MOTOR-DRIVEN RESISTANCE WELDING HEAD

MH-P20B-2□
MH-D20B-2□

OPERATION MANUAL

AMADA®

AA05OM1208811-05

Thank you for purchasing our Motor-Driven Resistance Welding Head **MH-P20B-2□/D20B-2□**.

- 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.

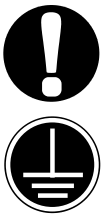
⚠ WARNING

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.

Apply the specified power supply

Application of a voltage out of the specified range 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

Do not splash water on the Welding Head

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

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-carrying capacities and loose connections can cause fire and electric shock.

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 heated 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 higher than 90%,
  - ・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 0°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.

- Operate the button carefully by hand. If it is operated roughly or with the tip of a screwdriver, a pen, etc., this will cause malfunction or damage.

- Since power supply to the motor is cut off at power off or emergency stop, the force follow-up mechanism may lower to the maximum stroke position by its own weight.

(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

- Owing to motor-driven mechanism, stable electrode force is always obtained even if the electrode opening changes. Also, you don't need to adjust the electrode opening finely when replacing electrode.
  The electrode force is 5 to 35 N (0.5 to 3.5 kgf) per electrode on **MH-P20B**, and 10 to 70 N (1 to 7 kgf) on **MH-D20B**.

- You can fit the electrode-force speed to suit your welding work as it is adjustable in four steps; the electrode-up/down speed, in eight steps.

- Thirty-one welding schedules are selectable; they are selectable externally.

- The electrode moves down fast from the start point (stand-by position) to the mid-point (middle-stop position); then slowly to contact the workpiece.
  Very little shock deforms the workpieces less and extends the electrode life.
  The start point and the mid-point are adjustable arbitrarily.

- The electrode moves up and down between the mid-point and workpiece for continuous welding. This reduces the weld cycle time as the electrode doesn't need to return to the start point every time it welds.

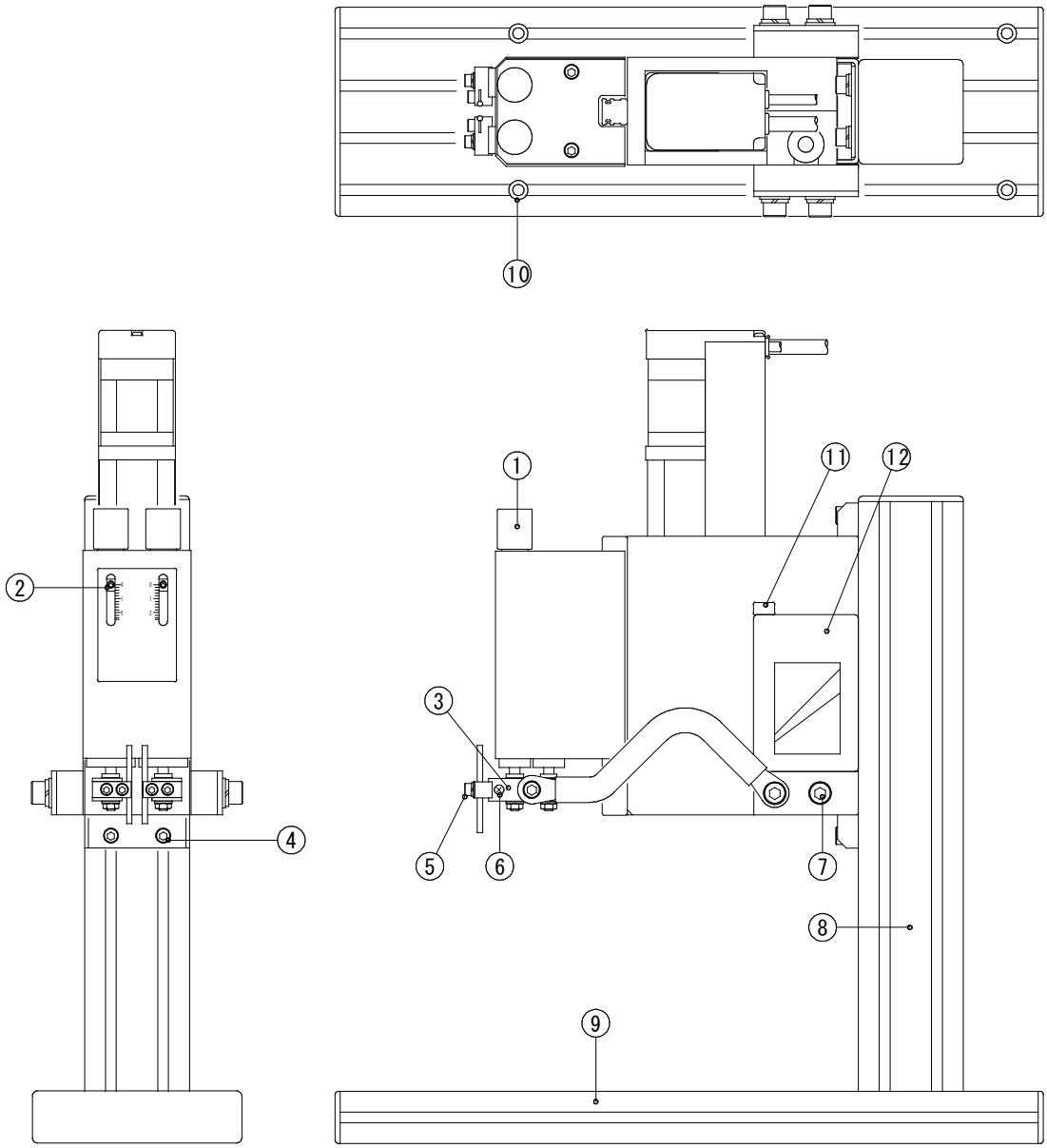
- During welding, the workpieces expands and shrinks. This Welding Head employs a spring so that the electrode can follow-up the deformation of the workpiece fast, which reduces the surface flash.

- The dedicated controller easily sets the electrode position and speed.

- Since this Welding Head is motor driven, the piping for air actuation is not needed, enabling an easy installation.

3. Name and Functions of Each Section

(1) MH-P20B



① Weld Force Adjustment Knob
Adjusts the electrode force.

② Lock Screw
Locks the Weld Force Adjustment Knob.

③ Holder
For fixing the Electrode Holder (sold separately).

ATTENTION

Should a metal object, such as a screwdriver and wire, contact the **Holder** during operation, the object may be welded to the Welding Head. Before starting work, be sure to remove all metal objects from around the equipment.

④ Body-Fixing Screw (M6)
Secures the Head body to the Column.

⑤ Holder-Mounting Screw (M4)
Mounts the Electrode Holder (sold separately) to the Holder.

⑥ Volt-Sensing-Cable-Connecting Screw
Connects the Volt-Sensing Cable (sold separately).

⑦ Secondary-Cable-Fixing Screw (M8)
Connects the Secondary Cable.

⑧ Column
For mounting the Head body.

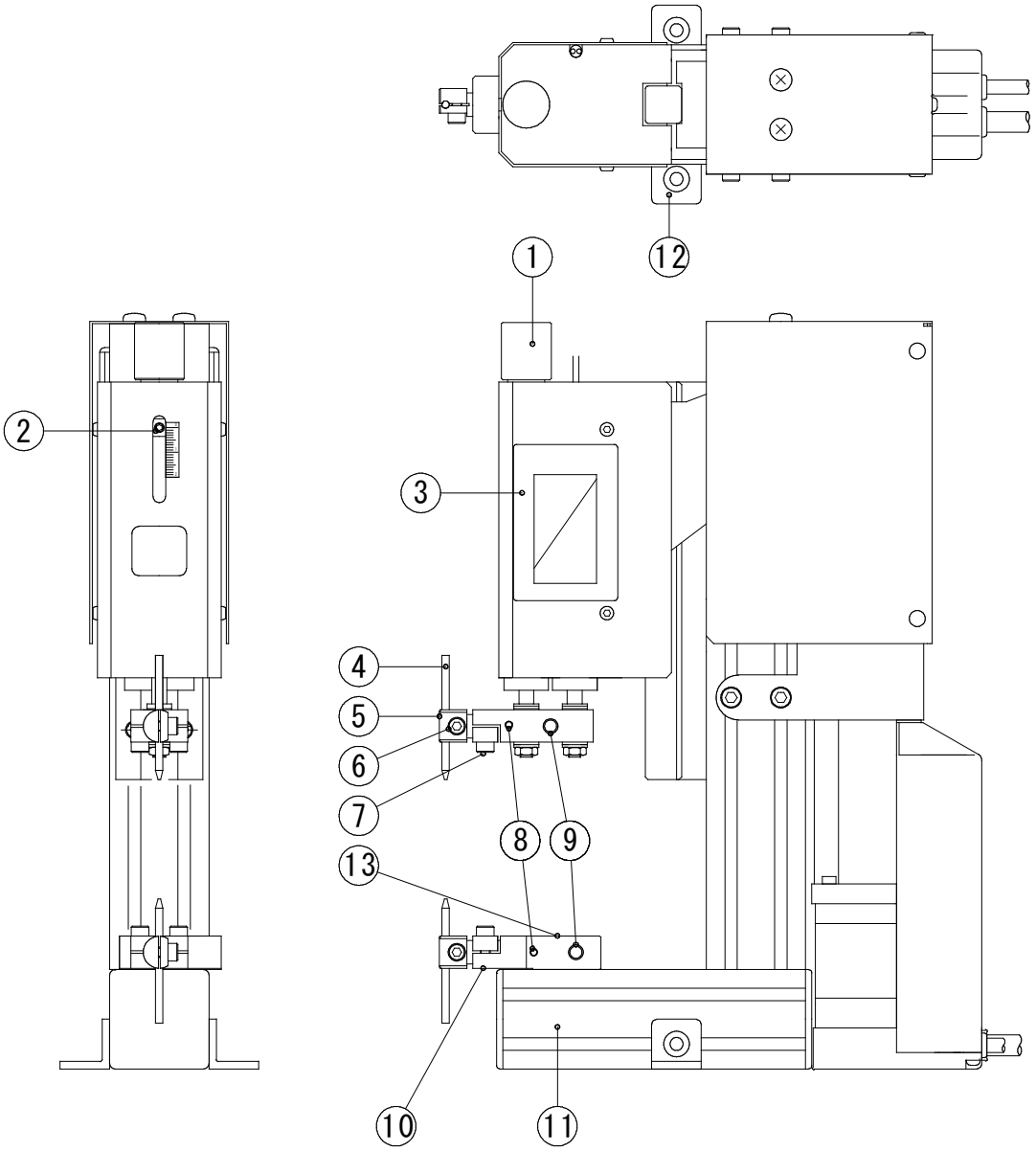
⑨ Base
For the Welding Head.

⑩ Base-Mounting Holes
For mounting the Welding Head to the workbench. Six (6) holes are provided. φ6.5 mm diameter, φ11 mm spot facing and 10 mm depth.

⑪ Maximum-Weld-Force-Indicating Label
Indicates the maximum electrode force (See p. 8-3).

⑫ Weld Force Conversion Graph
Shows an approximate electrode force for your weld force adjustment.

(2) MH-D20B



① Weld Force Adjustment Knob
Adjusts the electrode force.

② Lock Screw
Locks the Weld Force Adjustment Knob.

③ Weld Force Conversion Graph
Shows an approximate electrode force for your weld force adjustment.

④ Electrode
For spot welding. Material is CrCu.

⑤ **Electrode Holder**
Clamps the Electrode.

ATTENTION

Should a metal object, such as a screwdriver and wire, contact the **Electrode** or the **Electrode Holder** during operation, the object may be welded to the Welding Head. Before starting work, be sure to remove all metal objects from around the equipment.

⑥ **Electrode-Fixing Screw** (M4)
Secures the Electrode to the Electrode Holder.

⑦ **Holder-Mounting Screw** (M4)
Mounts the Electrode Holder to the Holder.

⑧ **Volt-Sensing-Cable-Connecting Screw**
Connects the Volt-Sensing Cable (sold separately).

⑨ **Secondary-Cable-Fixing Screw** (M6)
Connects the Secondary Cable.

⑩ **Holder**
For fixing the Electrode Holder. Two Holders are provided for the upper electrode and the lower one.

ATTENTION

Should a metal object, such as a screwdriver and wire, contact the **Holder** during operation, the object may be welded to the Welding Head. Before starting work, be sure to remove all metal objects from around the equipment.

⑪ **Base**
For the Welding Head.

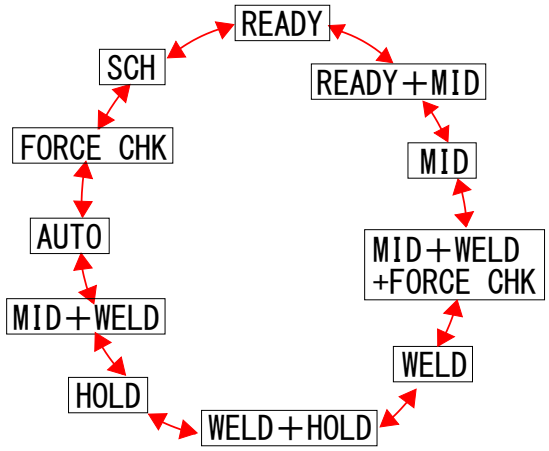
⑫ **Head-Fixing Bracket**
For fixing the Welding Head to the workbench. Two (2) brackets provided.
φ5.5 mm mounting hole diameter (M5 countersink).

