MOTOR-DRIVEN RESISTANCE WELDING HEAD

MH-D500D

OPERATION MANUAL

AMADA®

AA05OM1208867-02

Thank you for purchasing our Motor-Driven Resistance Welding Head **MH-D500D**.

- 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.

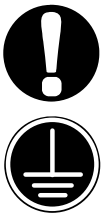
⚠ WARNING

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.

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 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 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.

- For the standard motor, 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. For the motor with brakes, since power supply to the motor is cut off at power off or emergency stop, the built-in brake works to hold the force follow-up mechanism.

(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

- Since **MH-D500D** is motor-driven, a piping for an air actuation is not needed, enabling an easy installation.

- Owing to the motor-driven mechanism, stable electrode force is always obtained although an electrode opening (length) changes. Also, you don't need to adjust the electrode opening finely when replacing the electrode.
  The electrode force of **MH-D500D** is 50 to 500 N (approx. 5 to 50 kgf).

- The Head with load cell displays the electrode force at welding on the color LCD by the built-in load cell. The display of either of N and kgf can be selected.
  Also, you can output a signal when the electrode force reaches the setting and do welding by connecting an optional cable.
  RS-232C, BCD data output, analog output, and RS-485 are available as options of the indicator.

- The Head with load cell can judge that the electrode force is OK or NG by using the comparing display function of indicator.

- The Head with load cell can output the welding start signal from the indicator when the electrode force reaches the specified value for the workpiece to be weld.

  CAUTION When starting welding by using the output from the indicator, the judgment that the electrode force is OK or NG cannot be done by the use of the comparison function.

- Since the electrode-forward/backward speed is adjustable in eight steps (four steps from Mid-Point to Weld Point), you can fit the electrode-force speed to suit your welding work.

- Totally, thirty-one operation schedules can be set. And the operation schedules can be externally selected.

- The electrode can be set to move fast from the start point (stand-by position) to the mid-point (middle-stop position); then slowly to contact a workpiece.
  Very little shock gives the workpiece less deformation, so it can also extend the life of the electrode.
  The positions of the start point and the mid-point are arbitrarily adjustable.

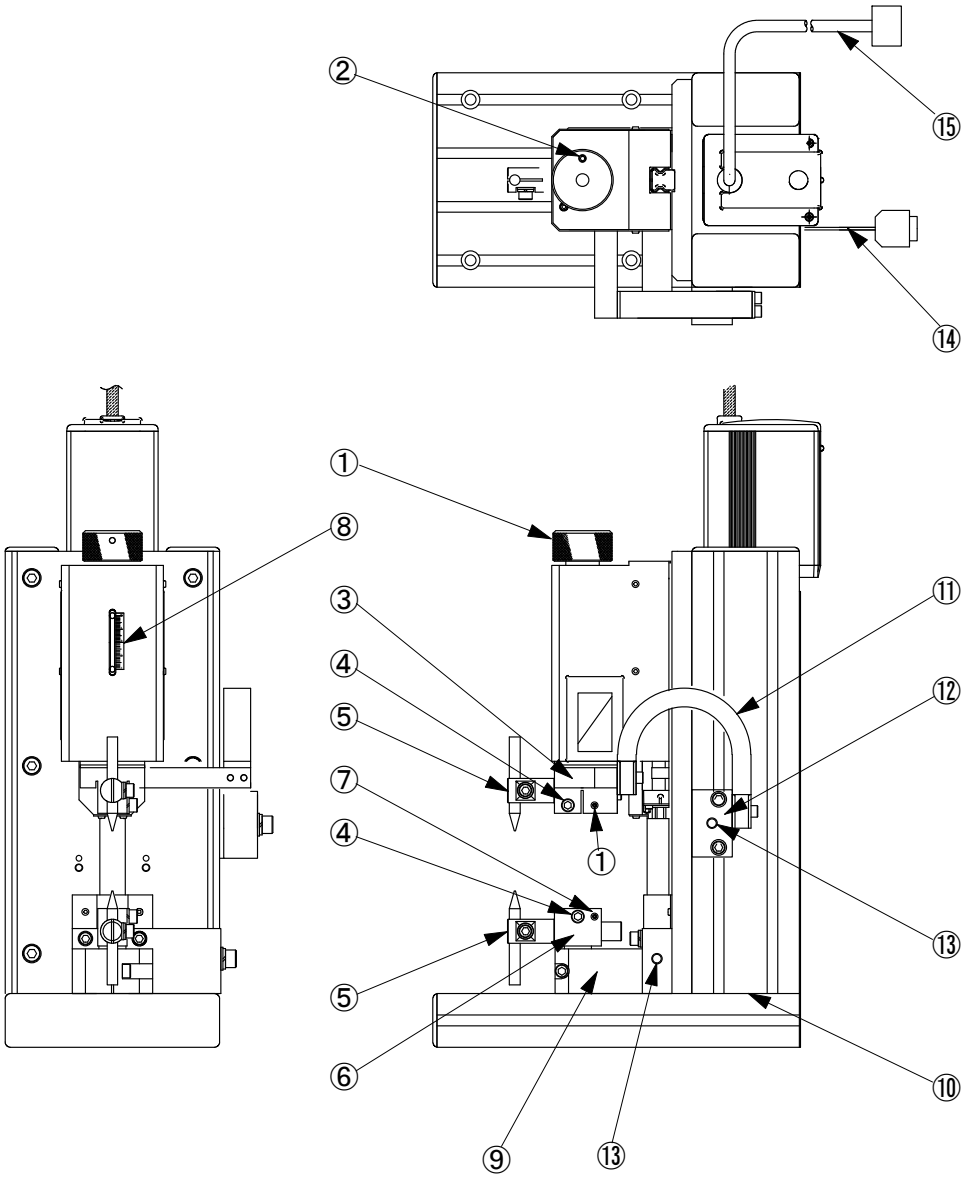
- For continuous welding, the electrode moves only between the mid-point and workpiece. It reduces the tact time because the electrode doesn't need to return to the start point every time it welds.

- During welding, the workpiece expands and shrinks. **MH-D500D** employs a spring so that the electrode can quickly follow-up the deformation of the workpiece, which reduces the surface flash.

- The dedicated controller can easily set the electrode position and speed.

3. Name and Functions of Each Section

(1) Head



① Weld Force Adjustment Knob
Adjusts the electrode force.

② Lock Screw
Locks the Weld Force Adjustment Knob.

③ Holder Upper
Fixes the electrode Holder.

ATTENTION

Should a metal object such as a screwdriver and wire contact **a part such as a Holder through which welding current flows** 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 M6 Electrode Holder-Mounting Screw
Mounts the electrode Holder to the Holder Upper.

⑤ Electrode Holders
Fixes the electrodes.

⑥ Holder
Mounts the electrode holder.

⑦ Screws for connecting Voltage Sensing Cable
Connects the Voltage Sensing Cables.
Use the cables which your welding power supply designates.

⑧ Indicator for Electrode Force
Shows an approximate electrode force.

⑨ Holder Lower
Fixes the Holder and supplies power.

⑩ Column and Base
For the Welding Head.

⑪ Flexible Feeder
Applies power to the upper electrode, transferring according to the movement of the upper electrode.

⑫ Block for supplying Power
Mounts a secondary cable.

⑬ M8 Screws for fixing Secondary Cable
Fixes the secondary cable.

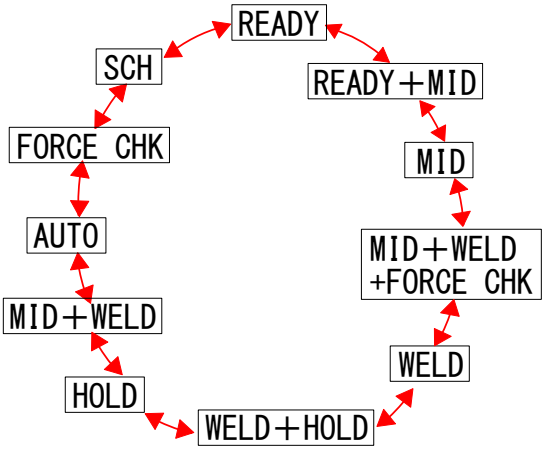
⑭ Cable for Weld Force Detecting Sensor

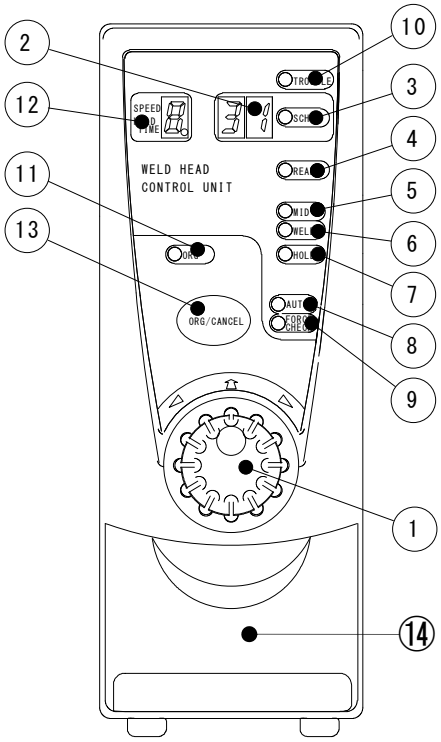
⑮ Motor Cable

(2) 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-D500D**.)	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.	

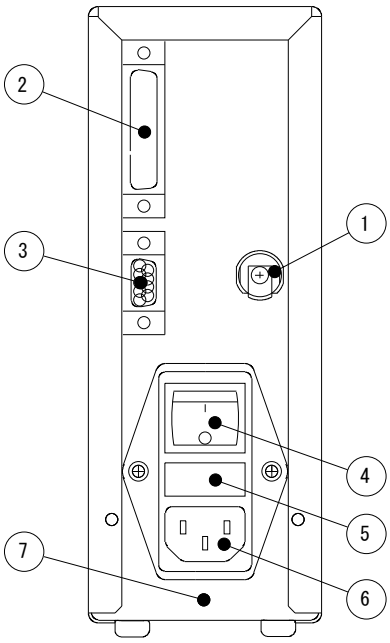
⑬ [ORG/CANCEL] Button

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

⑭ Communication Connector (D-Sub, 25 pins)

For data communication with the external device.

(3) 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.

