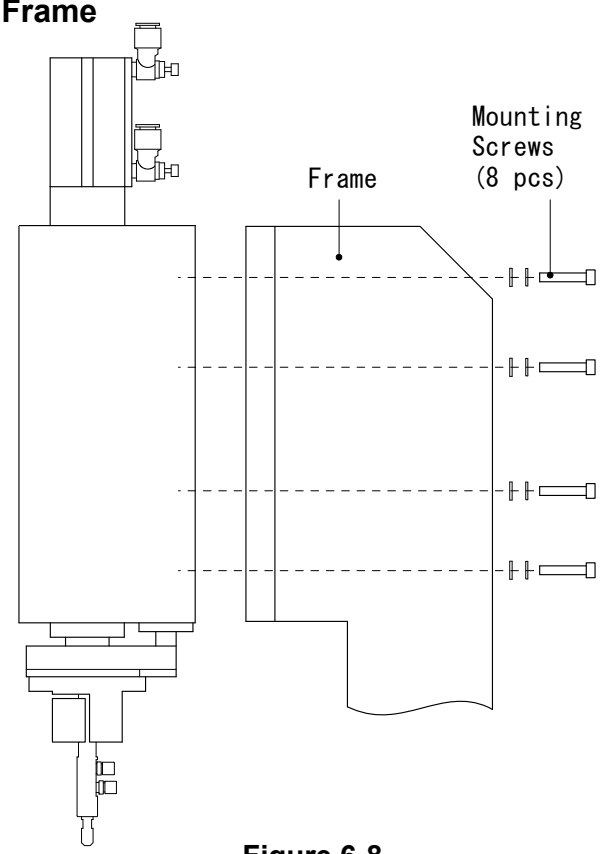


Figure 6-8

Recommendation	
Solenoid	Model No.: SY7140 series (SMC CORPORATION-made) When using an equivalent, select one which meets the following requirement. Effective section: 12.5 mm min. Connection dia.: Rc(PT)1/4 or Rc(PT)3/8
Regulator	Model No.: IR2020-02BG (SMC CORPORATION-made) When using an equivalent, select one which meets the following requirement. Setting range of force: 0.005 to 0.8 MPa Sensitivity: 0.2% max. of full span Repeatability: ±0.5% max. of full span Connection dia.: Rc(PT)1/4 or Rc(PT)3/8
Joint	Connection dia.: Rc(PT)1/4 or Rc(PT)3/8 (One which can connect to Solenoid and Regulator) Applicative tube type: Outer dia.:φ10, Inner dia.:φ6.5
Tube	Outer dia.: φ10, Inner dia.: φ6.5 Material: Polyurethane or Nylon

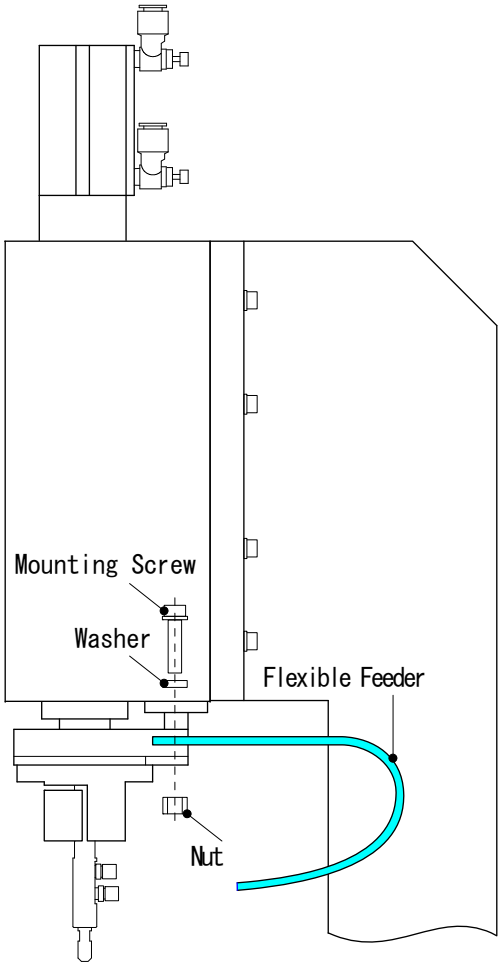


Figure 6-9

(10) Mounting the Flexible Feeder (or the Secondary Cable)

Connect the flexible feeder (or the secondary cable) to the feeder terminal.
When a stiff feeder is connected, the electrode does not move smoothly.