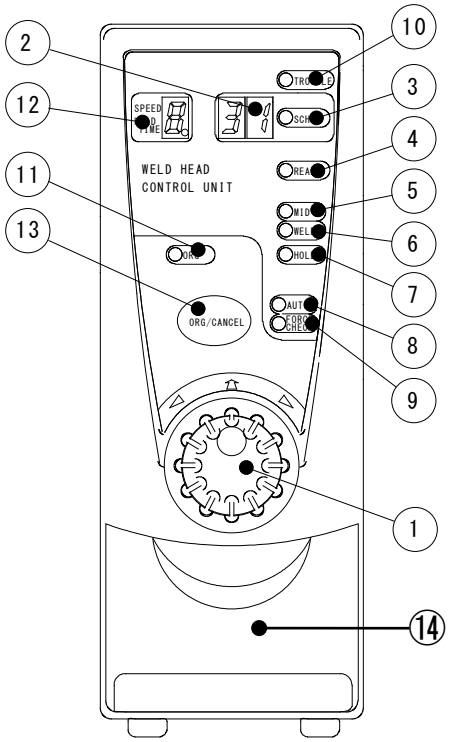
⑬ **Holder-Fixing Screw** (M5)
For fixing the lower Holder to the Base.

(3) Controller Front Panel

① Operation Button

Operate the Welding Head by turning the button clockwise/counterclockwise or pressing it.
By turning the button, the lamp illumination changes as shown:





See the list below for ② to ⑪

Lamp	When illuminated,	When blinking,
② [SCH (Schedule)] Display	Schedule Nos. are displayed. (31 combinations of Electrode position, Speed and Hold Time can be registered as Schedule in the model of **MH-P20B/D20B**.)	When power supply is applied, zero “0” blinks.
		When trouble occurs, fault code is displayed.
		Schedule No. is being changed.
		Weld force is being measured.
③ [SCH] Lamp	Operation button is selecting a function.	Schedule No. is being changed.
④ [READY] Lamp	Electrode is at Start Point and completed for work.	Start Point is being changed.
	Operation button is selecting a function.	
⑤ [MID] Lamp	Electrode is at Mid-Point.	Mid-Point is being changed.
	Operation button is selecting a function.	
⑥ [Weld] Lamp	Electrode is at Weld Point.	Lowest point (Downstop Point) is being changed.
	Operation button is selecting a function.	
⑦ [Hold] Lamp	Operation button is selecting a function.	Hold Time is being changed.
⑧ [AUTO] Lamp	Operation button is selecting a function.	Auto-function is setting electrode position and movement.
⑨ [FORCE CHK] Lamp	Operation button is selecting a function.	Weld force is being measured.
⑩ [TROUBLE] Lamp	Trouble is occurring.	
⑪ [ORG] Lamp	The **[ORG] Lamp** is in no use.	

⑫ [SPEED HOLD TIME] Display

Indicate the “electrode speed” and “HOLD Time after the application of weld force is completed”. The larger number indicates the faster electrode speed and the longer HOLD Time.

And the lamp lights up simultaneously with other lamps as follows:

Lamp	When illuminated,	When blinking,
④ **[READY] Lamp** and ⑤ **[MID] Lamp** and ⑫ **[SPEED HOLD TIME] Display**	Operation button is selecting a function. (**[SPEED HOLD TIME] Display** does not light up.)	Electrode speed between Start Point and Mid-Point is being set.
	Electrode is moving between Start Point and Mid-Point.	
⑤ **[MID] Lamp** and ⑥ **[WELD] Lamp** and ⑫ **[SPEED HOLD TIME] Display**	Operation button is selecting a function. (**[SPEED HOLD TIME] Display** does not light up.)	Electrode speed from Weld Point to Mid-Point is being set.
	Electrode is moving from Weld Point to Mid-Point.	
⑤ **[MID] Lamp** and ⑥ **[WELD] Lamp** and ⑨ **[FORCE CHK] Lamp** and ⑫ **[SPEED HOLD TIME] Display**	Operation button is selecting a function. (**[SPEED HOLD TIME] Display** does not light up.)	Electrode speed from Mid-Point to Weld Point is being set.
	Electrode is moving from Mid-Point to Weld Point. (**[FORCE CHK] Lamp** does not light up during movement.)	
⑥ **[WELD] Lamp** and ⑦ **[HOLD] Lamp** and ⑫ **[SPEED HOLD TIME] Display**	Operation button is selecting a function. (**[SPEED HOLD TIME] Display** does not light up.)	The desired time for which the additional weld force is exerted on after applying the weld force at Weld Point is being set.
⑦ **[HOLD] Lamp** and ⑫ **[SPEED HOLD TIME] Display**	Operation button is selecting a function. (**[SPEED HOLD TIME] Display** does not light up.)	Hold Time is being set.
⑫ **[SPEED HOLD TIME] Display**	In case of Movement Mode 1, electrode position is at Start Point and the **Display** shows “A” when setting is not performed.	

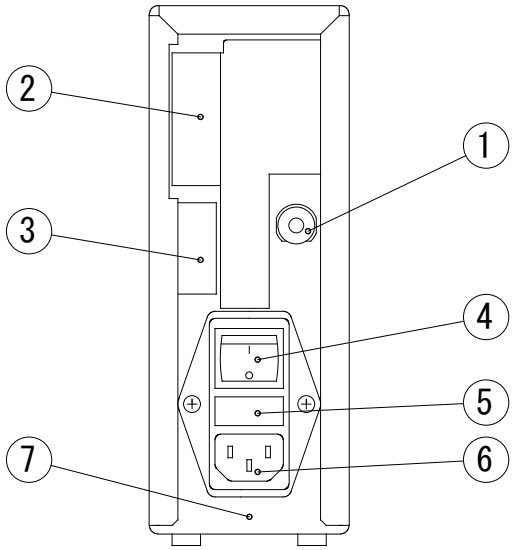
⑬ [ORG/CANCEL] Button

The **Button** interrupts the operation of setting.

⑭ Communication Connector (D-Sub, 25 pins)

For data communication with the external device.

(4) Controller Rear Panel



① **[MOTOR CONTROL] Connector**
It is a connector for controlling a motor to drive the electrode.

② **I/O Connector**
It is for input/output of signals.

③ **Connector for Weld Force Detecting Sensor**
It is for inputting the weld force signal of the welding head.

④ **Power Switch**
It is a switch for turning on/off power supply of 100 to 240 V AC.

⑤ **Fuse Holder**
It contains a fuse.

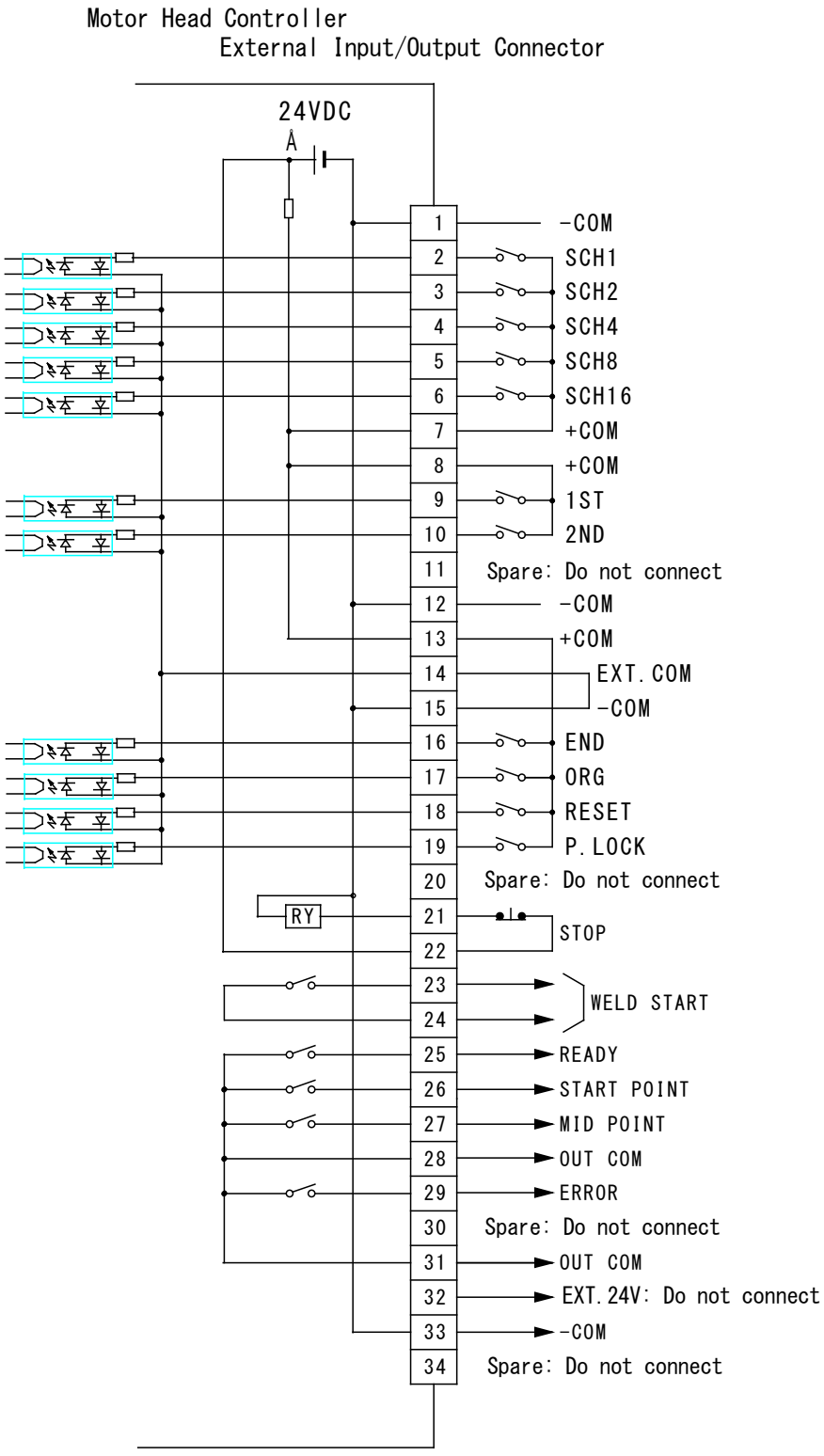
Fuse Rating	250 V, 1 A, 5 mm dia. 20 mm length (Delay melting and high breaking capacity type)

⑥ **Connector for Power Supply Cable**
It is for connecting a power supply cable (separately sold) of power supply of 100 to 240 V AC.

⑦ **Ground Terminal**
Use the ground terminal when you can not take a ground by using a power supply cable with a ground wire (separately sold).

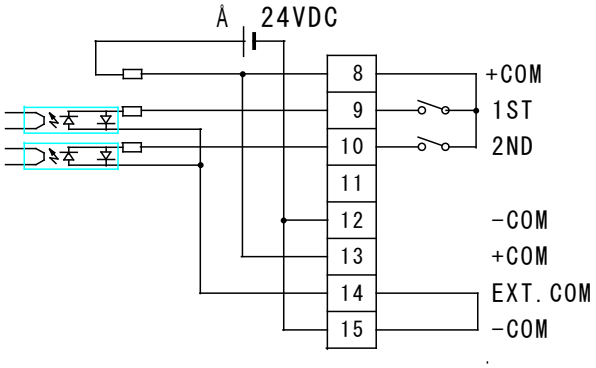
4. Interface

(1) Connection Diagram of External Input/Output Signal

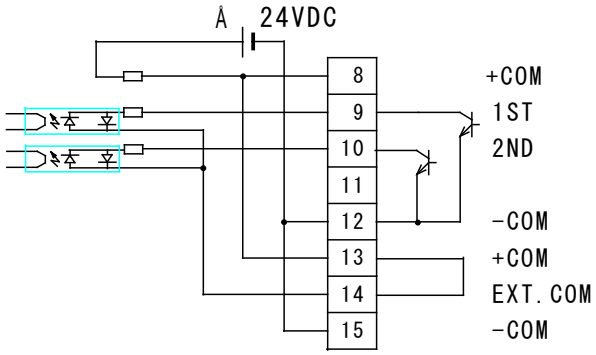


[Example of Connection]

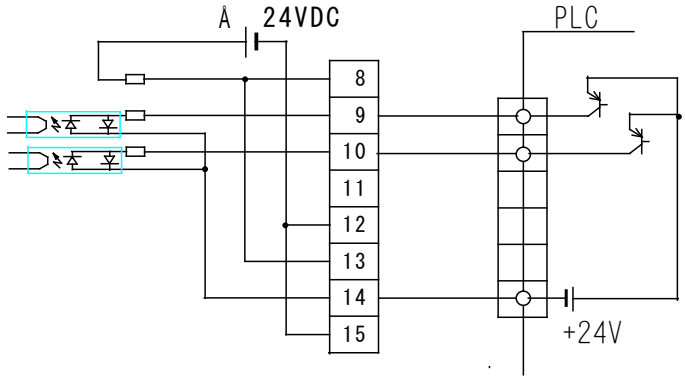
・When contacts are used as input terminal of I/O connector



・When NPN transistor (sink type) on PLC is used as input terminal of I/O connector



・When PNP transistor (source type) on PLC is used as input terminal of I/O connector



(2) I/O Connector

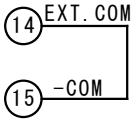
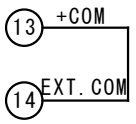
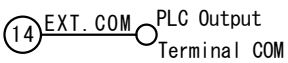
Each pin on I/O Connector is described.
Input signal is explained as contact input.