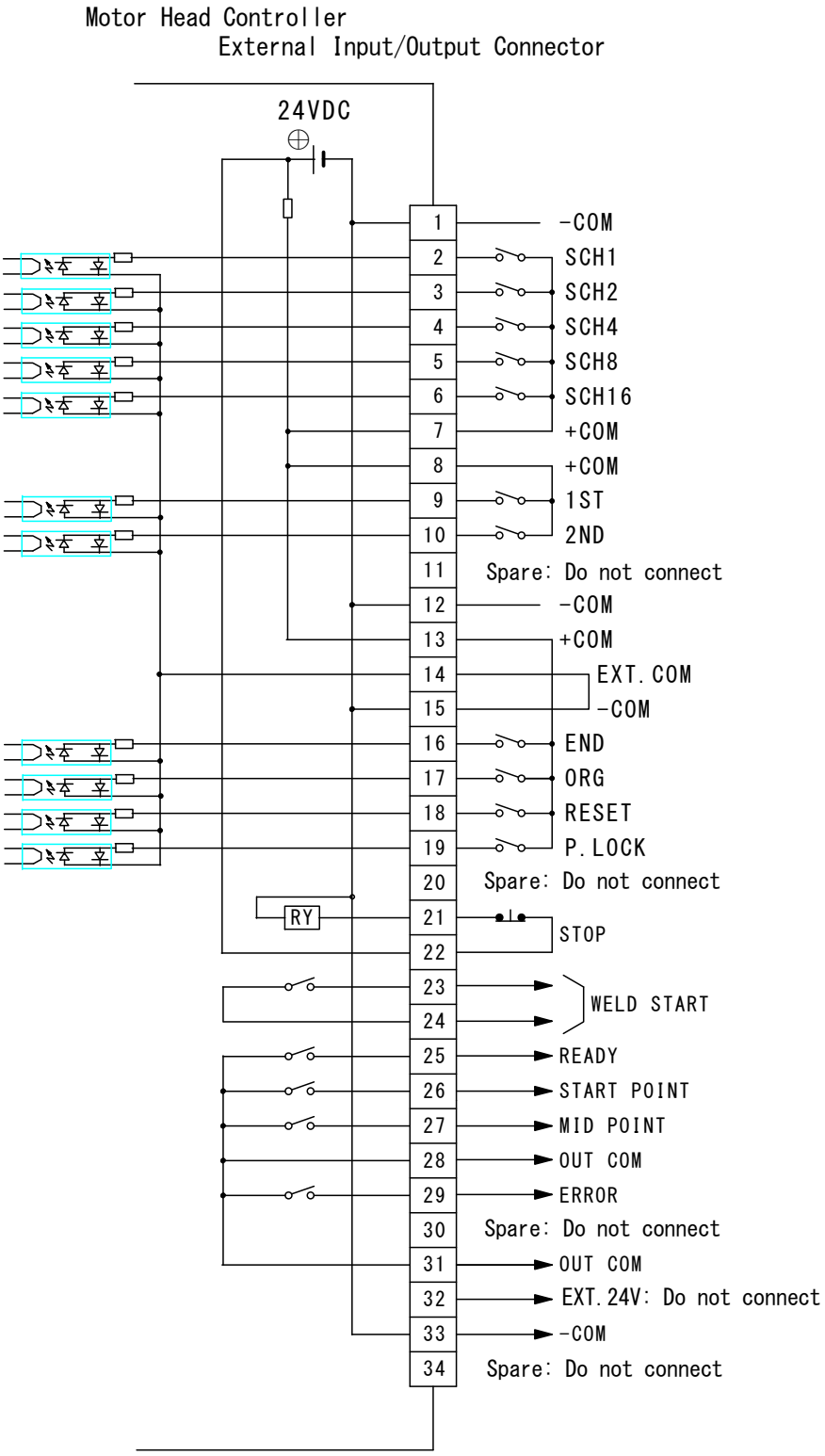
Fuse Rating	250 V, 1 A, 5 mm dia. 20 mm length (Delay melting and high breaking capacity type)

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).

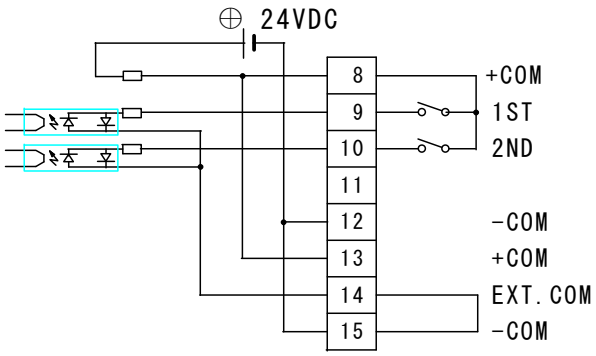
4. Interface

(1) Connection Diagram of External Input/Output Signal

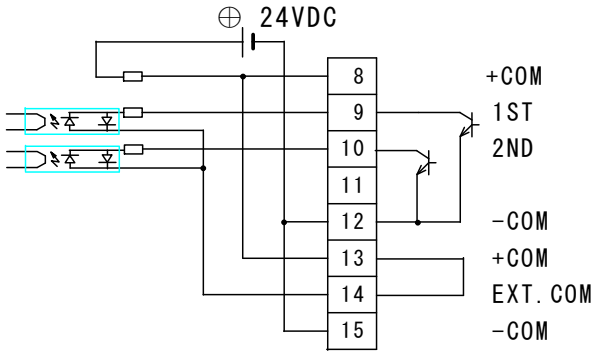


[Example of Connection]

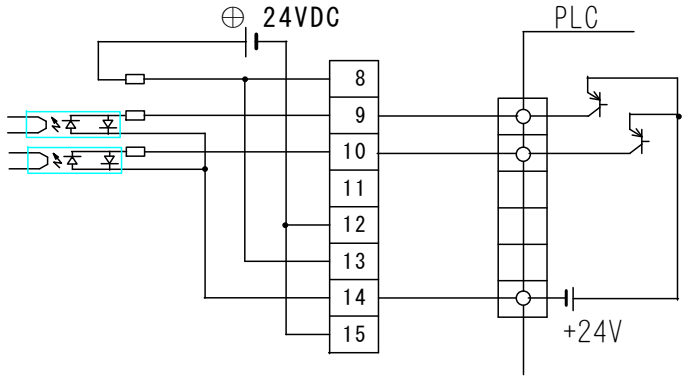
- When contacts are used as input terminal of I/O connector



- 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

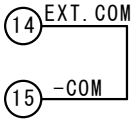
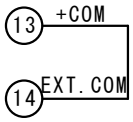
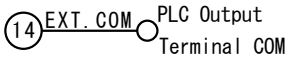
Each pin on I/O Connector is described.
Input signal is explained as contact input.

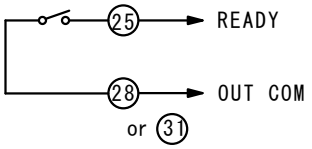
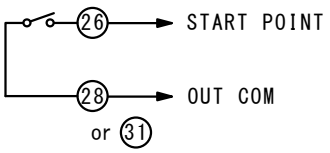
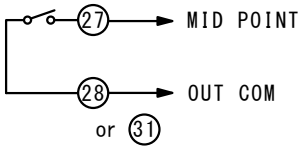
Pin No.	I/O	Description
1		Internally connected to GND (0V).
2	Input	Select a schedule number, referred to as **SCH No.** below, indicating a combination of the circuit-closed pins among Pins, No. 2, 3, 4, 5 and 6 (See table below.). The schedule number selected by I/O Connector has priority over the schedule number set on **MH-D500D**. Before selecting the schedule number by the operation button on **MH-D500D**, 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		

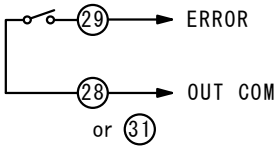
SCH No. \ Pin No.	6	5	4	3	2
1					●
2				●	
3				●	●
4			●		
5			●		●
6			●	●	
7			●	●	●
8		●			
9		●			●
10		●		●	
11		●		●	●
12		●	●		
13		●	●		●
14		●	●	●	
15		●	●	●	●
16	●				

SCH No. \ Pin 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. (In the 2-level type foot switch which is Accessories, Pins 14 and 15 are connected at factory shipment.)  ・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-D500D** 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 Pin 21 and 22 is opened, the motor carries out emergency stop. Usually, close it by an electric wire or 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 Pin 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-D500D**, 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-D500D**, 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] (0V) internally at factory shipment.
34		Spare pin: Do not connect.

5. Installation and Connection

Before using your **MH-D500D**, install it according to the following procedures.

⚠ WARNING

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

⚠ CAUTION

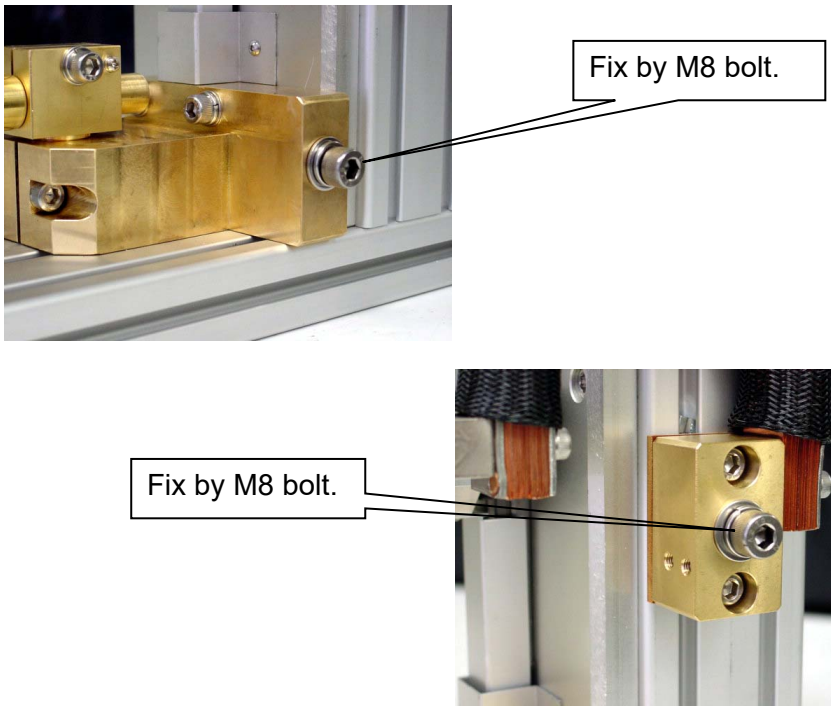
Be sure to firmly install the **MH-D500D** on the horizontal place before using. When the distance from welding transformer is shorter, higher work efficiency will be obtained.

① Determination of Where to Install

Determine where to install **MH-D500D**, the welding power supply and welding transformer.

② Connection of Secondary Cable

Connect the secondary cable to **MH-D500D**.
When installing it, use appropriate tools for the screws, bolts and nuts to firmly fasten them so as not to be loosened.

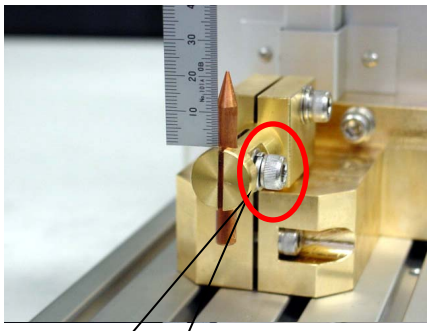


③ Installation and Replacement of Electrode

Loosen M6 bolt fixing Electrode Holder to extract the electrode.

Insert the new electrode into the hole of Electrode Holder.
Install the new electrode so as to keep the electrode extension always the same.

Tighten M6 bolt fixing Electrode Holder to secure the new electrode.