ATTENTION

Flexible feeder, secondary cable and screws are sold separately.
Please provide them.

(11) Connecting the Solenoid to the Regulator

Install the solenoid and the regulator near the welding head.
Set the air supply pressure to 0.5 to 0.7 MPa.

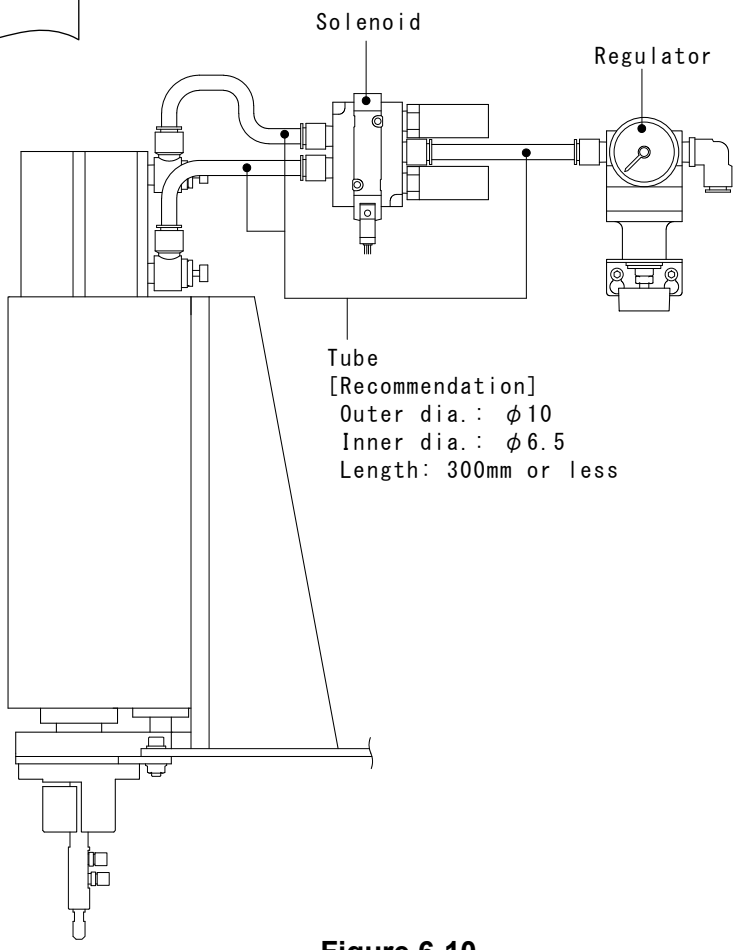


Figure 6-10

Description on this page is for the **MH-1201A-41**.
Users who are not using them don't need to read this page.

(12) Connecting the Load Cell Cable to the Digital Indicator (NTS-4231)

Connect the crimp-on terminal of the Load Cell Cable to the terminal block of the digital indicator.
As the following drawings show, connect the wire to the terminal with the same letter.

ATTENTION

For the power supply cable and the other signal wires, see the operation manual for the digital indicator.