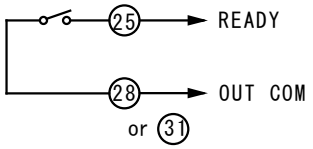
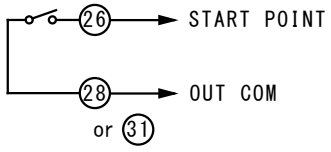
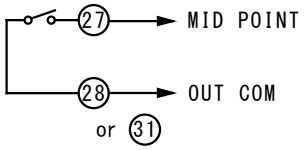
Pin No.	I/O	Description
1		Internally connected to GND (0V).
2	Input	Select a schedule number, referred to as **SCH No.** below, indicating a combination of the circuit-closed pins among Pins, No. 2, 3, 4, 5 and 6 (See table below.). The schedule number selected by I/O Connector has priority over the schedule number set on **MH-P20B/D20B**. Before selecting the schedule number by the operation button on **MH-P20B/D20B**, open the circuits of all the Pins of No. 2, 3, 4, 5 and 6 in I/O Connector. Input [SCH] signal at least 2 ms before the welding current flows. During in operation, the schedule number cannot be changed.
3		
4		
5		
6		

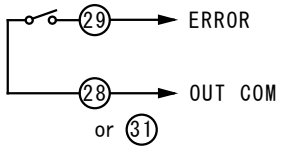
Pin No. / SCH No.	6	5	4	3	2
1					●
2				●	
3				●	●
4			●		
5			●		●
6			●	●	
7			●	●	●
8		●			
9		●			●
10		●		●	
11		●		●	●
12		●	●		
13		●	●		●
14		●	●	●	
15		●	●	●	●
16	●				

Pin No. / SCH No.	6	5	4	3	2
17	●				●
18	●			●	
19	●			●	●
20	●		●		
21	●		●		●
22	●		●	●	
23	●		●	●	●
24	●	●			
25	●	●			●
26	●	●		●	
27	●	●		●	●
28	●	●	●		
29	●	●	●		●
30	●	●	●	●	
31	●	●	●	●	●

The mark ● denotes the circuit-closed pin.

Pin No.	I/O	Description
7		Output pins for 24 V DC through 100Ω internal resistor.
8		
9	Input	Input pin for start-up signal. When [1ST] is closed, electrode moves from Start Point to Mid-Point. When [2ND] is closed after [1ST] was closed, electrode moves from Mid-Point to Weld Point. Although only [2ND] is closed, electrode does not move.
10		
11		Spare pin: Do not connect.
12		Connected to [GND] (0V) internally at factory shipment.
13		Output pins for 24 V DC through 100Ω internal resistor.
14		According to the usage, connect pins as follows. ・When contact is used as input signal of I/O Connector, connect Pins 14 and 15.  ・When NPN transistor (sink type) on PLC is used as input signal of I/O Connector, connect Pins 13 and 14. COM terminal of PLC connects to —COM terminal, that is, Pins 1, 12 and 15.  ・When PNP transistor (source type) on PLC is used as input signal of I/O connector, connect Pin 14 to COM terminal of PLC. 
15		Connected to [GND] (0V) internally at factory shipment.
16	Input	Input pin for [End] signal from welding power supply. If Pin 16 is closed, input signal of [2ND] cannot be accepted.

Pin No.	I/O	Description
17	Input	Input pin for Start Point resuming signal. When the circuit of Pin 17 becomes closed, the electrode resumes Start Point. (In case that the motor finishes moving back to Original Point, the electrode does not move.)
18		Input pin for [RESET] signal. If a trouble occurs, rectify the trouble and close the circuit of the Pin to turn off [NG] signal. (See Chapter 7 for fault codes.) Close at least for 2 ms. Pin 18 does not work while the circuit of Pin 18 is closed.
19		Input pin for prohibition of setting the operation schedule. When Pin 19 is closed, the operation schedule of **MH-P20B/D20B** cannot be set. (The schedule number can be modified.)
20		Spare pin: Do not connect.
21	Output	Output pin for an emergency stop of the motor. When the circuit between Pins 21 and 22 is opened, the motor carries out emergency stop. Connect the operation switch for an emergency stop of the motor to Pins 21 and 22 of the I/O connector. Use the operation switch whose capacity is more than 24 V DC, 20 mA. Since power supply to the motor is cut off, the force follow-up mechanism may lower to the maximum stroke position by its own weight.
22		
23		Output pin for current-supplying start signal to the welding power supply. When the weld force is completed, the circuit between Pins 23 and 24 becomes closed. Contact capacity is 24 V DC, 20 mA.
24		
25		Output pin for completion signal of being ready for work. When the resumption of Start Point is completed, the Pin becomes closed. In an emergency of **MH-P20B/D20B**, the Pin becomes opened. 
26		Output pin for completion signal of arriving at Start Point. When the electrode is at Start Point, the Pin becomes closed. 
27		Output pin for completion signal of arriving at Mid-Point. When the electrode is at Mid-Point, the Pin becomes closed. 

Pin No.	I/O	Description
28		Common terminal to [READY], [START POINT], [MID POINT] and [ERROR]
29	Output	Output pin for a trouble signal. When a trouble occurs in **MH-P20B/D20B**, the Pin becomes opened until it is reset. 
30		Spare pin: Do not connect.
31		Common terminal to [READY], [START POINT], [MID POINT] and [ERROR]
32		Do not connect to the Pin for [EXT. 24 V].
33		Connected to [GND] (0 V) internally at factory shipment.
34		Spare pin: Do not connect.

5. Installation and Connection

Before using your **MH-P20B/D20B**, install it according to the following procedures.

⚠ WARNING

Connect the grounding wire to the grounding terminal located near the grounding mark.

⚠ CAUTION

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

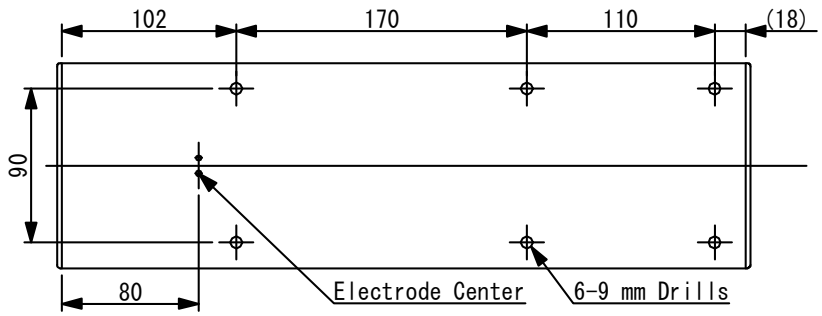
① Determining Where to Install

Determine where to install the **MH-P20B/D20B**, welding power supply and welding transformer.

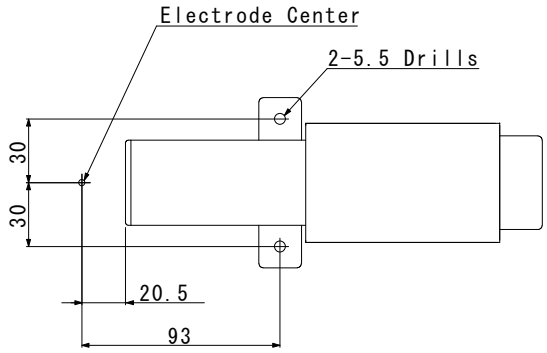
② Drilling Mounting Holes

Drill mounting holes on the workbench to secure the **MH-P20B/D20B**, following the drawings below:

MH-P20B Drillings



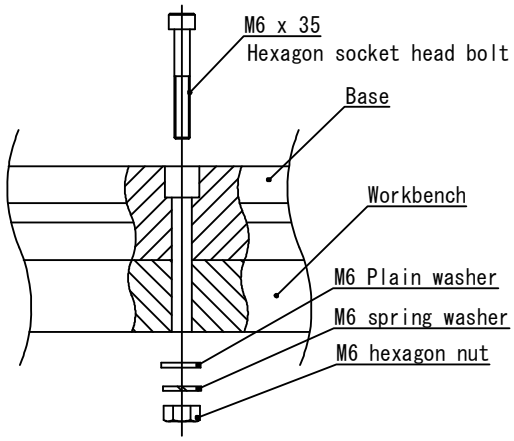
MH-D20B Drillings



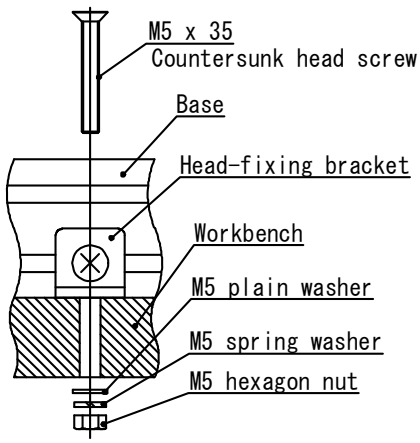
③ Installing the MH-P20B/D20B

Install the **MH-P20B/D20B** to the workbench with the supplied hexagon socket head bolts/cross-recessed countersunk head screws, plain washers, spring washers and hexagon nuts (See drawings below). Use a proper tool suitable for the bolts/screw to secure the Head.

MH-P20B



MH-D20B



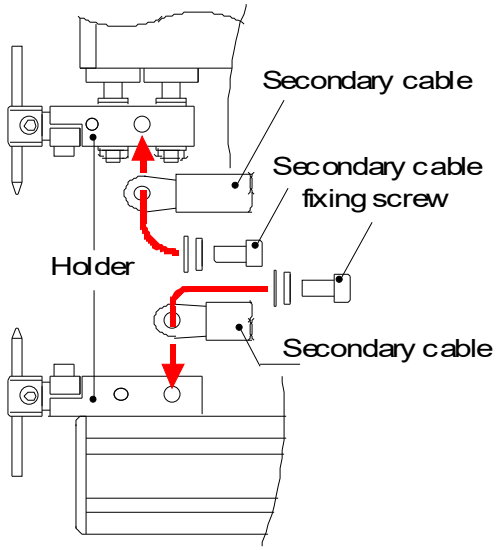
ATTENTION

The supplied bolts/screws are for installing the **MH-P20B/D20B** on our Workbench **MA-11A**. When using another workbench, prepare bolts/screws suitable for it.

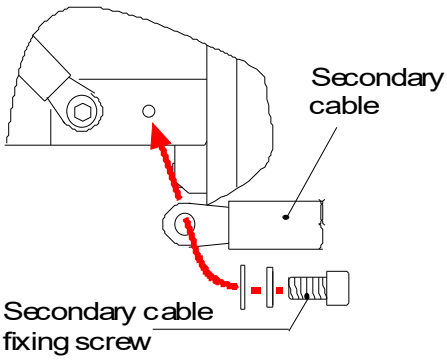
④ Connecting the Secondary Cable

After finishing the installation to your workbench, connect the secondary cable to the **MH-P20B/D20B**, which has no polarity.
Note that the **MH-P20B** has the secondary-cable-fixing screws on its right and left sides. When connecting, use tools of correct sizes for the screws, bolts and nuts to secure cables.

MH-D20B



MH-P20B



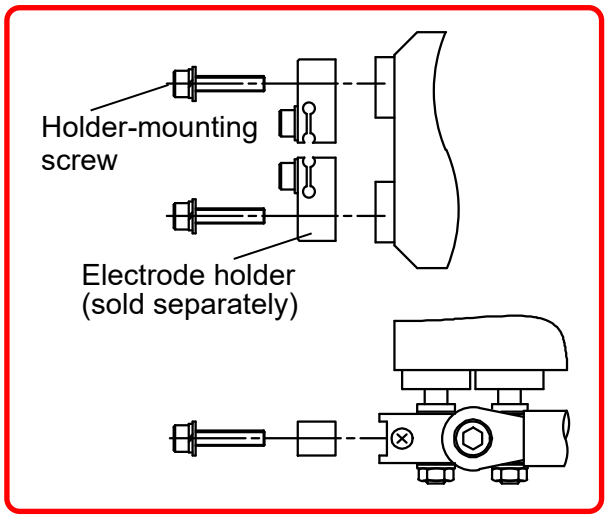
⑤ Installing the Electrode Holder

(The steps ⑤ and ⑥ are required for **MH-P20B** only. Proceed to step ⑦ for **MH-D20B**.)

Remove the Holder-Mounting Screw using the supplied hexagon rod spanner for M4.

Fit the Electrode Holder (sold separately) into the Holder groove.

Tighten the Holder-Mounting Screw to fix.



ATTENTION

The Holder is made of soft material. Be sure not to damage it when tighten the screw.

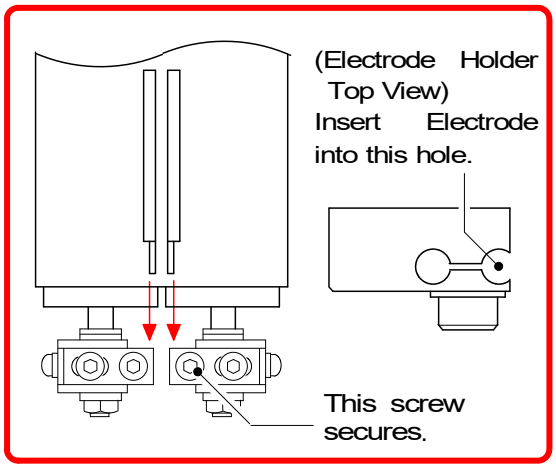
⑥ Installing and Replacing the Electrode (Sold separately)

(The steps ⑤ and ⑥ are required for **MH-P20B** only. Proceed to step ⑦ for **MH-D20B**.)

Loosen the Electrode-Fixing Screw using the supplied hexagon rod spanner for M4.

Insert the Electrode into the Electrode Holder.