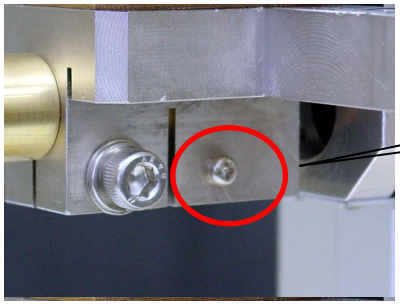


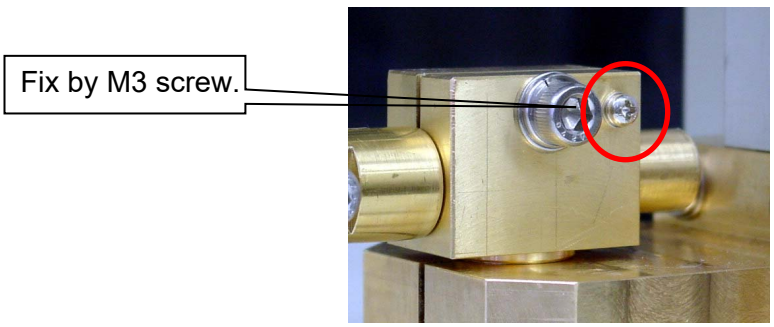
④ Connection of Voltage Sensing Cable

When employing the voltage detecting function such as our Welding Power Supply and Weld Checker etc., connect Voltage Sensing Cable to the Holder.

ATTENTION

The Voltage Sensing Cable is sold separately. Please purchase it separately.





⑤ Connecting Cable of Weld Force Detecting Sensor

Connect the cable of Weld Force Detecting Sensor to controller of the motor.

⑥ Connection of I/O Connector

Connect I/O Connector to controller of the motor.
2-level type foot switch is connected to terminals of [1ST], [2ND] and [COM] of I/O Connector (Accessories).

⑦ Connection of AC Cable

Finally, connect AC cable to the connector of the power supply cable and outlet for 100 to 240 V AC, 50/60 Hz.

6. Operation

(1) Getting Started

① 2-level Footswitch

It is of 2-level type. The switch of the first level is External Input [1ST]. The switch of the second level is External Input [2ND].
These two switches allow a variety of operations.

② Position of Electrode

The **MH-D500D** 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.

③ Working Mode of Electrode

In the model of **MH-D500D**, 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.

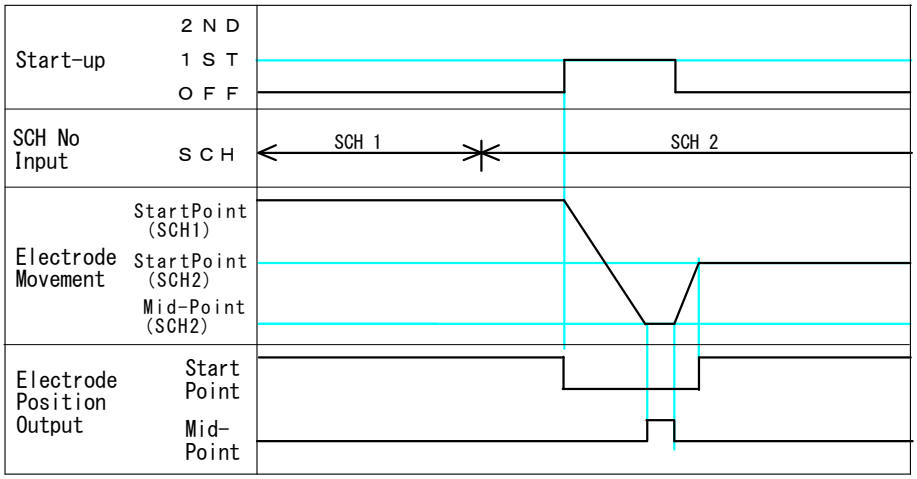
In **Mode 1**, when the electrode is at Start Point and no setting is performed, then, “A” is shown on [SPEED HOLD TIME] Display.

④ 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 the 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 the 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 the 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	35	
3	50	
4	60	
5	70	
6	80	
7	100	
8	125	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 the 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	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, and 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 the 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.

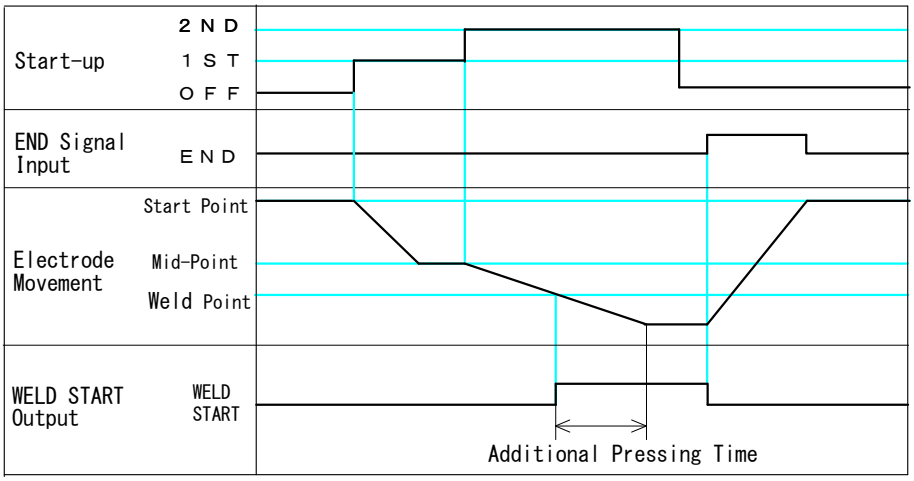
Press the operation button for 1 second. [WELD] and [HOLD] Lamp blink.

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	35	
3	50	
4	60	
5	70	
6	80	
7	100	
8	125	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.
A numeral blinks on [FORCE CHK] Lamp and [SCH] Display. A minus "—" lights up on [SPEED HOLD TIME] Display.
Rotate the operation button to change Schedule No. and press it to fix.

A minus "—" blinks on [FORCE CHK] Lamp and [SPEED HOLD TIME] Display.

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 (Movement 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 (Movement 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

- Use the appropriate tools for the size of screws for maintenance.
  After the completion of adjustment, tighten the screws firmly so that there may occur no loosening or rattling.
- When a caution is given that denotes "Turn off the power switch of the motor controller", strictly observe it to avoid an electric shock and incorrect operation.

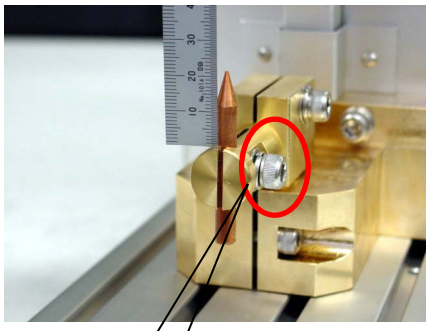
(1) Installing and Replacing Electrode (Separately sold)

① Turn off the power switch of the motor controller and the welding power supply.

② Loosen the bolt M6 of Electrode Holder to extract the electrode.

③ Insert the new electrode into the hole of Electrode Holder.

④ Tighten the bolt M6 of Electrode Holder to secure the new electrode.
Fix the electrode so as to keep the electrode extension always the same.



(2) Adjustment of Weld Force

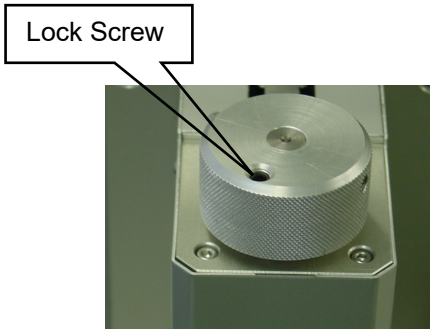
ATTENTION

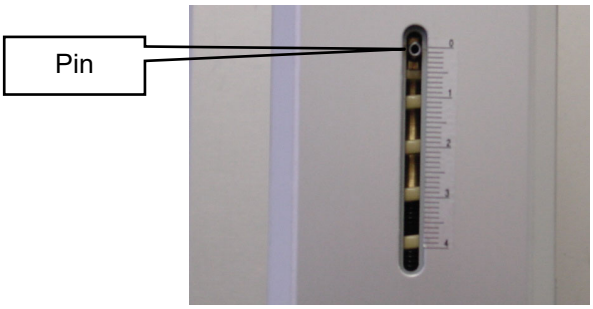
- For safety, make it sure to stop the apparatus before starting the adjustment of weld force.
- The weld force conversion graph represents theoretical values. To measure the actual weld force, use a pressing force gauge or spring balance.

① Loosen Lock Screw.

② The scale represents the weld force.
Turn Weld Force Adjustment Knob to make the center of Pin meet with the desired weld force scale.

③ Tighten Lock Screw to lock Weld Force Adjustment Knob

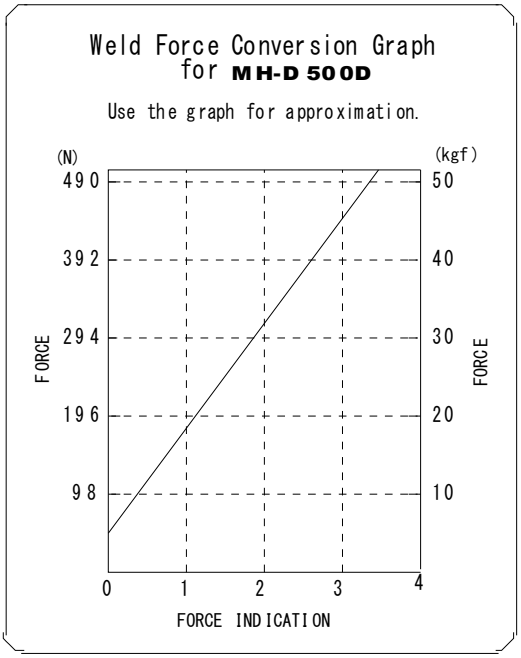




④ After adjusting, measure the weld force by the use of a pressing force gauge or spring balance.

Weld Force Conversion Graph

The weld force conversion graph represents theoretical values. To measure the actual weld force, use a pressing force gauge or spring balance.



9. Specifications

(1) Specifications

For direct welding

Items	MH-D500D-00-							
	00/30	01/31	02/32	03/33	40	41	42	43
Electrode Force	50–500 N (Approx. 5 to 50 kgf) Stepless adjustment							
Weld Force Method	Spring forced							
Load Cell Equipped	No		Yes		No		Yes	
Electrode Dia.	6 mm	8 mm	6 mm	8 mm	6 mm	8 mm	6 mm	8 mm
Electrode-Driving Method	Standard motor				Motor with brakes			
Electrode Stroke	45 mm							
Throat Depth	100 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 to 240 V AC±10%, 50/60 Hz, 70 VA							
Welding Current	3000 A (At 2% duty cycle)							
Ambient Condition	Temperature: 0° to 40°C, Humidity: 90% or less (No condensation)							
Mass	Head: 16 kg, Controller: 3 kg				Head: 16.5 kg, Controller: 3 kg			

For automated application

Items	MH-D500D-00-							
	50/80	51/81	52/82	53/83	90	91	92	93
Electrode Force	50–500 N (Approx. 5 to 50 kgf) Stepless adjustment							
Weld Force Method	Spring forced							
Load Cell Equipped	No		Yes		No		Yes	
Electrode Dia.	6 mm	8 mm	6 mm	8 mm	6 mm	8 mm	6 mm	8 mm
Electrode-Driving Method	Standard motor				Motor with brakes			
Electrode Stroke	45 mm							
Throat Depth	100 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 to 240 V AC±10%, 50/60 Hz, 70 VA							
Welding Current	3000 A (At 2% duty cycle)							
Ambient Condition	Temperature: 0° to 40°C, Humidity: 90% or less (No condensation)							
Mass	Head: 13 kg, Controller: 3 kg				Head: 13.5 kg, Controller: 3 kg			

(2) Accessories

Name	MH-D500D-00-			
	00/02/30/ 32/40/42	01/03/31/ 33/41/43	50/52/80/ 82/90/92	51/53/81/ 83/91/93
Work Tools	M6 Hexagon rod spanner (Nominal # 5): 1 pc		N/A	
	M4 Hexagon rod spanner (Nominal # 3): 1 pc		N/A	
2-Level Footswitch	1 pc (with Controller)		N/A	
Electrode	6 dia. x 50 mm length (Cr-Cu alloy) 2 pcs	8 dia. x 70 mm length (Cr-Cu alloy) 2 pcs	N/A	
Connector	N/A		External I/O Connector: 1 pc	
Operation Manual	1 copy			

(3) Separately Sold Items

① Electrode Holder

Model	Specification
Z-03039-003	6 mm diameter, 1 pc
Z-03039-004	4 mm diameter, 1 pc
Z-03039-005	8 mm diameter, 1 pc

② Electrode 6 mm dia.