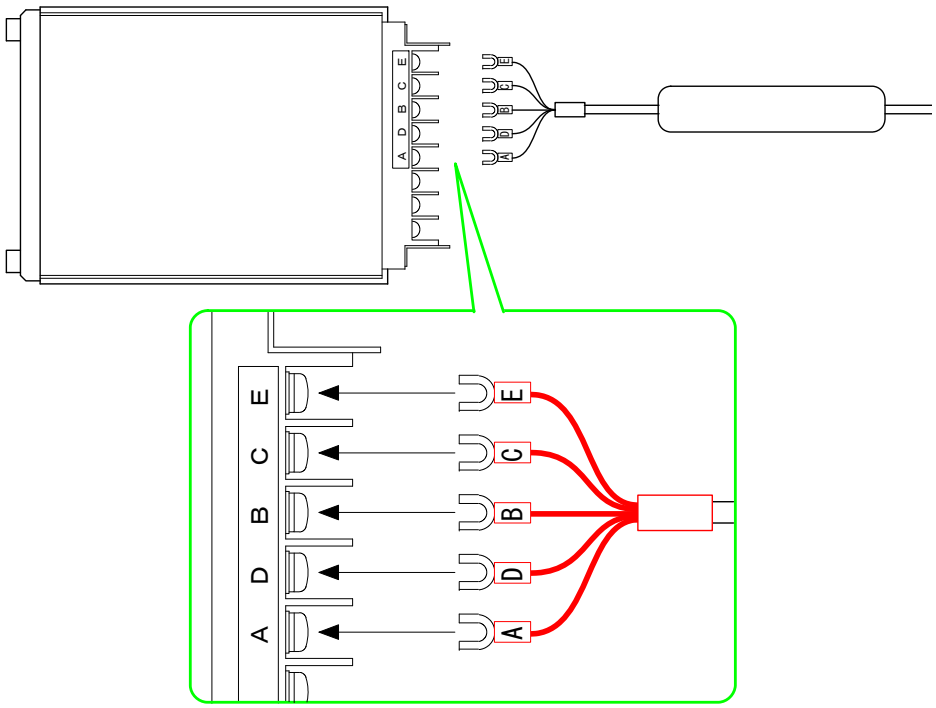


Figure 6-11

7. User's Maintenance

ATTENTION

For the following work, use tools of correct sizes for the screws. After the adjustment, tighten the screws securely.

(1) Replacing the Electrode

A water-cooled electrode is employed. Follow the procedures below:

① Turn off the Main Circuit Breaker of the Welding Power Supply.

② Close the cooling water main valve, shutting off the cooling water supply.

③ Cover the electrode with wastes at the water-cooled shank; engage the attached single open-ended spanner * with the grooves of electrode.

④ Pull out the electrode slowly while turning the single open-ended spanner * clockwise or counterclockwise. Take care because the cooling water may spout out.

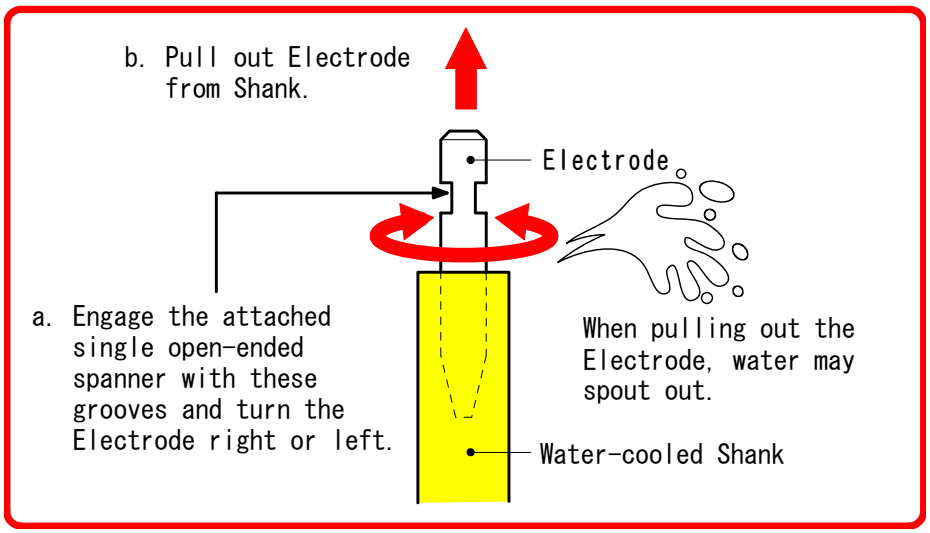


Figure 7-1

⑤ Check that a new electrode has no cut and dust at the engaging portion shown by dotted line in Figure 7-1; insert into the water-cooled shank.
Do not use an electrode having a cut; it will cause water leak. Wipe off dust and stains with wastes.

* The single open-ended spanner is not attached to the **MH-1201A-50**. Please provide tools of correct shape for the electrode.

⑥ Turn on the Main Circuit Breaker of the Welding Power Supply.