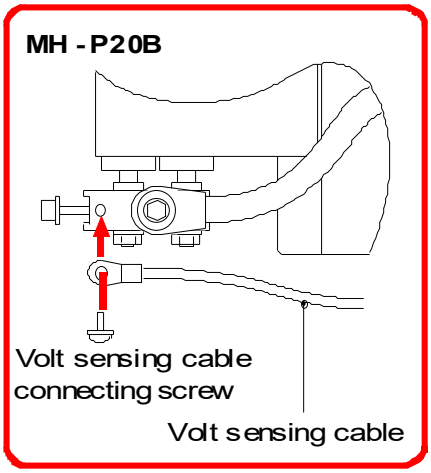
Tighten the Electrode-Fixing Screw to secure the Electrode.

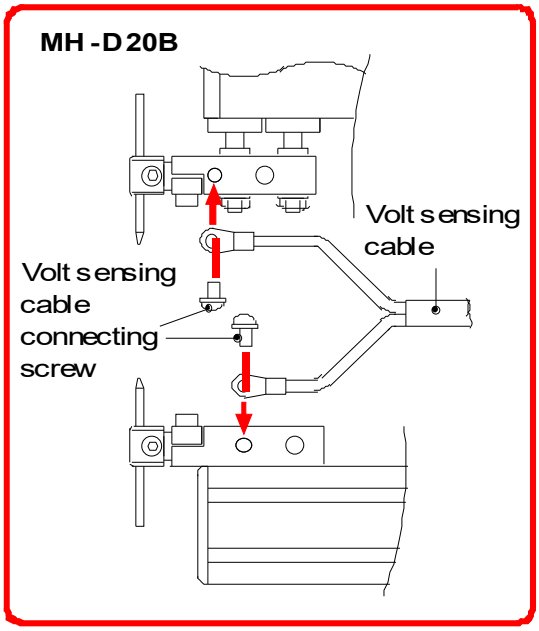


⑦ Connecting the Volt-Sensing Cable

When employing the voltage-detecting function of our Welding Power Supply, Weld Checker, etc., connect the Volt-Sensing Cable to the Electrode Holder.
On the **MH-P20B**, connect the Volt-Sensing Cables on the right and left Holders.

ATTENTION
The Volt-Sensing Cable is sold separately. Please purchase it from us.





⑧ Connecting the Weld Force Detecting Sensor Cable

Connect the Weld Force Detecting Sensor Cable to the Motor Controller.

⑨ Connecting the I/O Connector

Connect the I/O Connector to the Motor Controller.
Connect the operation switch for an emergency stop of the motor to Pins 21 and 22 of the I/O connector. Use the operation switch whose capacity is more than 24 V DC, 20 mA.

⑩ Connecting the AC Cable

Lastly, connect the **MH-P20B/D20B** AC Cable to the 100–240 V AC, 50/60 Hz outlet.

6. Operation

(1) Getting Started

① Position of Electrode

The **MH-P20B/D20B** Electrode has five (5) positions to stop.

Position	Description
Original Point	The position where the electrode has completely returned.
Start Point	A little bit farther position from Original Point. It can be set arbitrarily. [READY] Lamp lights up when the electrode is at this position.
Mid-Point	Just before the position where the electrode contacts workpiece. It can be set arbitrarily. [MID] Lamp lights up when the electrode is at this position.
Weld Point	The position where the electrode contacts workpiece. [WELD] Lamp lights up when the electrode is at this position. Weld start signal is output and welding current flows.
Downstop Point	A little bit beyond the position from Weld Point. It can be set arbitrarily.

② Working Mode of Electrode

In the model of **MH-P20B/D20B**, it has two working modes.

Movement	Mode 0	Mode 1
For setting Position or measuring Weld Force	Performed by External Input [1ST or 2ND]	Performed by External Input [1ST or 2ND] or pressing the operation button.
For resuming Start Point of motor	Performed by External Input [1ST or ORG]	Performed by External Input [1ST or ORG] or pressing [ORG/CANCEL] button.
Electrode is pressed on the way other than from Mid-Point to Weld Point.	Error indicated	Error indicated and the power supply to motor turned off.

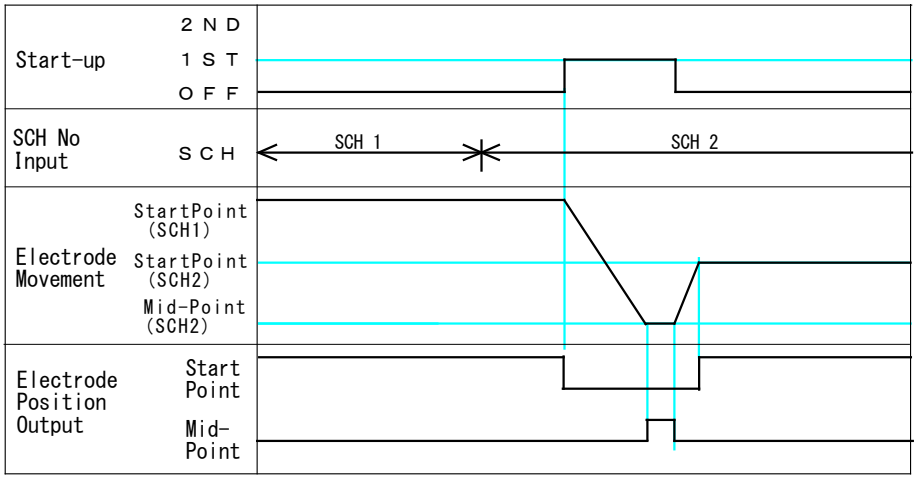
In **Mode 1**, when the electrode is at Start Point and no setting is performed, then, “A” is shown on [SPEED HOLD TIME] Display.

③ Attention on Movement

・Change of Schedule No.

Only the change of Schedule No. does not allow the electrode to move. External Output [START POINT] continues to hold the signal of the previous position.

In case that Start Point of changed Schedule No. differs from the one of the last Schedule No., once make the electrode move to Mid-Point to attain the new Start Point.



- In case of continuous operations across several Schedule Numbers, set each Start Point so as to keep them always the same.
- When the weld force is exerted on the electrode on the way other than moving from Mid-Point to Weld Point, then the fault code “E” is displayed.

  In case of **Mode 0**,

  When a trouble occurs at the side of released weld force, that is, between Mid-Point and Start Point, open External Input [1ST] to make the electrode move to Start Point.

  When a trouble occurs at the side of increased weld force, that is, between Start Point and Original Point, open External Input [1ST] to make the electrode move to Start Point (to the direction of released weld force). At Start Point, External Output [START POINT] is output.

  In case of **Mode 1**,

  The supplying of power to the motor is turned off to stop.

(2) Mode Setting

① Setting

Turn on the power while pushing the operation button. The character of “SEt” blinks on [SCH (SCHEDULE)] Display and [SPEED HOLD TIME] Display.

Continue to press the button until blinking changes into lighting-up.

Depress the operation button, and “0” blinks on [SPEED HOLD TIME] Display. Rotate the operation button, and indication changes as follows.

- 0……means “change of Mode”
- 1……means “change of [ERROR] signal output”
- E……means “end”

② Changing

Press the operation button while “0” blinks on [SPEED HOLD TIME] Display.

Mode No. blinks on [SCH (SCHEDULE)] display. Rotate the operation button to select “0” or “1”.

Press the operation button to fix Mode No.

Finally, be sure to perform the step ④.

③ Change of ERROR Signal Output

Press the operation button while “1” blinks on [SPEED HOLD TIME] Display.

Mode No. blinks on [SCH (SCHEDULE)] Display. Rotate the operation button to select “0” or “1”.

- 0……means “circuit opened in case of error”
- 1……means “circuit closed in case of error”

Press the operation button to fix.

Finally, be sure to perform the step ④.

④ End of Setting

Rotate the operation button to select “E”. Press the operation button to fix.

Confirm “End” on [SCH (SCHEDULE)] and [SPEED HOLD TIME] Display, which means the completion of setting.

Turn off the power.

(3) Applying Power and Moving to Start Point

Turn on the power.

Zero “0” blinks on [SCH] Display of the front panel.

Close the circuit of External Input [1ST or ORG], and the electrode, after it once returns back to Original Point, moves to Start Point.
If the circuit of External Input [1ST or ORG] is opened while electrode is moving, the electrode stops there.
When the circuit of External Input [1ST or ORG] is closed again, the electrode begins to move.

When the electrode reaches Start Point, [READY] Lamp lights up and the preparation is completed.
Note that Original Point and Start Point are at the same position when the shipping package is opened and the power is supplied for the first time.

> In case of **Mode 1**, it works by pressing [ORG/CANCEL] button in addition to the use of External Input.

(4) Auto-Setting of Electrode Position

The electrode position can be set automatically by means of the auto-setting function. Turn the operation button to light up [AUTO] Lamp.

Press the operation button for 1 second, and [AUTO] Lamp blinks.

Close External Input [1ST], and the electrode moves to Original Point.

Open External Input [1ST] when electrode stops with beeps.
(Beeps are given when the package is opened and the power is supplied for the first time, because Original Point and Start Point are at the same position.)

A numeral blinks on [SCH] Display. Turn the operation button to change Schedule No.

When Schedule No. is determined, press the operation button.
The blinking numeral on [SCH] Display changes to the illuminated one.

Place the workpiece.

Close External Input [1ST and 2ND] to make the electrode move forward. Hold External Input [1ST and 2ND] closed. The electrode presses the workpiece and beeps are given.
When the application of the electrode force is completed, open External Input [1ST and 2ND] and thereafter close External Input [1ST] again. The electrode returns to the position before Original Point with beeps.

Open External Input [1ST and 2ND] to complete the auto-setting with a beep.
The position where the electrode stops is Start Point.

The electrode positions determined by the auto-setting are as follows:

Electrode Position	Description
Original Point	Position where the electrode has completely returned.
Start Point	Between Weld Point and Original Point.
Mid-Point	2 mm before Weld Point.
Downstop Point	5 mm beyond Weld Point.

The electrode speed and Hold Time are not set automatically. The previous settings are valid. Change these settings manually.

In case of **Mode 1**, it works by pressing the operation button in addition to the use of External Input. When using the operation button, press the operation button again, because the electrode stops after pressing the workpiece.

(5) Manual Setting of Electrode Position

① Selecting Schedule No.

Turn the operation button to light up [SCH] Lamp.

Press the operation button for 1 second. [SCH] Lamp and [SCH] Display blink.

Turn the operation button clockwise and counterclockwise to select a numeral (1 to 31) on [SCH] Display.

After selecting Schedule No., press the operation button.

> Press [ORG/CANCEL] button to interrupt the operation.

② Setting Start Point

Turn the operation button to light up [READY] Lamp.

Press the operation button for 1 second, and [READY] Lamp lights up.

Close External Input [1ST].
The electrode moves to Start Point with beeps. (When the electrode has been at Start Point, only beeps are given.)

Open External Input [1ST].

Turn the operation button clockwise and counterclockwise to make the electrode move forward and backward in 0.1 mm-increment/decrement.

Press the operation button until the electrode reaches the desired position. [READY] Lamp blinks fast.

Close External Input [1ST]. The Start Point setting is completed with beeps.

> **When you want to interrupt the operation,**
>
> Press [ORG/CANCEL] button, and [READY] Lamp blinks fast.
>
> Close External Input [1ST]. The electrode returns to the previous position with beeps.

In case of **Mode 1**, it works by pressing the operation button in addition to External Input.

③ Changing Moving Speed between Start Point and Mid-Point

Turn the operation button to light up both [READY] and [MID] Lamp.

Press the operation button for 1 second. [READY] and [MID] Lamp blink.

The number of blinking [SPEED HOLD TIME] Lamp indicates the current speed setting. Turn the operation button clockwise and counterclockwise to change the number of the blinking lamp. Select your desired speed.

No.	Moving Speed (mm/s)	Note
1	20	Min.
2	60	
3	100	
4	140	
5	180	
6	220	
7	260	
8	300	Max.

After setting the speed, close and thereafter open External Input [1ST]. Check the speed of the electrode that moves forward and backward.

Press the operation button when your desired speed is determined.

> Press [ORG/CANCEL] button to interrupt.

④ Setting Mid-Point

Turn the operation button to light up [MID] Lamp.

Press the operation button for 1 second. [MID] Lamp blinks.

Close External Input [1ST] to make the electrode move to Mid-Point with beeps.

Open External Input [1ST].

Turn the operation button clockwise and counterclockwise to make the electrode move forward and backward in 0.1 mm-increment/decrement.

Press the operation button when the electrode reaches the desired position. [MID] Lamp blinks fast.

Close External Input [1ST]. The electrode moves to Start Point with beeps to complete Mid-Point setting.

When you want to interrupt the operation,

Press [ORG/CANCEL] button, and [MID] Lamp blinks fast.

Close External Input [1ST]. The electrode returns to the previous position with beeps.

In case of **Mode 1**, it works by pressing the operation button in addition to External Input.

⑤ Setting Moving Speed from Mid-Point to Weld Point

Turn the operation button to light up all of [MID], [WELD] and [FORCE CHK] Lamp.

Press the operation button for 1 second. [MID], [WELD] and [FORCE CHK] Lamp blink.

The number of the blinking [SPEED HOLD TIME] Lamp indicates the current speed setting. Turn the operation button clockwise and counterclockwise to change the number of the blinking lamp. Select your desired speed.

No.	Moving Speed (mm/s)	Note
1	7.5	Min.
2	15	
3	25	
4	30	Max.

After setting the speed, close and thereafter open External Input [both 1ST and 2ND]. Check the speed of the electrode that moves forward and backward.

Press the operation button when your desired speed is determined.

Press [ORG/CANCEL] button to interrupt.