Model	Dimension (Material)
A4-02924	6 mm dia. x 50 mm length (Cr-Cu alloy)
M4-00593	6 mm dia. x 76 mm length (Tungsten press-fit)
M4-00599	6 mm dia. x 76 mm length (Molybdenum press-fit)

③ Electrode 4 mm dia.

Model	Dimension (Material)
M4-00083	4 mm dia. x 50 mm length (Cr-Cu alloy)
Z-02712-001	4 mm dia. x 50 mm length (Alumina-dispersed Copper)
Z-02712-002	4 mm dia. x 50 mm length (MCZ)
Z-02712-003	4 mm dia. x 50 mm length (Tungsten)
Z-02712-004	4 mm dia. x 50 mm length (Molybdenum)

④ Electrode 8 mm dia.

Model	Dimension (Material)
A4-02946	8 mm dia. x 70 mm length (Cr-Cu alloy)
A4-05663	8 mm dia. x 80 mm length (Tungsten)
M4-00598	8 mm dia. x 76 mm length (Molybdenum press-fit)

⑤ Power Cable

Model	Specification
KP-35 KS-16A SVT#18x3 B-TYPE*	3-pin plug, for 100-120 V AC
KP244 VCTF3*1.25 KS16D 3M gray*	Japanese use, for 200 V AC
CEE3P-W-1.8*	Round plug, for 200-240 V AC
KPR-24(SB)-B	3-pin/2-pin conversion adapter for power cable, for 100-120 V AC

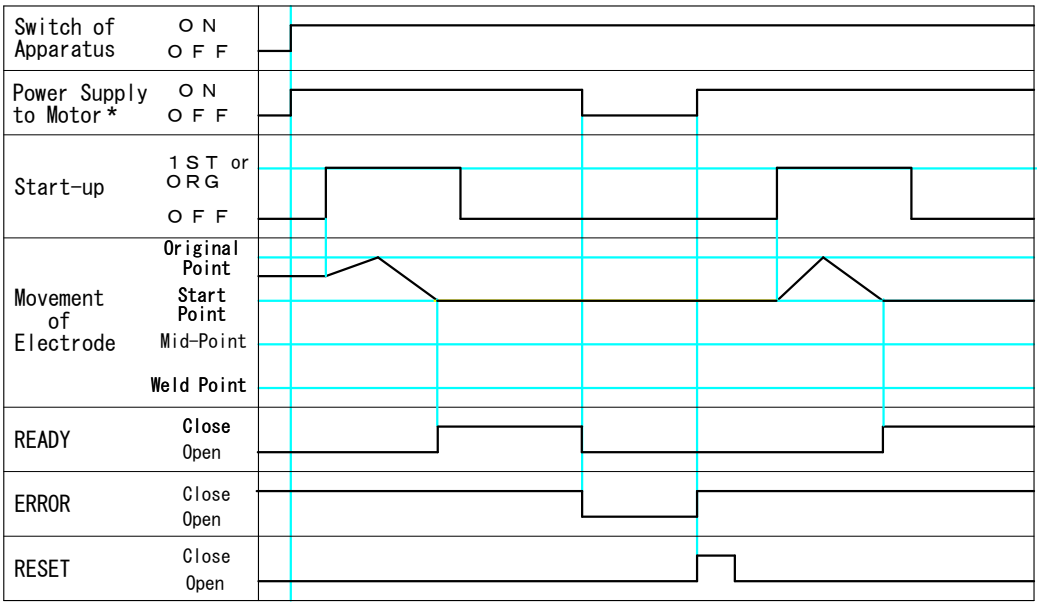
* Exclusively for the **MH-D500D**. Do not use for other devices.

⑥ Start Cable at Set Weld Force

Model	Specification
A-05986-001	For separately-installed type of controller
A-05986-002	For all-in-one type of controller

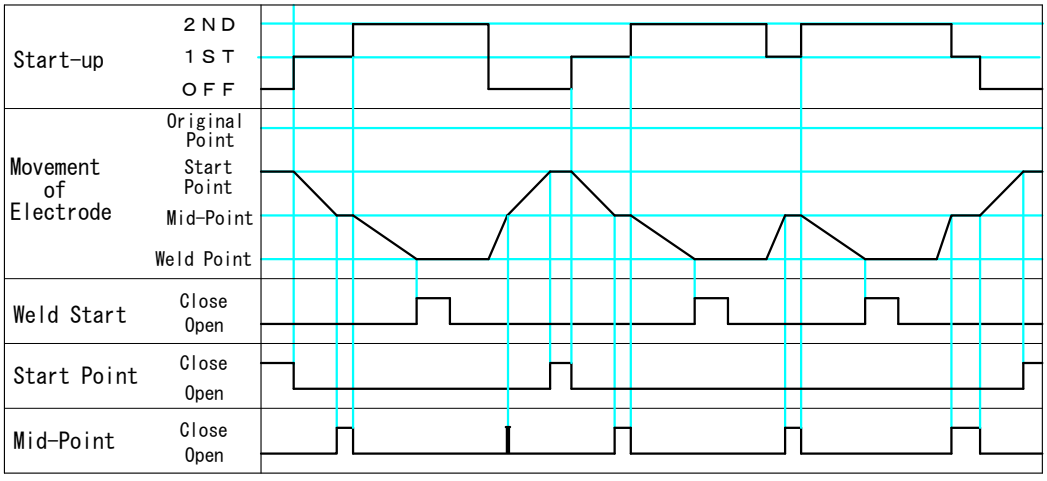
(4) Timing Chart

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



10. Data Communication

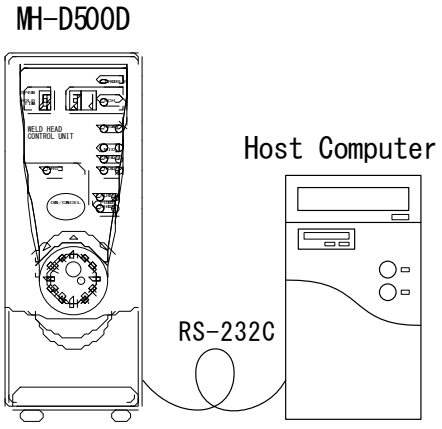
(1) Communication Specifications

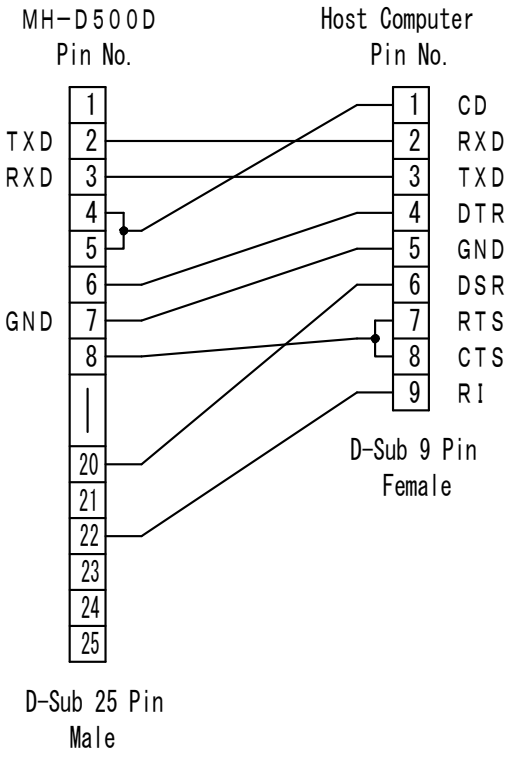
Method	RS-232C: RS-232C, Asynchronous, Teletype procedure RS-485: RS-485, Asynchronous, Half-Duplex
Transmission rate	9600 bps
Data type	Start bit:--------- 1 Data bit:--------- 8 Stop bit:--------- 1 Parity bit: --------1 (Even parity)
Character code	ASCII (CR code is indicated as "$^{C}_{R}$" and LF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

(2) Connection of Communication Connector

① RS-232C

Signals of RS-232C use TXD, RXD and GND.

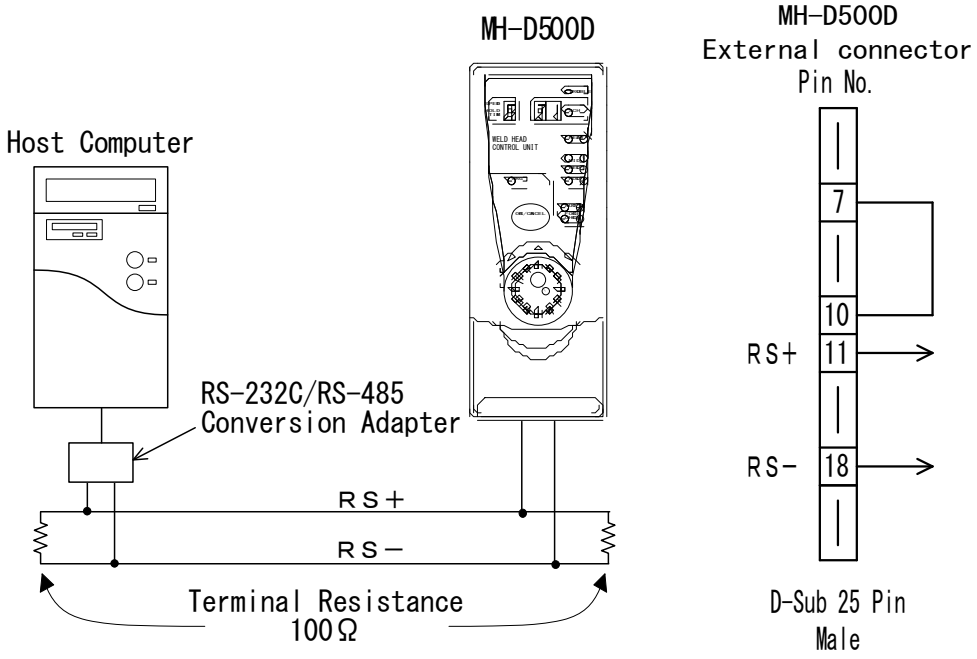




DTR and DSR are not used in **MH-D500D**.
CTS is not checked at the start of sending.