⑦ Secure fitting, i.e., engagement of the electrode and water-cooled shank, applying weld force several times.

ATTENTION

When applying weld force, be sure to turn off [WELD ON/OFF] switch.

⑧ Open the cooling water main valve to supply the cooling water.
Check for the water leak from the fitting portion of the electrode. If water leaks, remove the electrode, following ① through ④; check that no cut or stain is at the fitting portion. Re-place the electrode again and supply the cooling water.
If water does not stop leaking, replace with another electrode.

⑨ Checking the electrode height.
When a fixture is used, check the height of electrode carefully.

⑩ Wipe off water around the electrode and water-cooled shank.

⑪ Replacement of electrode is now complete.
Provide workpieces and make a test run to check such as weld strength.

(2) Adjusting the Electrode Stroke and Replacing the Water-Cooled Shank

Loosen the water-cooled shank-fixing screw with the attached hexagon socket screw key to adjust the electrode stroke. After adjusting, make sure to tighten the screw. When replacing the water-cooled shank, stop the cooling-water supply referring to (1) Replacing the Electrode above.

(3) Adjusting the Weld Force

① Turn the knob to adjust the supplied air pressure for desired weld force. Refer to the Weld Force Conversion Chart (p. 7-3) for the relation between air pressure and weld force.

② After adjusting the air pressure, lock the knob with the lock nut.

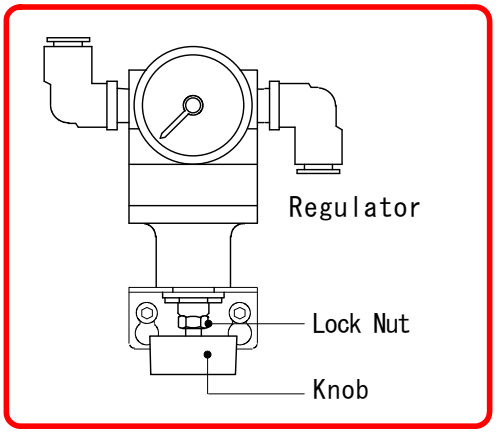
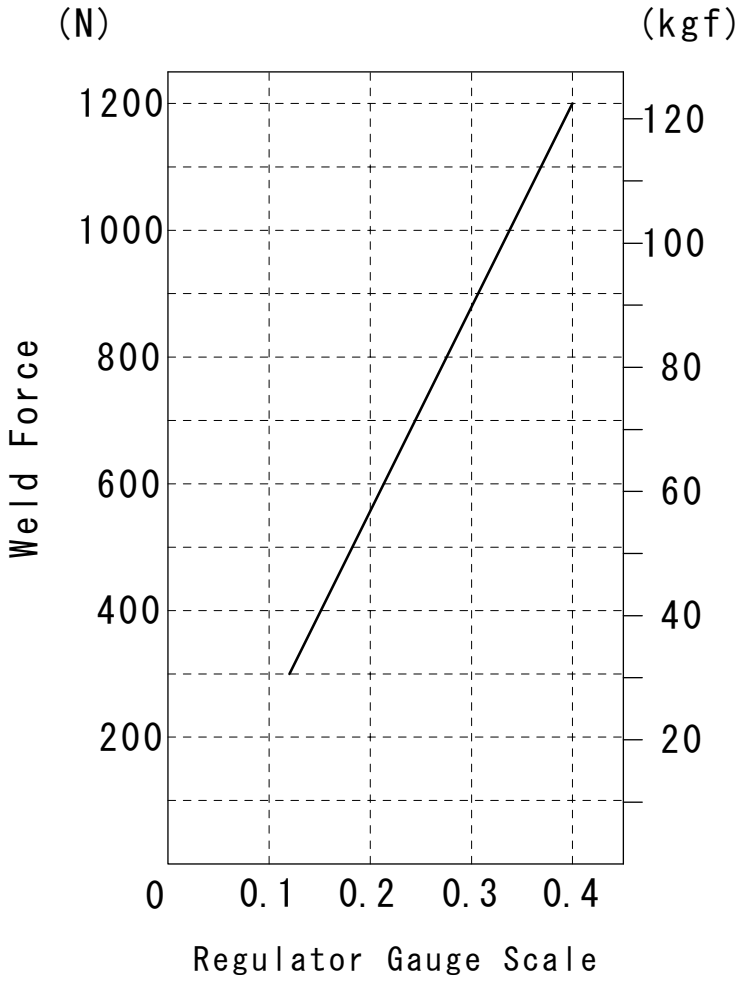


Figure 7-2

ATTENTION

The Weld Force Conversion Chart indicates the theoretical values. When measuring the actual weld force, use a pressure gauge.