⑥ Setting Downstop Point

Turn the operation button to light up [WELD] Lamp.

Press the operation button for 1 second. [WELD] Lamp blinks.

Close External Input [2ND and 1ST] to make the electrode move to Downstop Point with beeps.

Open External Input [2ND and 1ST].

Turn the operation button clockwise and counterclockwise to make the electrode move forward and backward in 0.1 mm-increment/decrement.

Press the operation button when the electrode reaches the desired position. [WELD] Lamp blinks fast.

[In case that the electrode cannot move beyond Weld Point because of a workpiece]
Turn the operation button until the electrode stops, then press the operation button.
Downstop Point is set 5 mm beyond Weld Point and [WELD] Lamp blinks fast.

Close External Input [1ST]. The electrode moves to Start Point with beeps to complete Weld Point setting.

When you want to interrupt the operation

Press [ORG/CANCEL] button, and [WELD] Lamp blinks fast.

Close External Input [1ST]. The electrode returns to the previous position with beeps.

In case of **Mode 1**, it works by pressing the operation button in addition to External Input.

⑦ Setting Additional Pressing Time at Weld Point

By the function of setting the additional pressing time, the additional electrode force can be exerted on the electrode for desired period without stopping the motor.

Turn the operation button to light up both [WELD] and [HOLD] Lamp.

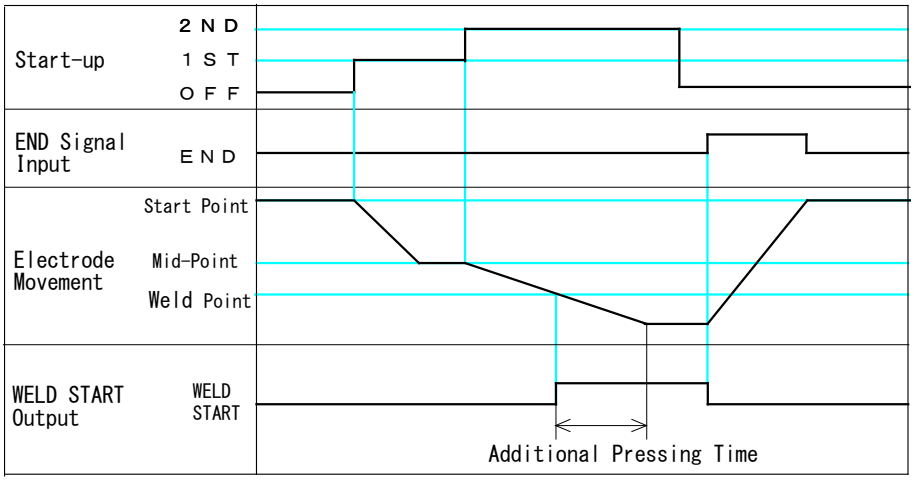
Press the operation button for 1 second. [WELD] and [HOLD] Lamp blink.

The number of the blinking [SPEED HOLD TIME] Lamp indicates the additional pressing time setting. Turn the operation button clockwise and counterclockwise to change the number of the blinking lamp. Select your desired period.

Numeral of [SPEED HOLD TIME] Lamp	Additional Pressing Time (ms)	Note
0	0	Stop at Weld Point
1	10	Min.
2	20	
3	30	
4	40	
5	50	
6	60	
7	70	
8	80	
9	90	
A	100	Max.

Press the operation button when your desired period is indicated.

Press [ORG/CANCEL] button to interrupt.



⑧ Setting of Hold Time

Turn the operation button to light up [HOLD] Lamp.

Press the operation button for 1 second. [HOLD] Lamp blinks.

The number of the blinking [SPEED HOLD TIME] Lamp indicates the present Hold Time setting. Turn the operation button clockwise and counterclockwise to change the number of the blinking lamp. Select your desired speed.

No.	Hold Time (ms)	Note
1	100	Min.
2	200	
3	300	
4	400	
5	500	
6	1000	
7	2000	Max.
8	Keep holding until End Signal is input.	

After selecting the number, close External Input [both 1ST and 2ND]. Check the selected Hold Time, observing a series of pressure test operations of the electrode that moves, holds and returns. (However, the electrode does not return by End Signal in the pressure test operation when 8 is selected.)

Press the operation button when your desired Hold Time is determined.

Press [ORG/CANCEL] button to interrupt.

⑨ Setting Moving Speed from Weld Point to Mid-Point

Turn the operation button to light up both [MID] and [WELD] Lamp.

Press the operation button for 1 second. [MID] and [WELD] Lamp blink.

The number of the blinking [SPEED HOLD TIME] Lamp indicates the current speed setting.
Turn the operation button clockwise and counterclockwise to change the number of the blinking lamp. Select your desired speed.

No.	Moving Speed (mm/s)	Note
1	20	Min.
2	60	
3	100	
4	140	
5	180	
6	220	
7	260	
8	300	Max.

After selecting the number, close and thereafter open External Input [both 1ST and 2ND]. Check the speed, observing the electrode that moves forward and backward.

Press the operation button when your desired speed is determined.

Press [ORG/CANCEL] button to interrupt.

(6) Welding Work

Close External Input [1ST]. Then the electrode moves forward to Mid-Point.
Close External Input [2ND and 1ST]. Then the electrode moves forward to Weld Point.

When the electrode contacts the workpiece and the weld force reaches the setting value, then the electrode stops.
Weld Start Signal is output and the welding starts.

When Weld Start Signal is once output, the weld force of the electrode is maintained although External Input [2ND and 1ST] is opened.
When Hold Time has elapsed or End Signal is output from the welding power supply, the weld force is released.

[In case that End Signal cannot be input although Hold Time is set to "8"]
Press [ORG/CANCEL] button while closing External Input [2ND and 1ST]. The electrode returns to Start Point or Mid-Point.

After the weld force of the electrode is released, open External Input [both 1ST and 2ND]. Then, the electrode returns to Start Point.
In case that External Input [1ST] is closed, the electrode returns to and stops at Mid-Point.
When External Input [2ND and 1ST] is closed while the electrode is at Mid-Point, the electrode starts to apply the weld force again.
Be sure not to release the electrode while welding current is being applied.

(7) Measuring Weld Force

Turn the operation button to light up [FORCE CHK] Lamp.

Press the operation button for 1 second.
[FORCE CHK] Lamp blinks and a numeral blinks on [SCH] Display. A vertical bar "|" lights up on [SPEED HOLD TIME] Display on the **MH-P20B**; a minus "—" on the **MH-D20B**.
Rotate the operation button to change Schedule No. and press it to fix.

[FORCE CHK] Lamp blinks. A vertical bar "|" blinks on [SPEED HOLD TIME] Display on the **MH-P20B**; a minus "—" on the **MH-D20B**.
On the **MH-P20B**, you can select one from the right and left electrodes to measure.
The blinking "|" indicates the electrode to be measured.
Rotate the operation button to move "|" to the right or left.

Set up a pressing force gauge.

Close External Input [2ND and 1ST]. The electrode moves forward.
When the electrode contacts the pressing force gauge, the electrode stops with beeps.

Open External Input [2ND and 1ST], and measure the weld force.

Close External Input [1ST]. The electrode returns to Start Point.

After the electrode has returned to Start Point, press [ORG/CANCEL] button to complete the mode of measuring the weld force.

When you want to interrupt the operation except at Start Point,

Press [ORG/CANCEL] button. [FORCE CHK] Lamp blinks fast.

Close External Output [1ST]. The electrode returns to Start Point with beeps.

In case of **Mode 1**, it works by pressing the operation button in addition to External Input.

7. Fault Indications

When a trouble occurs at the apparatus, [TROUBLE] Lamp lights up and a fault code is shown on [SCH] Display. Closing External Input [RESET] or continuing to press the operation button can reset the fault signal.

Fault Code	Trouble Content	Corrective Measures
E (Mode 0)	Electrode force is applied on the way to return to Start Point	Close External Input [1ST] again to make the electrode move to Original Point. Rectify the cause of the trouble. Thereafter, reset the fault signal or close External Input [1ST]. [TROUBLE] output is released.
	Electrode force is applied before Mid-Point	Close External Input [1ST] and [2ND] to make the electrode return to Start Point. Rectify the cause of a trouble. Thereafter, reset the fault signal or close External Input [1ST]. [TROUBLE] output is released.
E (Mode 1)	Electrode force is applied on the way to return to Start Point or applied before Mid-Point	After rectifying the cause of a trouble, reset the fault signal and resume Start Point.
1	Fault occurred in controller memory	Some settings have been lost. You must re-set again. Turn on the power while pressing [ORG/CANCEL] button to clear all the settings.
2	Fault occurred in memory's R/W-function in controller	Turn off the power and thereafter, turn it on again. If the trouble continues, repair is needed. Consult us.
3	Fault occurred in controller CPU	After turning off the power or resetting the fault signal, resume Start Point. If the trouble continues, repair is needed. Consult us.
4	Fault occurred in electrode-driving motor	After turning off the power or resetting the fault signal, resume Start Point. If the trouble continues, repair is needed. Consult us.
5	Fault occurred in the control signal of electrode-driving motor	After turning off the power, check the connector conduction between the controller and motor. If the trouble continues, repair is needed. Consult us.
6	[STOP]-Pin circuit is opened	Close the circuit of [STOP]-Pin. After turning off the power or resetting the fault signal, resume Start Point. When the circuit of [STOP]-Pin is opened, the force follow-up mechanism may lower to the maximum stroke position by its own weight. Be careful when returning the electrode.

8. User's Maintenance

ATTENTION

- Make sure that the tool used for adjustment fits the screw size.
  Upon completion of adjustment, tighten the screws firmly. There should be no looseness or rattling.
- The Holder is made of soft material. When tightening a screw, take care not to damage it.
- When a caution is given that denotes "Unplug the AC Cable from outlet", strictly observe it to avoid an electric shock.

(1) MH-P20B

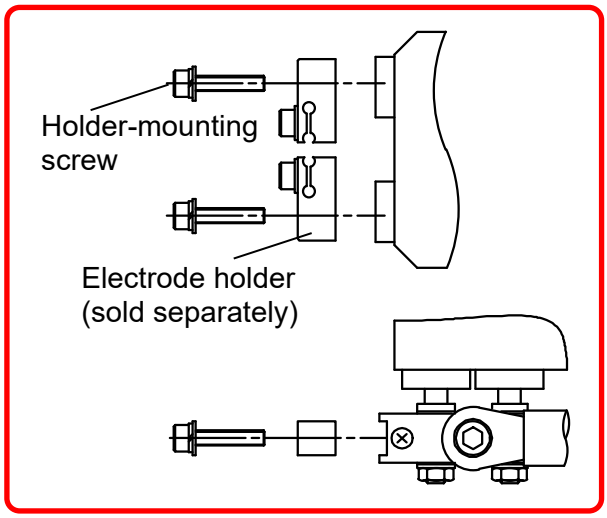
① Installing the Electrode Holder

Unplug the AC Cable from the outlet to turn off the welding power supply.

Remove the Holder-Mounting Screw using the supplied M4 hexagon rod spanner.

Fit the Electrode Holder (sold separately) into the Holder groove.

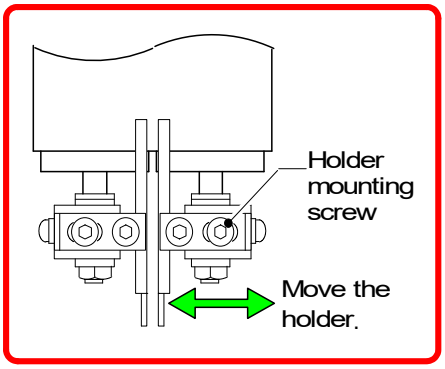
Tighten the Holder-Mounting Screw to fix.



② Adjusting the Weld Pitch

Loosen the Holder-Mounting Screw using the supplied M4 hexagon rod spanner.

Move the Holder right and left to adjust the weld pitch.
See **Chap.9, (4),** ① for the range of the distance between electrodes.



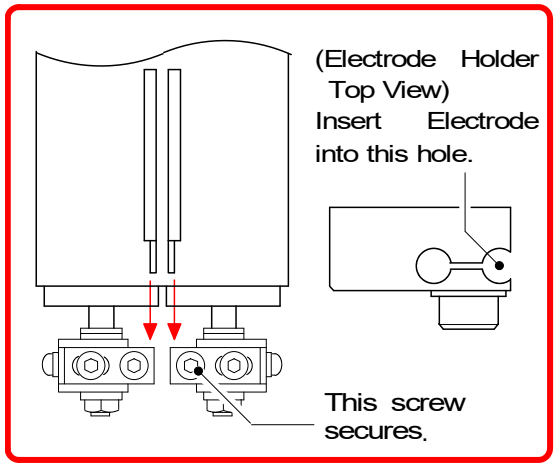
③ Installing and Replacing the Electrode (Sold separately)

Unplug the AC Cable from the outlet to turn off the welding power supply.

Loosen the Electrode-Fixing Screw using the supplied M4 hexagon rod spanner.

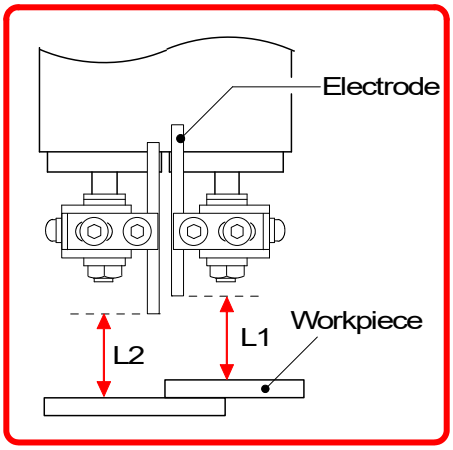
Insert the Electrode into the Electrode Holder.