② RS-485

Signals of RS-485 use (RS+) and (RS-).
Short-circuit between Pins 7 and 10.



ATTENTION

- RS-232C/RS-485 conversion adopter 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-D500D** 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-D500D**

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-D500D**→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-D500D**

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-D500D**→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. Welding Head with Load Cell

(1) Connection of Load Cell Sensor to Indicator

Connect cables of a load cell sensor to the signal input/output terminal block at the back panel of **Indicator DS-6200** (See **Load Cell Connection** in Operation Manual of Indicator.)

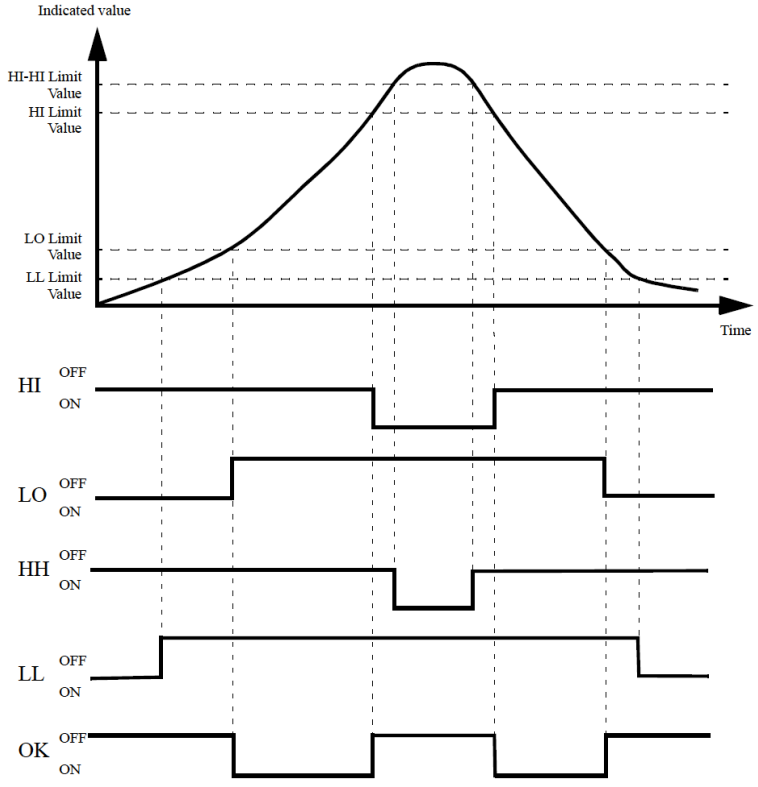
(2) Comparison Functions of Indicator

By the comparison function, the HI limit and LO limit values are set. When the set value exceeds the HI limit, the HI output is turned on, and when the set value falls below the LO limit, the LO output is turned on. Also, HI-HI limit and LO-LO limit values may be set outside the HI-LO limit comparison. When the set value exceeds the HI-HI limit, the HH output is turned on, and when the set value falls below the LO-LO limit, the LL output is turned on.
When the HI, HH, LO and LL outputs are all off, the OK output is turned on.

<HI/LO output conditions>
HI: indicated value > HI limit value
LO: indicated value < LO limit value

<HH/LL output conditions>
HH: indicated value > HI-HI limit value
LL: indicated value < LO-LO limit value

<OK output conditions>
OK: All conditions of HH, HI, LO and LL are off.



The way to set the values is described below (See **Comparison Functions** in Operation Manual of Indicator).

How to set

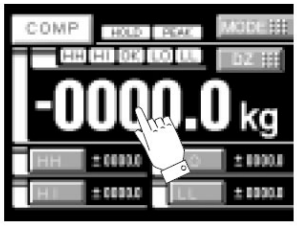
Setting call → Comparison setting → Page 1

Simple setting call

Press any of the HI-HI, HI, LO and LO-LO buttons at the bottom of the indicated value display screen to go direct to the entry screen.

About the indicated value display color

The display color can be changed by pressing the indicated value display section. Every time it is pressed, State 1 and State 2 are changed.



・State 1

The indicated value display color is fixed (yellow).

・State 2

The indicated value display color changes following the comparison status.

OK: green
HI, LO: yellow
HH, LL: red

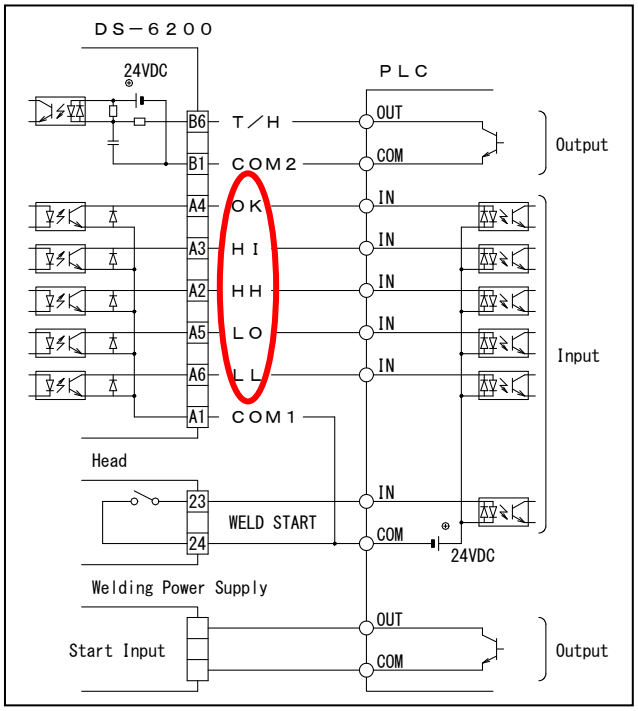
(3) How to Hold at Indicator HI-LO Limit Judging and Indicated Value

After Upper and Lower Limit has been judged at Indicator, the displayed value can be held by the use of external devices such as PLC (Sequencer), etc. (See **Comparison Functions** in Operation Manual of Indicator for the way to set Upper and Lower Limit). Examples of the connection and signal timing are described below.

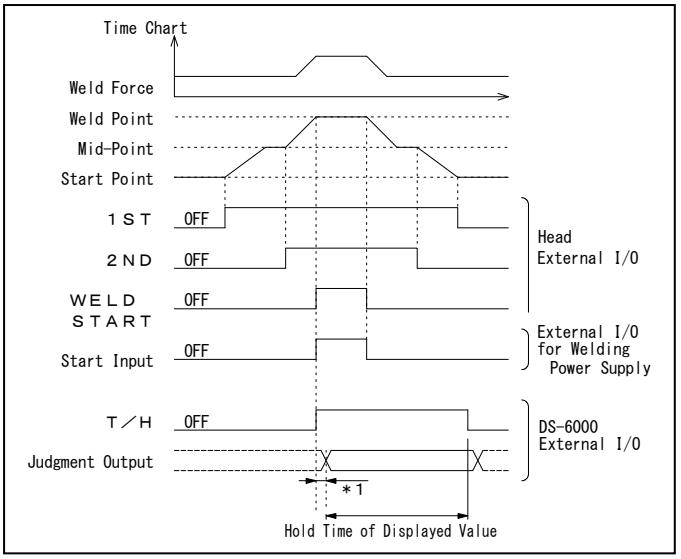
⚠ **CAUTION**	In the case of the judgment of OK or NG using Comparison Functions, no start can be performed by the use of Indicator Output.

① Example of connection
Connect the judgment output signal cable to be used among the judgment outputs on Indicator, “OK, HI, HH, LO and LL”.

See **Rear Panel** in Operation Manual of Indicator for details of input and output signals.



② Example of signals timing
The example depicts the judgment of weld force at the start of welding.
1) Input “1ST” and “2ND” of Head to exert weld force.
2) Output the “T/H” signal of Indicator and the start input signal of welding power supply by detecting “WELD START” signal of Head. Output the start input signal of welding power supply in synchronization with “WELD START” signal of Head.
3) Read the judgment output of Indicator in the elapsed time (1 ms) indicated at *1. After reading the judgment output, cut off “T/H” signal of Indicator.



(4) Calibration of Load Cell

The way to calibrate the built-in load cell is described below.
A pressing force gauge is necessary for measuring weld force across electrodes.

Calibrate Indicator with a load cell sensor by the Equivalent Input Calibration.
The rated output values required for the calibration are described on the data sheet of the load cell sensor. Save the sheet for future reference.
See **Calibration** in Operation Manual of Indicator for calibration procedures.

 **ATTEN-TION**	When “0” calibration is required, remove the front cover of Head and raise the spring up by hand so that the load cell may be under no-load for the calibration.

① Input the Rated Capacity and Rated Output (indicated by arrows) attached to each load cell to Indicator.
See **Equivalent Input Calibration Procedure** in Operation Manual of Indicator for the way to input.

 **CAUTION**	When “0” calibration is done, remove the front cover of a load cell portion and raise the spring up by hand after reducing the pressing force by Weld Force Adjustment Knob so that the load cell may be under no-load. Then, check that the load cell is under no-load and set “0” point.

② After measuring a pressing force across the electrodes by the use of a pressing force gauge, input the difference between the measured pressing force and the indicated value on Indicator using the Digital Offset Function of Indicator so as to make the indicated value on Indicator equal to the measured value on the pressing force gauge.
Do the Digital Offset Calibration at the value near the actual weld force, and then less error can be obtained.
Also, the offset value varies depending on masses such as electrodes, holders, etc.
(Displayed Value on Indicator)=(Actual Indicated Value on Gauge)-(Offset Value)
See **Digital Offset** in Operation Manual of Indicator for the way to input.

③ Make sure that the value of a pressing force gauge at exerting the force on electrodes is equal to the value on Indicator.

 **CAUTION**	The indicated value on Indicator also is not “0” because of structural dependence when weld force is not exerted. Never apply the electric current onto the pressing force gauge.

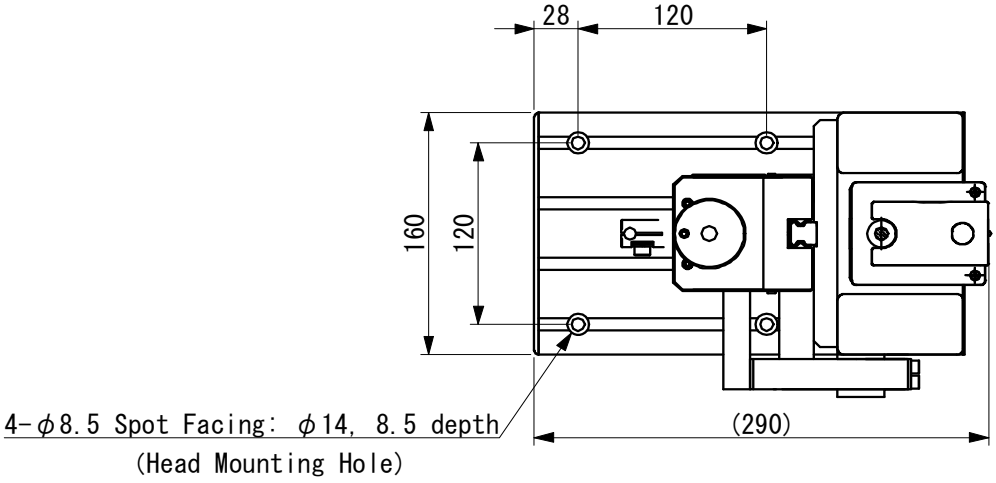
④ Calibration Protection is recommended so that calibration-related set values can not be changed owing to any operation mistake. See **Calibration Protection** in Operation Manual of Indicator for the way to protect.