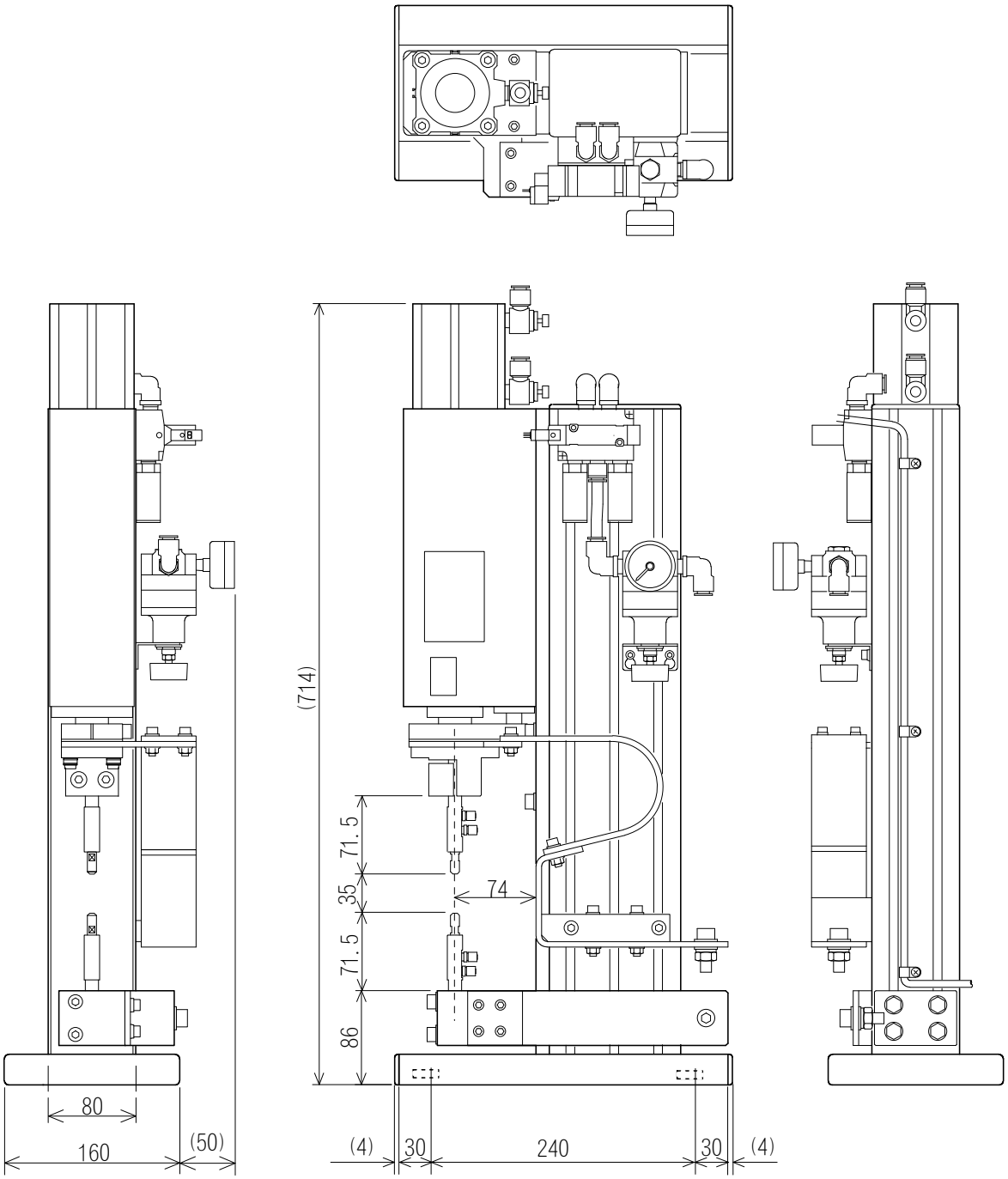
Weld Force Conversion Chart



8. Outline Drawing