Tighten the Electrode-Fixing Screw to secure the Electrode.



④ Adjusting the Electrode Height

Adjust the electrode height in advance to allow L1 = L2 when welding a stepped workpiece. If the distances to the workpieces are different, two built-in photo-micro switches do not turn on simultaneously, resulting in inferior welding. In addition, it could affect the equipment.



⑤ Adjusting the Weld Force

ATTENTION

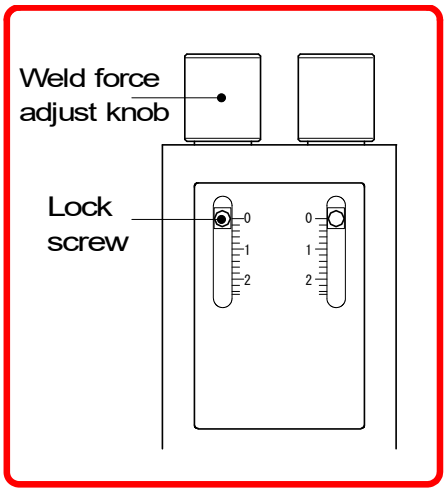
- For safety, always stop operation before starting adjustment.
- The weld force conversion graph represents theoretical values. To measure the actual weld force, use a pressure gauge or spring balance.

Loosen the Lock Screw using the supplied M2.5 hexagon rod spanner.

The scale represents the weld force.
Turn the Weld Force Adjust Knob to adjust the center of the Lock Screw to the desired weld force scale.

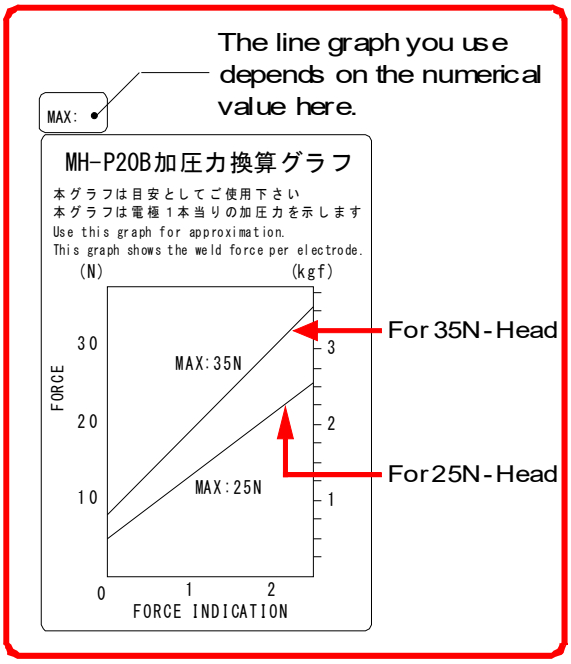
Tighten the lock screw to lock the Weld Force Adjust Knob

After adjusting, measure the weld force using a pressure gauge or spring balance.



⑥ How to Use the Weld Force Conversion Chart

Two line graphs are shown in the Weld Force Conversion Chart. Take care to use the line graph designated by the upper-left numerical value.



⑦ Adjusting the Head Body Position

Unplug the AC Cable from the outlet.

↓

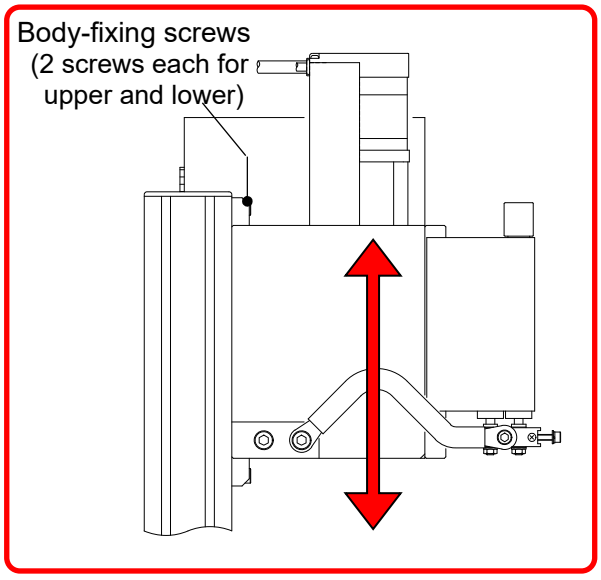
Loosen the Body-Fixing Screw.

↓

Move the Head Body up and down to adjust the mounting height.

↓

When the position is determined, tighten the Body-Fixing Screw firmly.



⚠ CAUTION

If you loosen the Body-Fixing Screw without supporting the Head Body, the Body falls down, which could result in injury and/or damage to the electrode.
Be sure to hold or support the Head Body when you loosen the Body-Fixing Screw.

⑧ Other

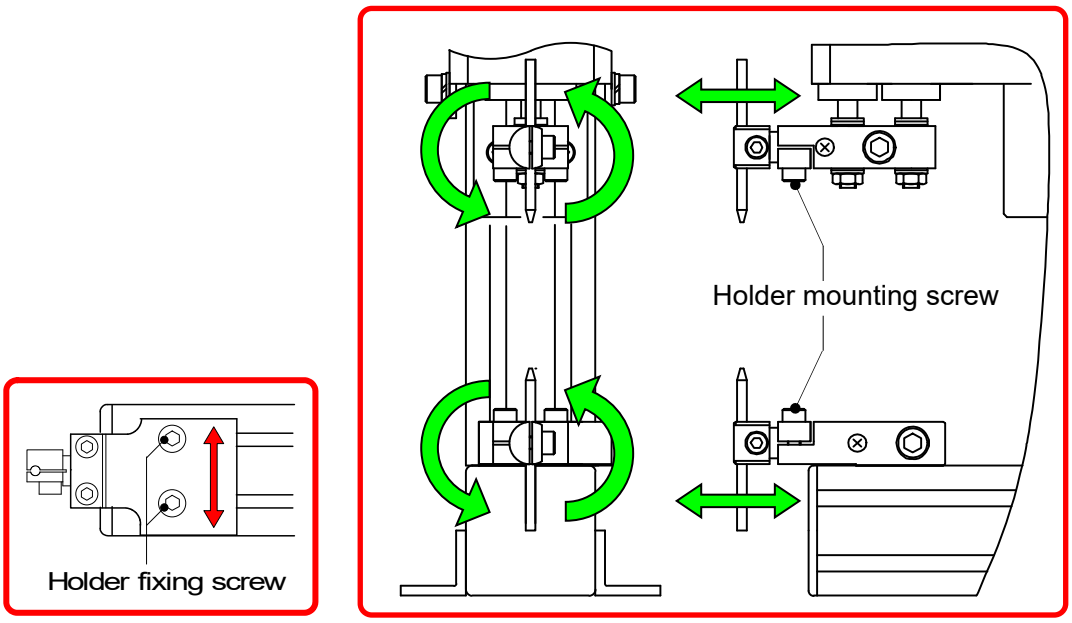
See **6. Operation** for the settings of “Head ascending/descending speed”, “Position of Start Point/Mid-Point”, “Hold Time”, etc.

(2) MH-D20B

① Aligning the Electrodes

Unplug the AC Cable from the outlet to turn off the power supply.

Loosen the Holder-Mounting Screws. Rotate or move back and forth the Electrode Holders to align the upper and lower electrodes as shown at lower right.



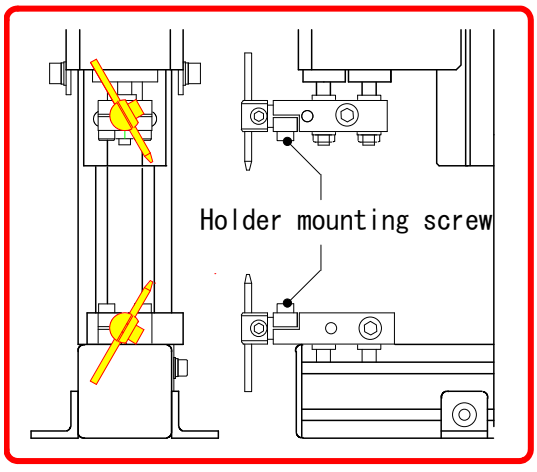
If you cannot align the electrodes, loosen the Holder-Fixing Screw to move right and left the lower Electrode Holder as shown at upper left.

② Adjusting the Electrode Mounting Angle

Unplug the AC Cable from the outlet to turn off the power supply.

Loosen the Holder-Mounting Screws and turn the Electrode Holders to adjust the mounting angle of the electrode.

After the adjustment, tighten the Holder-Mounting Screw securely.



③ Replacing the Electrode and Adjusting the Electrode Position

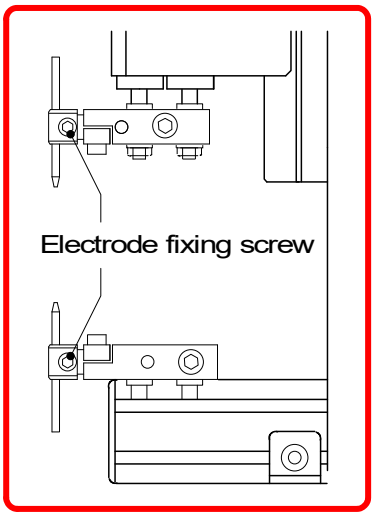
Unplug the AC Cable from the outlet to turn off the power supply.

Loosen the Electrode-Fixing Screw using the supplied M4 hexagon rod spanner.

When replacing the electrode, remove the old one and insert a new one.

Adjust the electrode position.

Tighten the Electrode-Fixing Screw firmly.



④ Adjusting the Weld Force

ATTENTION

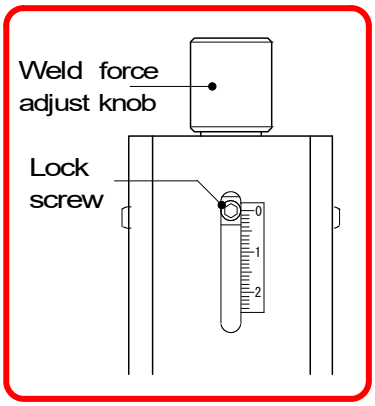
- For safety, always stop operation before starting adjustment.
- The weld force conversion graph represents theoretical values. To measure the actual weld force, use a pressure gauge or spring balance.

Loosen the Lock Screw using the supplied M2.5 hexagon rod spanner.

The scale represents the weld force.
Turn the Weld Force Adjust Knob to adjust the center of the Lock Screw to the desired weld force scale.

Tighten the lock screw to lock the Weld Force Adjust Knob.

After adjusting, measure the weld force using a pressure gauge or spring balance.



⑤ Other

See **6. Operation** for the settings of “Head ascending/descending speed”, “Position of Start Point/Mid-Point”, “Hold Time”, etc.

9. Specifications

(1) Product Specifications

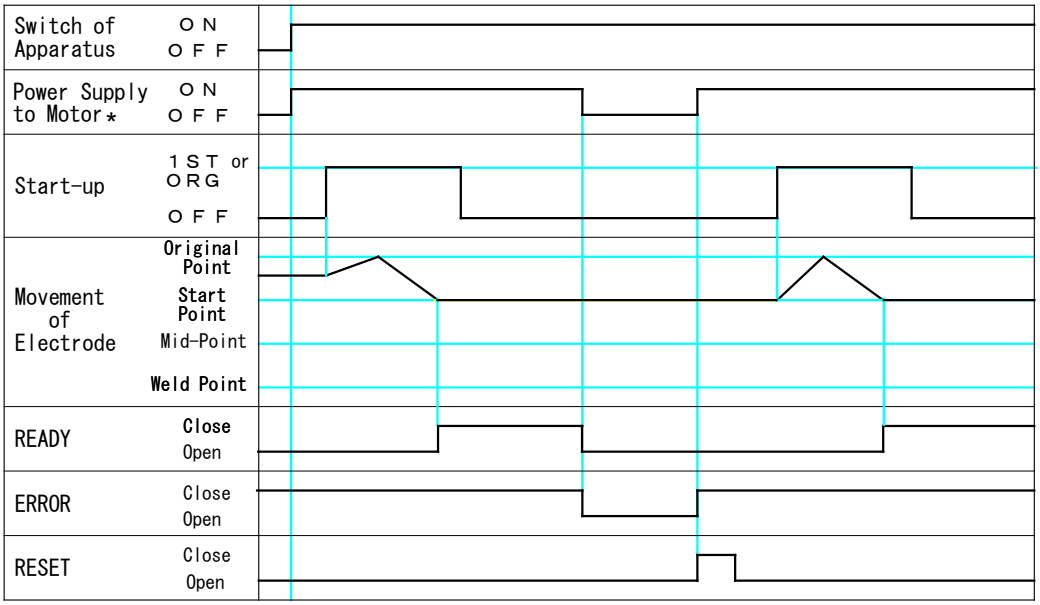
Items	MH-P20B-20	MH-P20B-21	MH-D20B-20
Head Type	For series welding		For direct welding
Electrode Force	8–35 N (Approx. 0.8–3.5 kgf) Stepless adjustment	5–25 N (Approx. 0.5–2.5 kgf) Stepless adjustment	10–70 N (Approx. 1–7 kgf) Stepless adjustment
Weld Force Method	Spring forced		
Electrode Holder	φ3/φ4 mm (Sold separately)		φ3 mm (Std, Supplied)
Electrode Dia.	φ3/φ4 mm (Sold separately)		φ3 mm (Cr-Cu alloy, Std, Supplied)
Electrode-Driving Method	Servomotor		
Electrode Stroke	45 mm		
Throat Depth	217 mm		105 mm
Number of Welding Schedules	31 Schedules (Selectable externally)		
Electrode Speed	Between Start Point and Mid-Point, Weld Point to Mid-Point : 8 Speeds (Selectable for each Schedule) Mid-Point to Weld Point: 4 Speeds (Selectable for each Schedule)		
Hold Time Setting	7 Settings		
Power Supply Volt	100–240 V AC ±10%, 50/60 Hz, 70 VA		
Welding Current	3000 A (At 2% duty cycle)		
Operating Conditions	Temperature: 0°–40°C, Humidity: 90% or less (No condensation)		
Mass (Including motor controller)	Head: 7 kg Controller: 3 kg		Head: 3.5 kg Controller: 3 kg