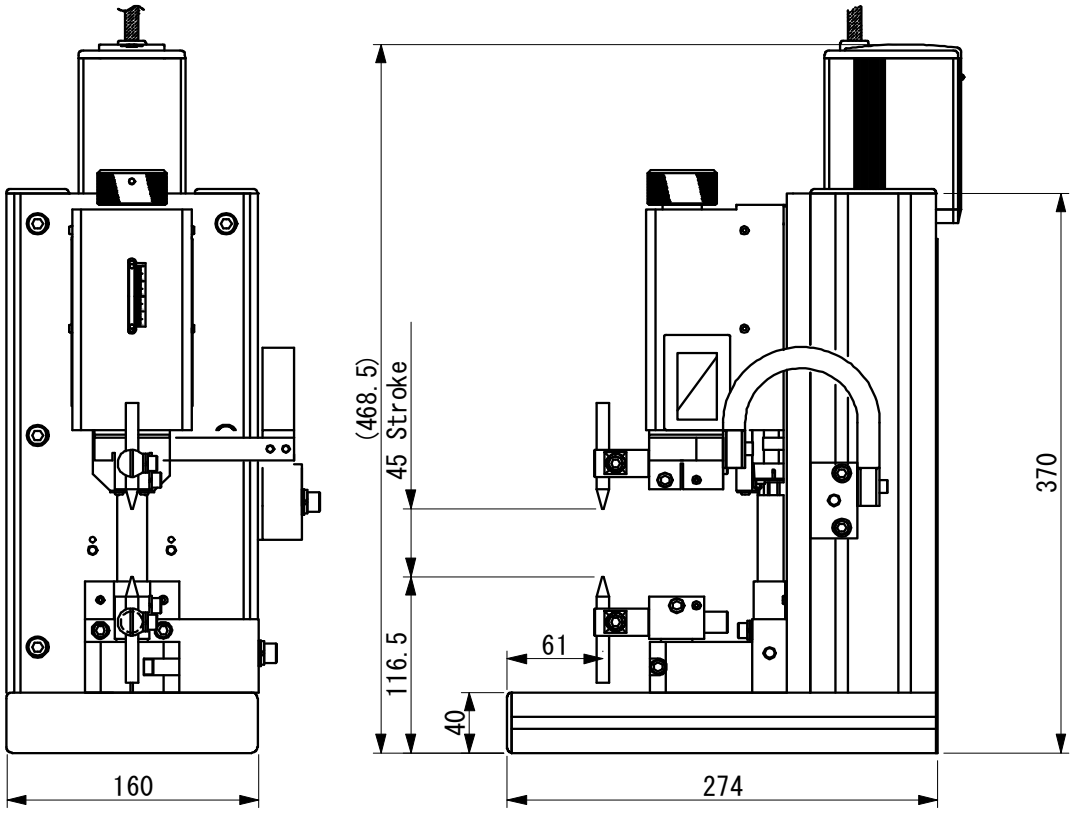
12. Outline Drawings

Note that the configuration of the Head differs depending on the model number.

(1) MH-D500D-00-00/01/30/31 Head

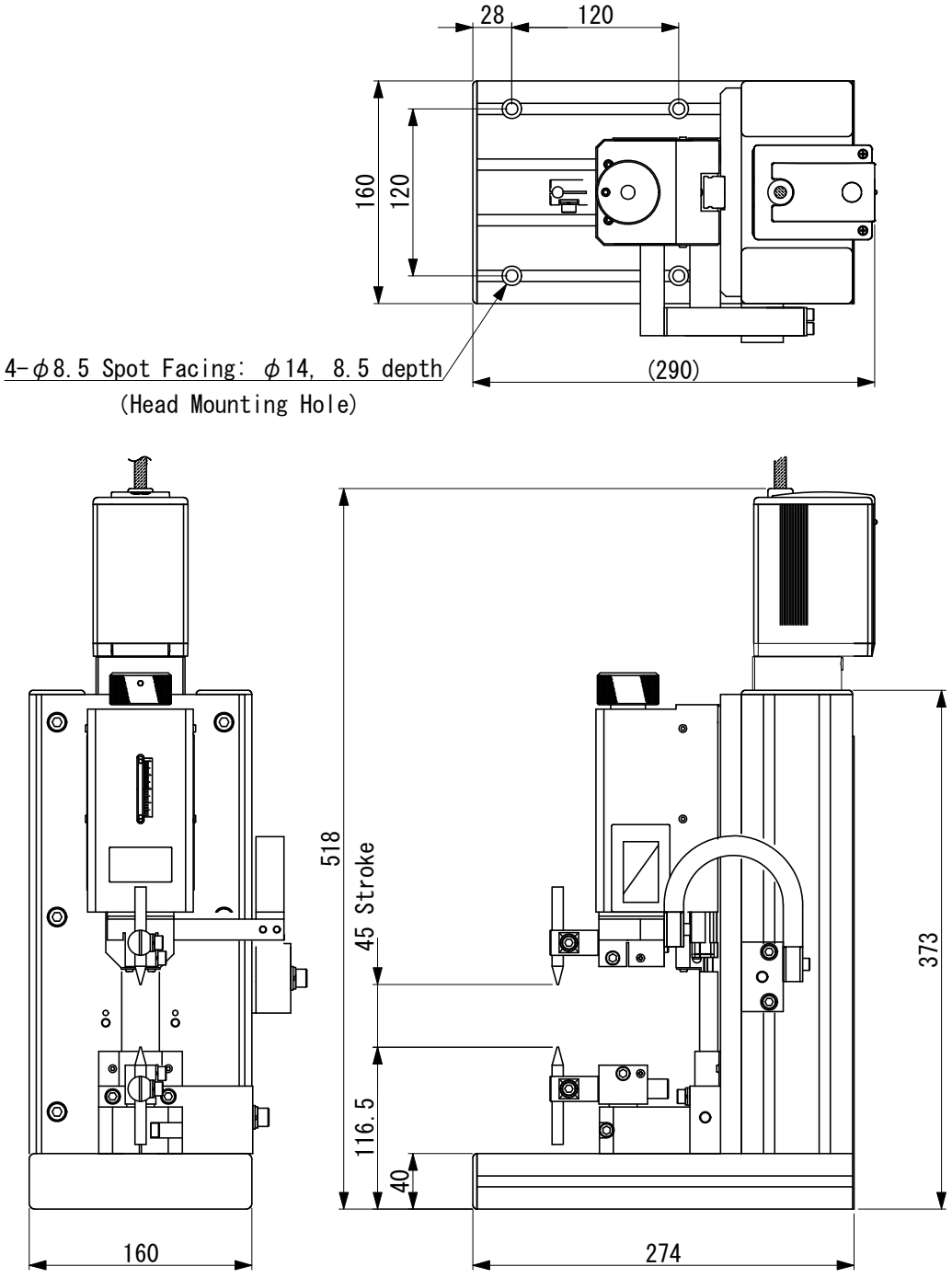
(Dimensions in mm)





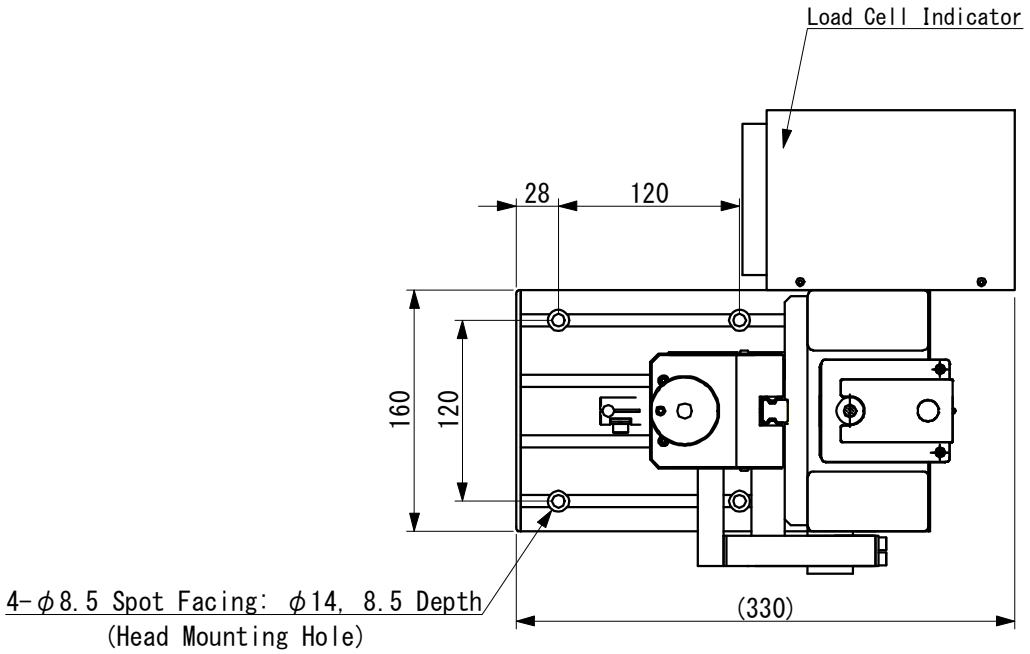
(2) MH-D500D-00-40/41 Head

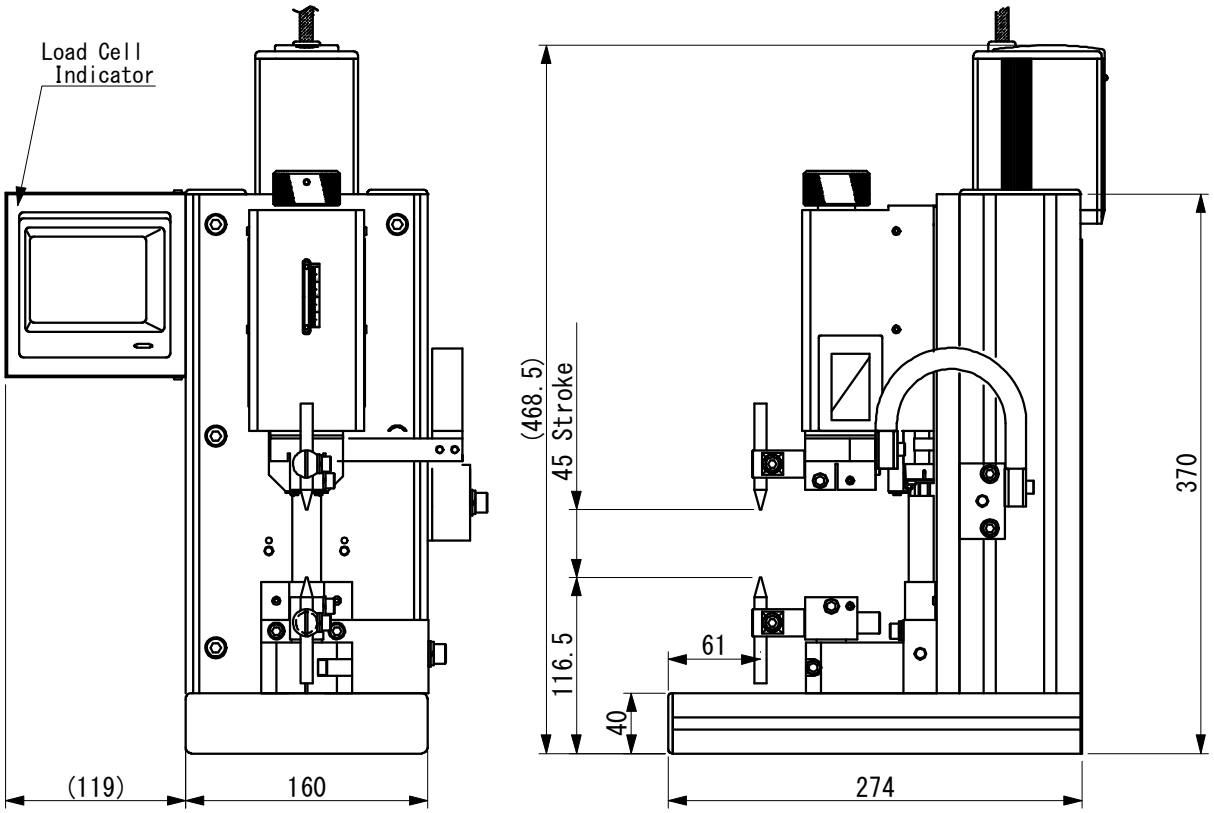
(Dimensions in mm)