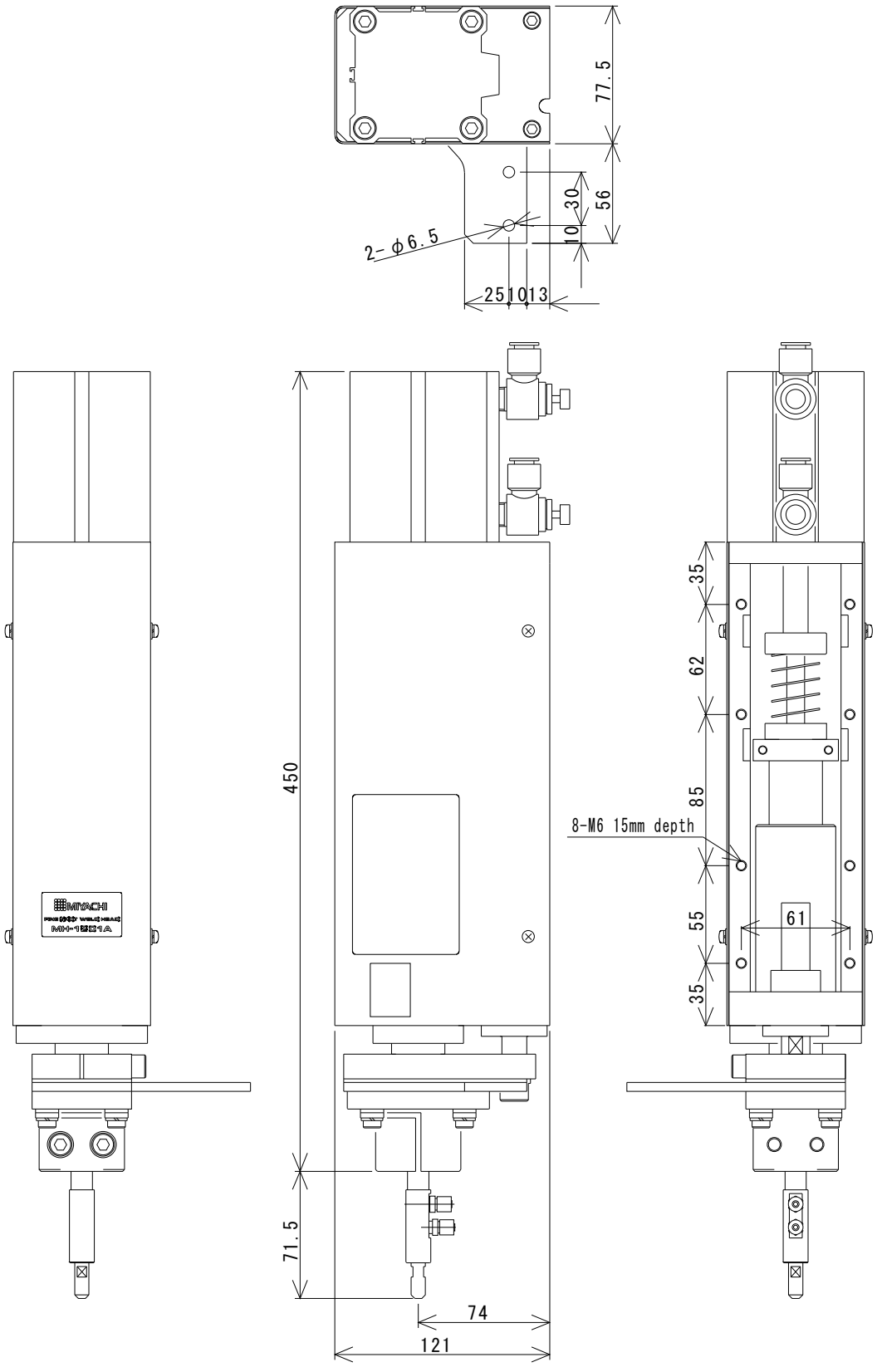
MH-1201A-00 / MH-1201A-41 / MH-1201A-10

(Dimensions in mm)