(2) Accessories

Name	MH-P20B-20	MH-P20B-21	MH-D20B-20
Bolts and Nuts for Fixing the Head	M6 x 50 Hexagon socket head bolts: 6 pcs		M5 x 35 Countersunk head screw: 2 pcs
	M6 Plain washer: 6 pcs		M5 Plain washer: 2 pcs
	M6 Spring washer: 6 pcs		M5 Spring washer: 2 pcs
	M6 Hexagon nut: 6 pcs		M5 Hexagon nut: 2 pcs
Work Tools	M2 Hexagon rod spanner (Nominal #2): 1 pc		
	M4 Hexagon rod spanner (Nominal #3): 1 pc		
	M6 Hexagon rod spanner (Nominal #5): 1 pc		—
External I/O Connector	1 pc		
Operation Manual	1 copy		
Electrode	—		φ3 mm (Cr-Cu alloy): 2 pcs

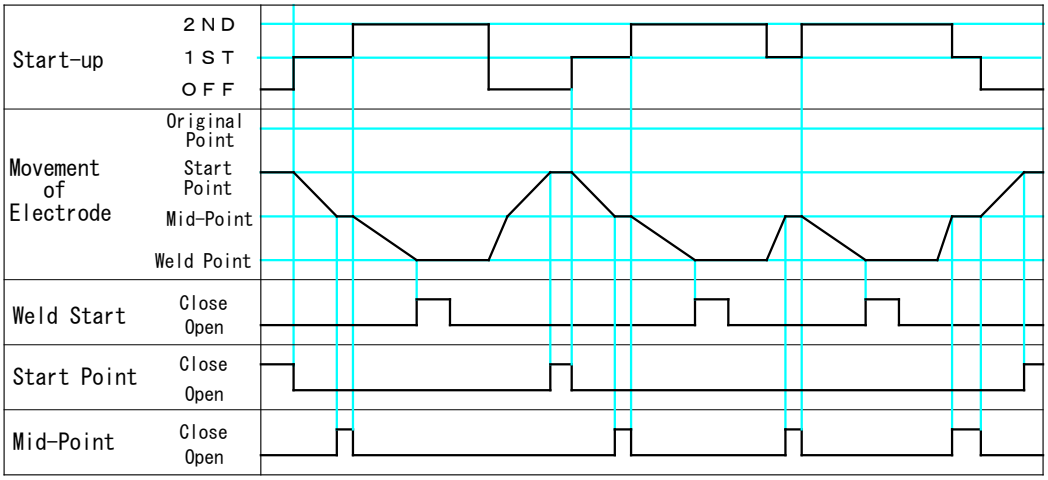
(3) Timing Chart

① Power ON and Error occurring



* When the fault code “E” occurs with the movement mode 0, the power supply to motor is not turned OFF. (Also, the READY signal is not turned OFF.)

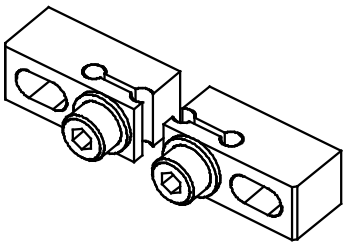
② Operating



(4) Separately Sold Items

① Electrode Holder MH-P20B-20/-21

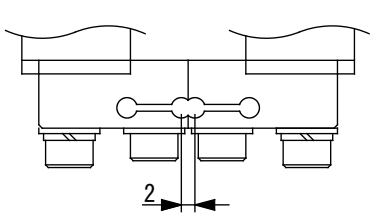
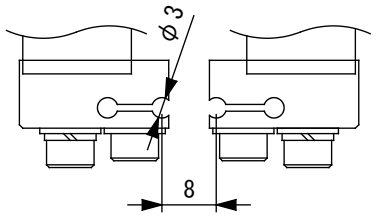
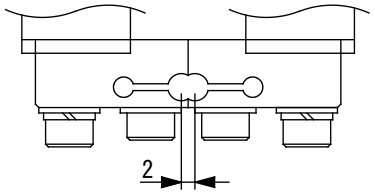
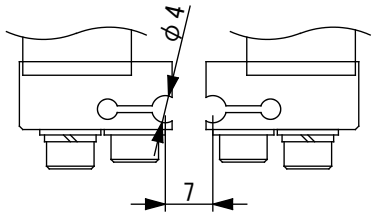
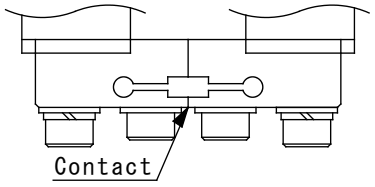
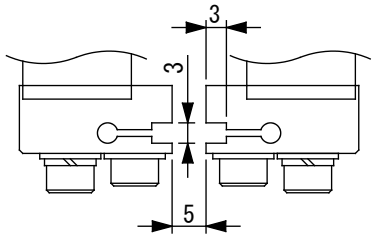
Model No.	Remarks
MK-H05-00 (φ3)	2 pcs per set
MK-H05-01 (φ4)	2 pcs per set
MK-H05-02 (□3)	2 pcs per set



See figures on the next page for the distance between electrodes installed into the Electrode Holder.

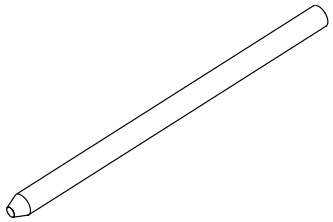
The distance between electrodes installed into the Electrode Holder (sold separately)

(Unit = mm)

	The minimum distance between electrodes	The maximum distance between electrodes
MK-H05-00 for φ3 electrode		
MK-H05-01 for φ4 electrode		
MK-H05-02 for □3 electrode		

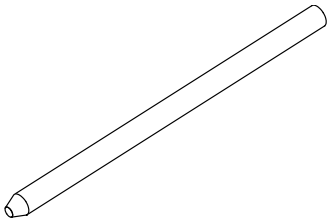
② φ3 Straight Electrode MH-P20B-20/-21, MH-D20B-20

Model No.	Size (Material)
41040	φ3 x 50 (Cr-Cu alloy)
A4-03494	φ3 x 50 (MCZ)
A4-03495	φ3 x 50 (NBC)
A4-04066	φ3 x 50 (alumina-dispersed-strengthened-copper)
M4-00792	φ3 x 50 (Molybdenum)
M4-15593	φ3 x 50 (Tungsten)



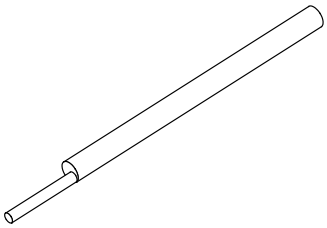
③ φ4 Straight Electrode MH-P20B-20/-21

Model No.	Size (Material)
M4-00083	φ4 x 50 (Cr-Cu alloy)
Z-02712-001	φ4 x 50 (alumina-dispersed-strengthened-copper)
Z-02712-002	φ4 x 50 (MCZ)
Z-02712-003	φ4 x 50 (Tungsten)
Z-02712-004	φ4 x 50 (Molybdenum)



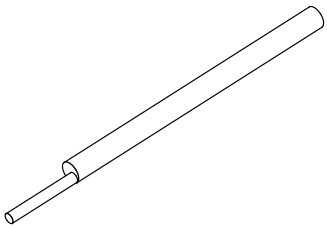
④ φ3 Eccentric electrode MH-P20B-20/-21

Model No.	Size (Material)
Z-02701-001	φ3 x 50, φ1.2 x 8 Tip (Cr-Cu alloy)
Z-02701-002	φ3 x 50, φ1.2 x 8 Tip (alumina-dispersed-strengthened-copper)
Z-02701-003	φ3 x 50, φ1.2 x 8 Tip (MCZ)



⑤ φ4 Eccentric electrode MH-P20B-20/-21

Model No.	Size (Material)
Z-02702-001	φ4 x 50, φ1.5 x 8 Tip (Cr-Cu alloy)
Z-02702-002	φ4 x 50, φ1.5 x 8 Tip (alumina-dispersed-strengthened-copper)
Z-02702-003	φ4 x 50, φ1.5 x 8 Tip (MCZ)



⑥ Power Cable MH-P20B-20/-21, MH-D20B-20

Model No.	Specifications
KP-35 KS-16A SVT#18x3 B-TYPE*	3-pin plug, for 100-120V AC
KP244 VCTF3*1.25 KS16D 3M gray*	Japanese use, for 200V AC
CEE3P-W-1.8	Round plug, for 200-240V AC
KPR-24(SB)-B	3-pin/2-pin conversion adapter for power cable, for 100-120V AC

* Exclusively for the **MH-P20B-2□/MH-D20B-2□**. Do not use for other devices.

10. Data Communication

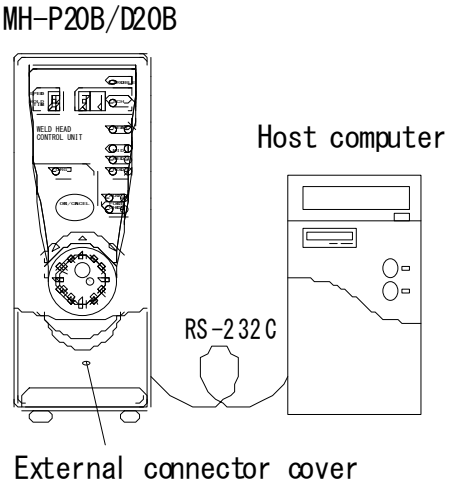
(1) Communication Specifications

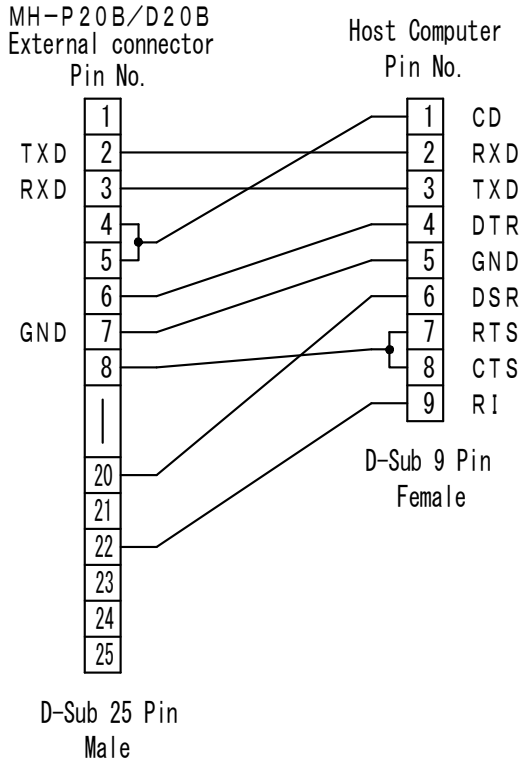
Method	RS-232C: RS-232C, Asynchronous, Teletype procedure RS-485: RS-485, Asynchronous, Half-Duplex
Transmission rate	9600 bps
Data type	Start bit:--------- 1 Data bit:--------- 8 Stop bit:--------- 1 Parity bit: --------1 (Even parity)
Character code	ASCII (CR code is indicated as "$^{C}_{R}$" and LF code as "$^{L}_{F}$".)

(2) Connection of Communication Connector

① **RS-232C**

Signals of RS-232C use TXD, RXD and GND.
The communication connector is within the external connector cover.

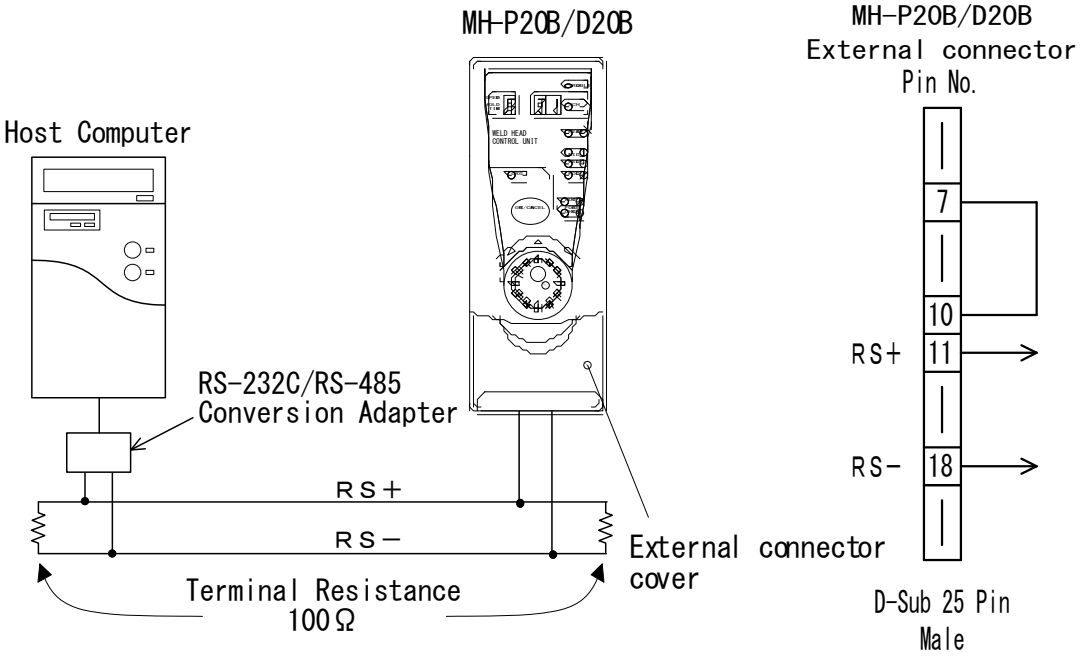




DTR and DSR are not used in **MH-P20B/D20B**.
CTS is not checked at the start of sending.