(3) MH-D500D-00-02/03/32/33 Head

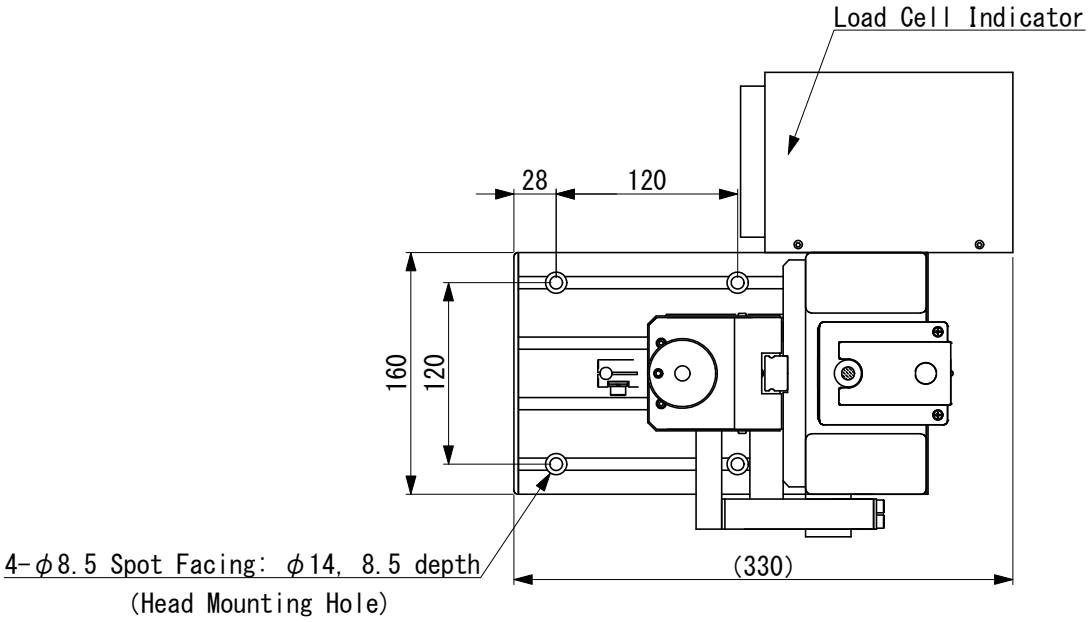
(Dimensions in mm)

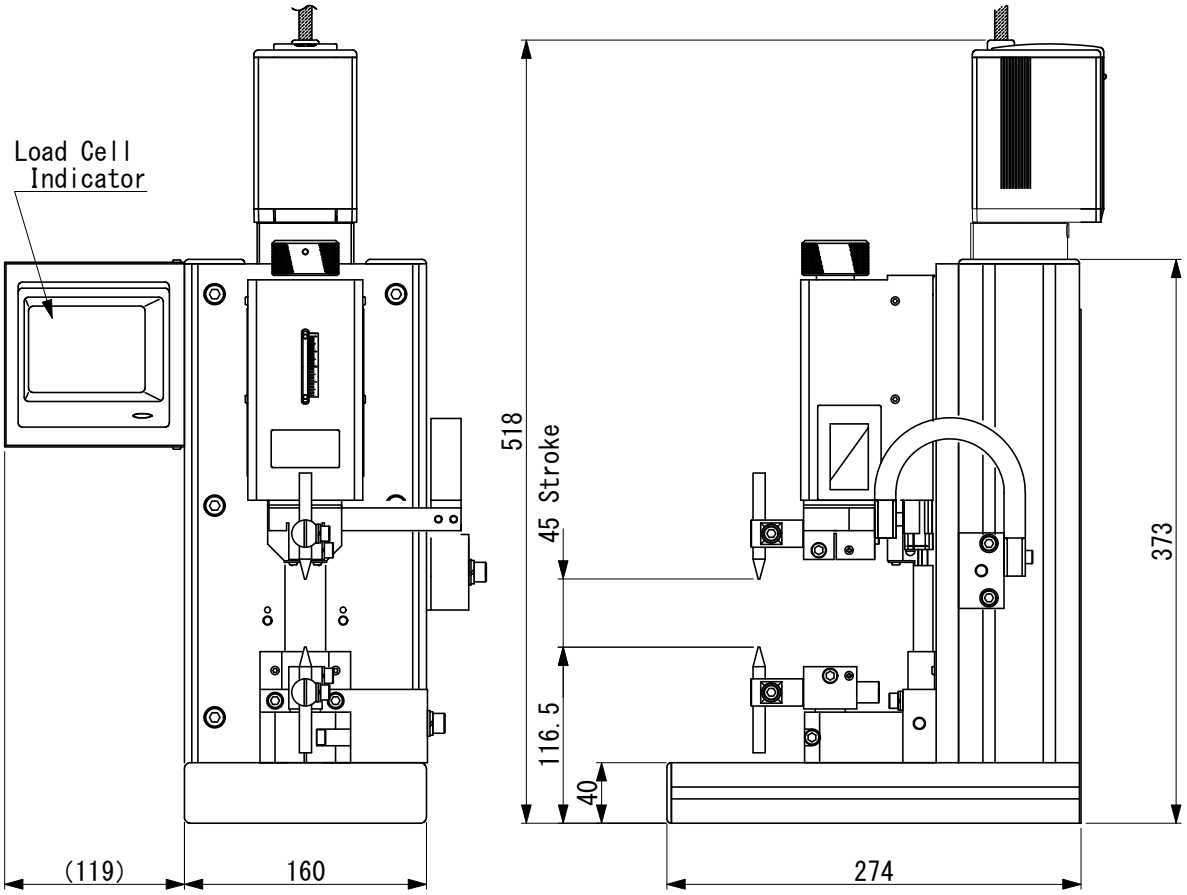




(4) MH-D500D-00-42/43 Head

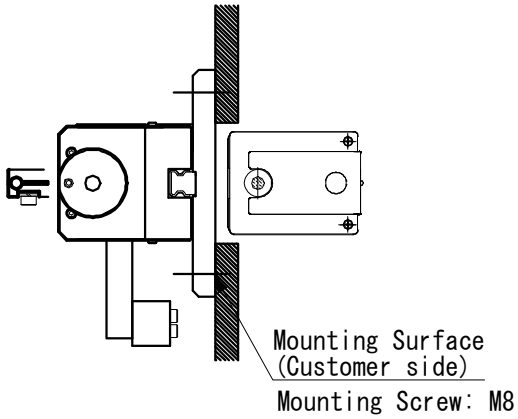
(Dimensions in mm)