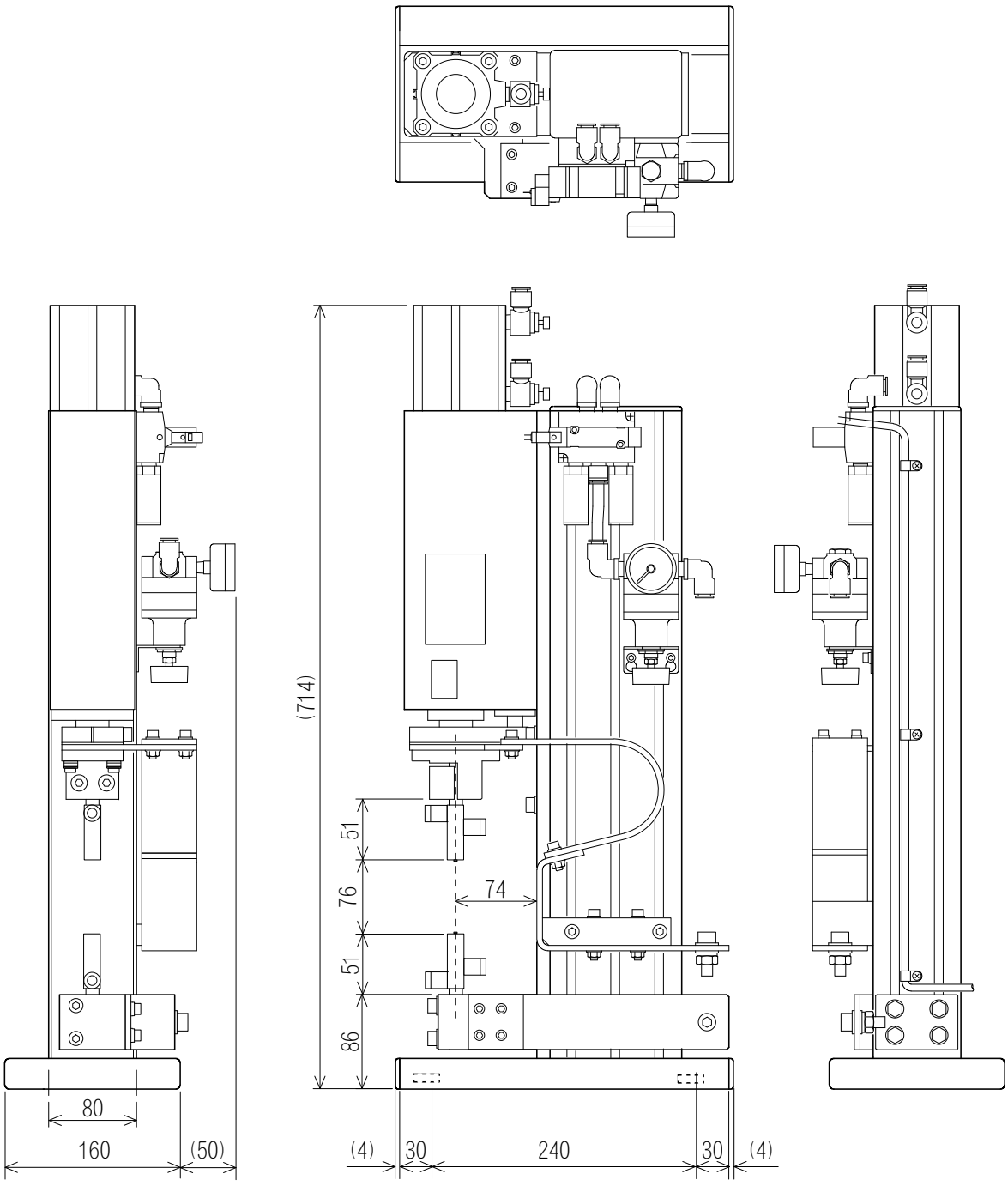
MH-1201A-20

(Dimensions in mm)



MH-1201A-50

(Dimensions in mm)



Digital Indicator (Nihon Tokushu Sokki Corporation-made NTS-4231)

(Dimensions in mm)