② **RS-485**

Signals of RS-485 use (RS+) and (RS-).
The communication connector is within the external connector cover.
Short-circuit between Pins 7 and 10.



ATTENTION

- RS-232C/RS-485 conversion adapter is user provided.
- Mount 100Ω of terminal resistance at the both ends of RS-485 cable (See the above figure).

(3) Bidirectional Communication

The Schedule data can be read and written by the command on the host computer side.
When the electrode is at Start Point, the schedule data can be read or written.

When the readout/overwrite command is sent from the host computer, **MH-P20B/D20B** sends back the data.
When sending the command, do not send the next command until the data are sent back or the timeout time elapses.

When using the overwrite command, compare the Schedule of the overwrite command with that of the sent-back data to confirm whether or not it has been changed.

Then, if the comparison is done at Start Point, Mid-Point and Downstop Point, confirm the first 4-digit number eliminating the last digit.
Ex.) In case of “01234” (12.34 mm) at Start Point, eliminate the last digit “0” and “4” to confirm “123” (12.3 mm).

① Readout Command

・Host Controller→**MH-P20B/D20B**

Item	Order	Character train	Description	Range
01	01-01	#	Communication start (from host)	Fixed
02	02-03	01	Communication ID	Fixed
03	04-04	R	Readout request	Fixed
04	05-07	nnn	Schedule No.	001 to 031
05	08-08	*	All contents	Fixed
06	09-09	$^{C}_{R}$	CR code (0x0D)	Fixed
07	10-10	$^{L}_{F}$	LF code (0x0A)	Fixed

▪ **MH-P20B/D20B**→Host Controller

Item	Order	Character train	Description	Range
01	01-01	!	Communication start (to host)	Fixed
02	02-03	01	Communication ID	Fixed
03	04-06	nnn	Schedule No.	001 to 031
04	07-07	:	Data start	Fixed
05	08-13	nnnnn,	Start Point	00000 to 05000 (nnn.nn, unit in mm)
06	14-19	nnnnn,	Mid-Point	00000 to 05000 (nnn.nn, unit in mm)
07	20-25	nnnnn,	Downstop Point	00000 to 05000 (nnn.nn, unit in mm)
08	26-27	n,	Moving speed between Start Point & Mid-Point	1 to 8
09	28-29	n,	Moving speed between Weld Point & Mid-Point	1 to 8
10	30-31	n,	Hold time	1 to 8
11	32-33	n,	Moving speed between Mid-Point & Weld Point	1 to 4
12	34-34	n	Additional pressing time at Weld Point	0 to A
13	35-35	$^{C}_{R}$	CR code (0x0D)	Fixed
14	36-36	$^{L}_{F}$	LF code (0x0A)	Fixed

② Overwrite Command

・Host Controller→**MH-P20B/D20B**

Item	Order	Character train	Description	Range
01	01-01	#	Communication start (from host)	Fixed
02	02-03	01	Communication ID	Fixed
03	04-04	w	Overwrite request	Fixed
04	05-07	nnn	Schedule No.	001 to 031
05	08-08	:	Data start	Fixed
06	09-14	nnnnn,	Start Point	00000 to 05000 (nnn.nn, unit in mm)
07	15-20	nnnnn,	Mid-Point	00000 to 05000 (nnn.nn, unit in mm)
08	21-26	nnnnn,	Downstop Point	00000 to 05000 (nnn.nn, unit in mm)
09	27-28	n,	Moving speed between Start Point & Mid-Point	1 to 8
10	29-30	n,	Moving speed between Weld Point & Mid-Point	1 to 8
11	31-32	n,	Hold time	1 to 8
12	33-34	n,	Moving speed between Mid-Point & Weld Point	1 to 4
13	35-35	n	Additional pressing time at Weld Point	0 to A
14	36-36	$^{C}_{R}$	CR code (0x0D)	Fixed
15	37-37	$^{L}_{F}$	LF code (0x0A)	Fixed

▪ **MH-P20B/D20B**→Host Controller

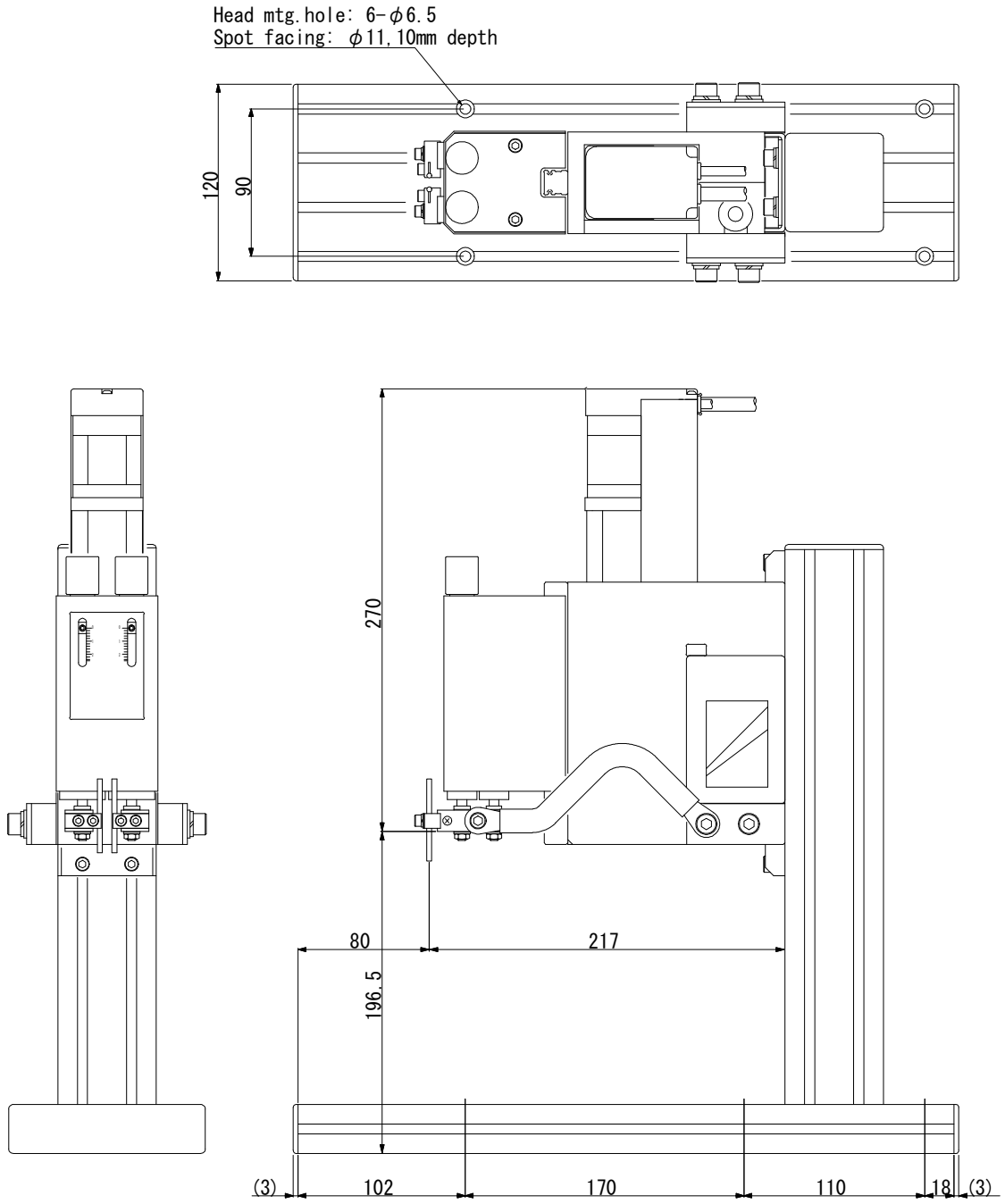
Item	Order	Character train	Description	Range
01	01-01	!	Communication start (to host)	Fixed
02	02-03	01	Communication ID	Fixed
03	04-06	nnn	Schedule No.	001 to 031
04	07-07	:	Data start	Fixed
05	08-13	nnnnn,	Start Point	00000 to 05000 (nnn.nn, unit in mm)
06	14-19	nnnnn,	Mid-Point	00000 to 05000 (nnn.nn, unit in mm)
07	20-25	nnnnn,	Downstop Point	00000 to 05000 (nnn.nn, unit in mm)
08	26-27	n,	Moving speed between Start Point & Mid-Point	1 to 8
09	28-29	n,	Moving speed between Weld Point & Mid-Point	1 to 8
10	30-31	n,	Hold time	1 to 8
11	32-33	n,	Moving speed between Mid-Point & Weld Point	1 to 4
12	34-34	n	Additional pressing time at Weld Point	0 to A
13	35-35	$^{C}_{R}$	CR code (0x0D)	Fixed
14	36-36	$^{L}_{F}$	LF code (0x0A)	Fixed

11. Outline Drawings

(1) MH-P20B-20/-21 Head

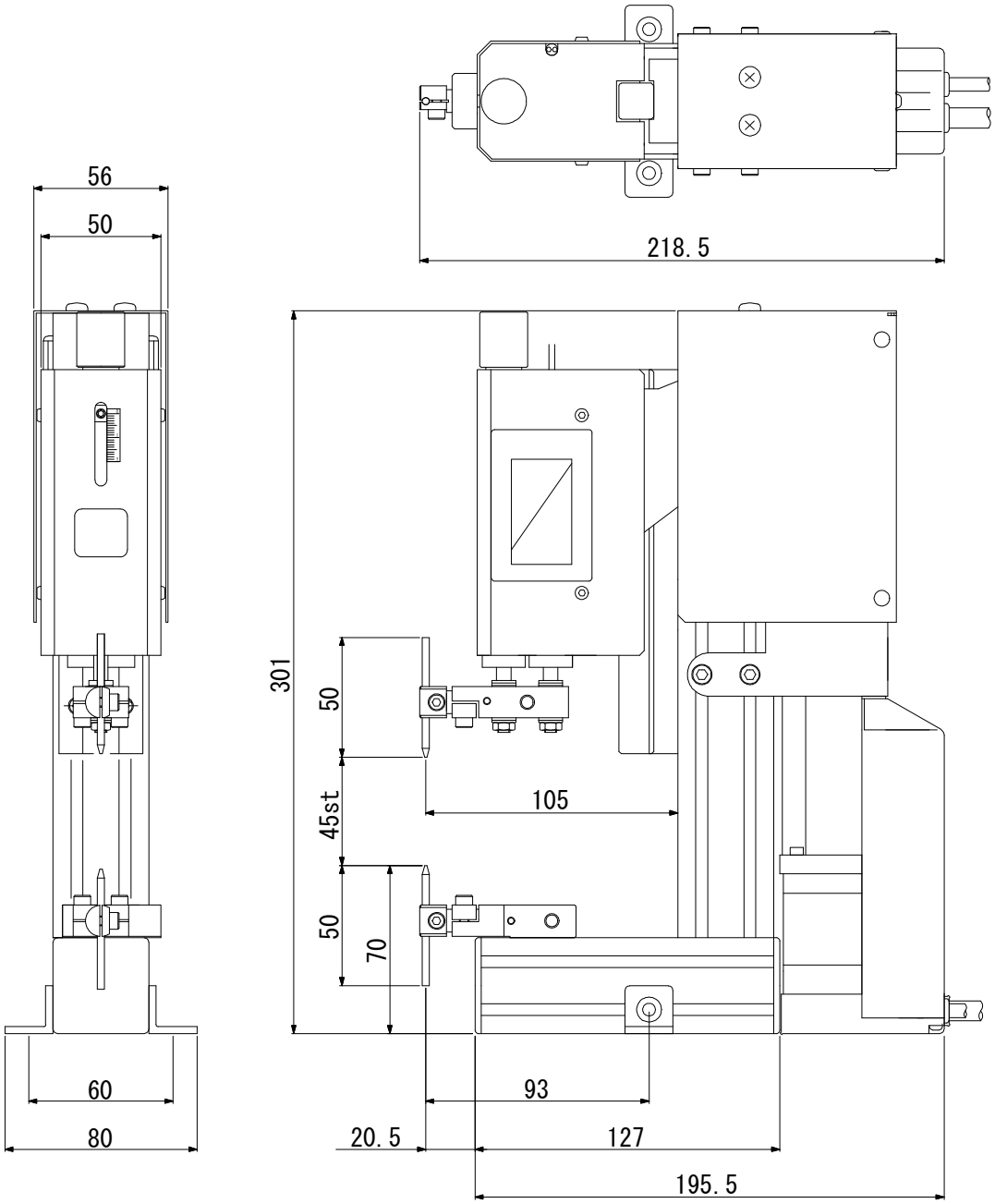
The separately sold electrode and electrode holder are mounded in the figure below.

Dimensions in mm



(2) MH-D20B-20 Head

Dimensions in mm



(3) Head Controller

Dimensions in mm