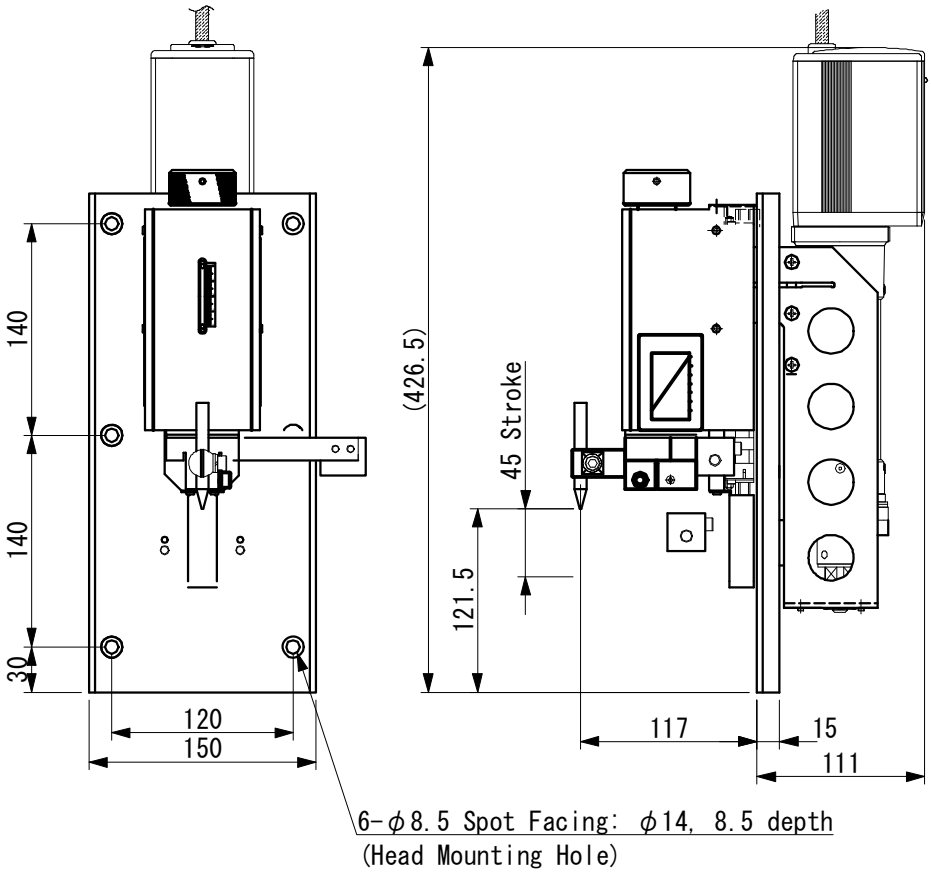




(5) MH-D500D-00-50/51/80/81 Head

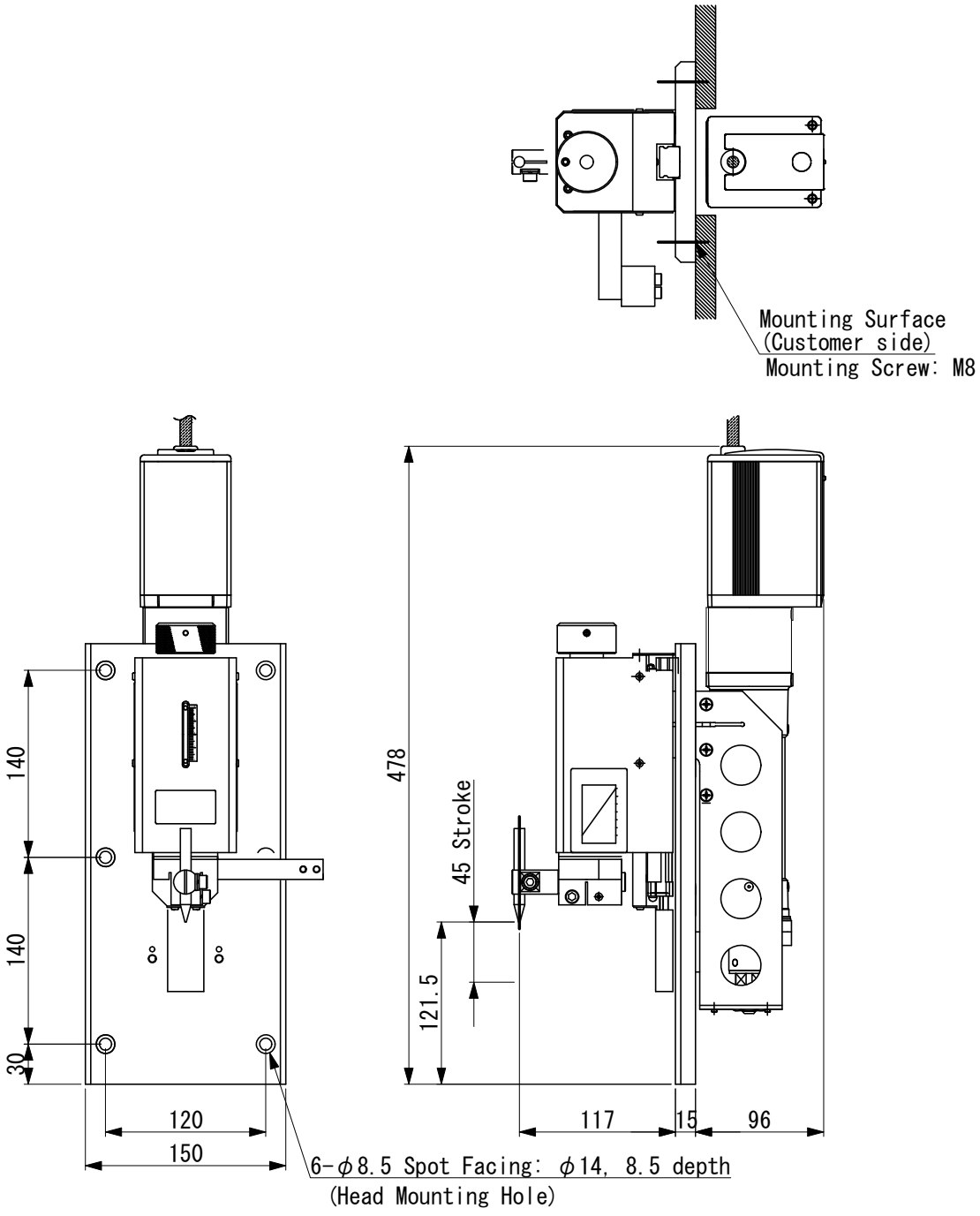
(Dimensions in mm)





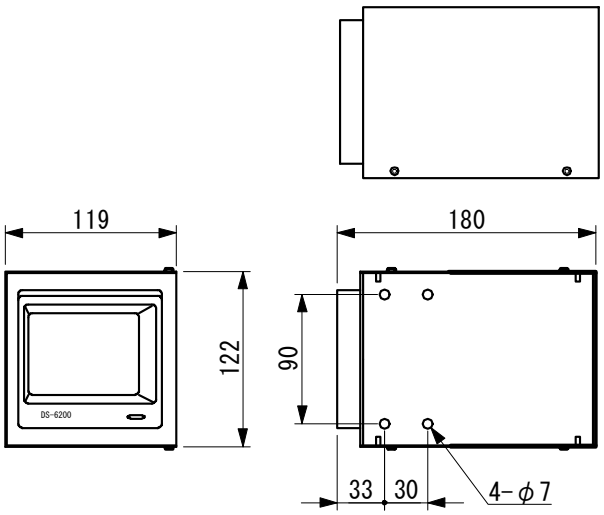
(6) MH-D500D-00-90/91 Head

(Dimensions in mm)

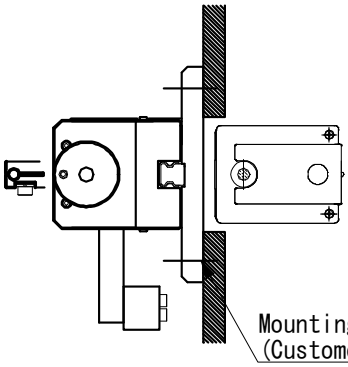


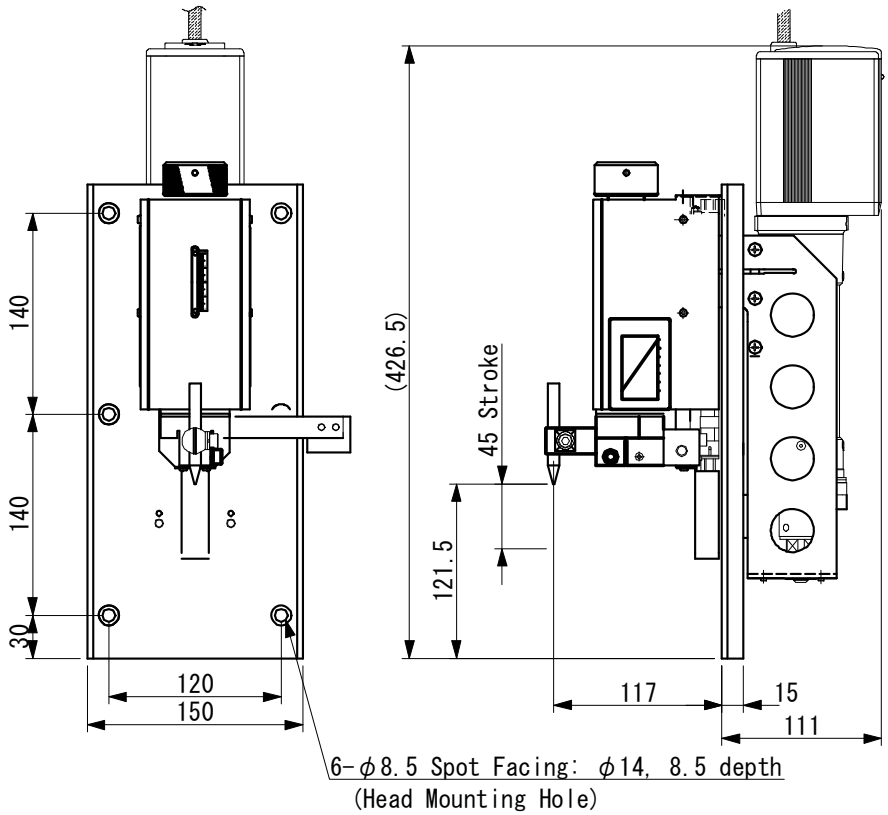
(7) MH-D500D-00-52/53/82/83 Head

(Dimensions in mm)



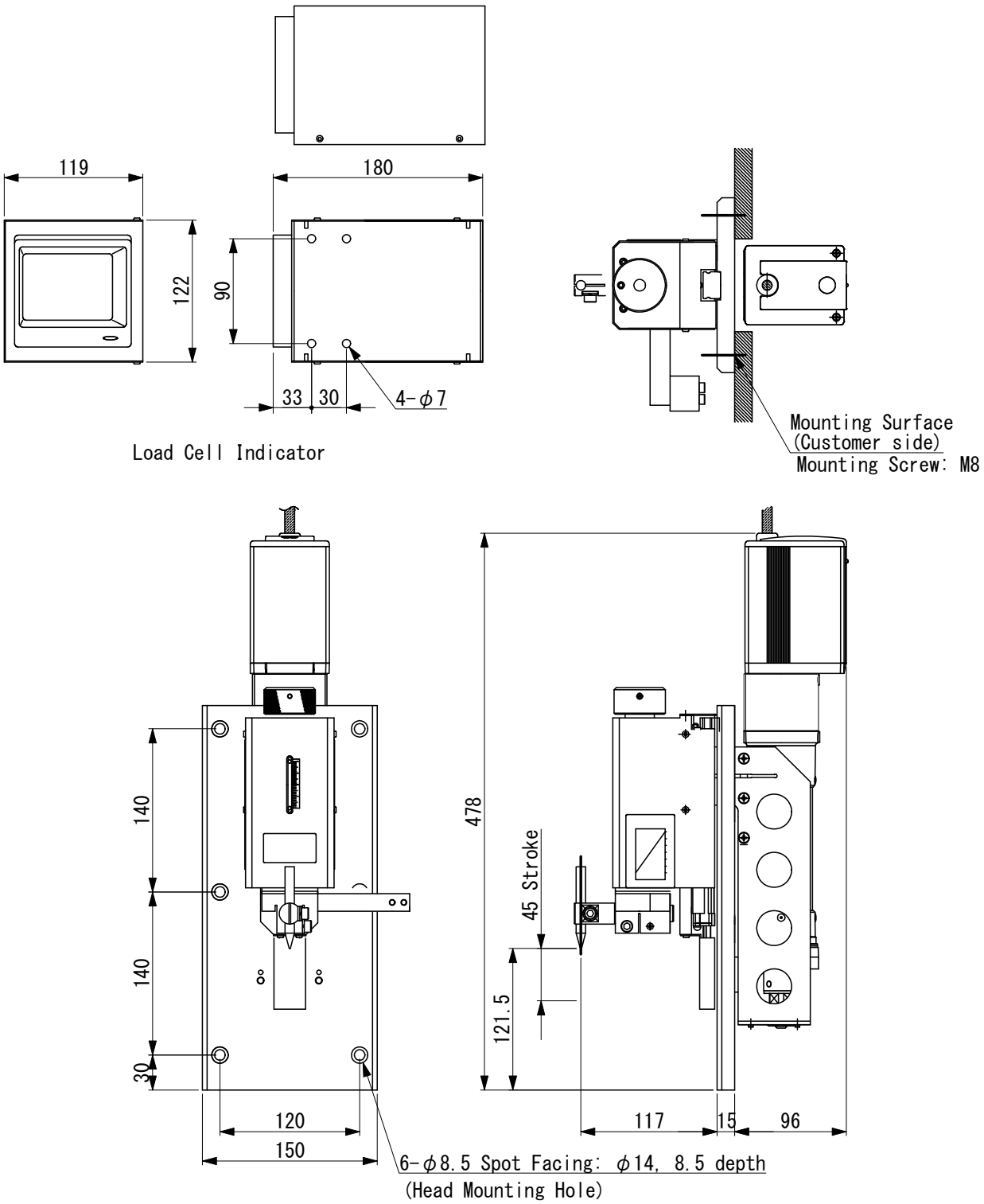
Load Cell Indicator





(8) MH-D500D-00-92/93 Head

(Dimensions in mm)



(9) Head Controller

(Dimensions in mm)