WELD FORCE SENSOR FOR RESISTANCE WELDING MACHINES

MA-520B/521B/522B

OPERATION MANUAL

AMADA®

Y02OM1200944-02

Thank you for purchasing our **MA-520B/521B/522B**, Weld Force Sensor for Resistance Welding Machines.
For correct use, read this Operation Manual carefully. After reading, save it properly for future reference.

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.

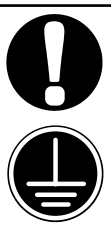
⚠ WARNING

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

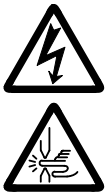
⚠ CAUTION

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 Sensor.
These actions can cause electric shock and fire. Do not do anything other than the maintenance described in the operation manual.

⚠ WARNING

Do not put your hands between the electrodes.
When welding, keep your fingers and hands away from the electrodes.

Do not touch any welded part or electrodes during welding and just after welding finished.
The welded part of a workpiece, electrodes and electrode holder are very hot.
Do not touch them; otherwise you may be burnt.

Do not 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. If any part needs to be repaired or replaced, consult us or your distributor.

Connect the specified cables securely.
Cables of insufficient current capacities and loose connections can cause fire and electric shock.

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

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

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

⚠ CAUTION

Use ear protectors.
Loud noises can damage hearing.

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.

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

(2) Precautions for Handling

- Do not install this Sensor in the following.
  Damp places where humidity is higher than 90%, places where the Sensor may be subjected to vibration or impact, 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.
- Operate the Sensor according to the method described in this operation manual.
- Never apply the welding current to the weld force sensor during welding. It can cause a malfunction or breakage. However, a measurement can be done while the welding current flows by connecting the optional part for measuring the weld force of the welding head which has two electrodes such as parallel gap welding and series welding.
- Do not apply a weld force larger than the rated load of the Sensor. Also, do not apply a weld force or have an impact on the Sensor suddenly.
- Do not bend the flexible joint part of the Sensor unnecessarily. When bending, do not bend it over 60° from right to left or up and down. Also, do not pull the flexible joint part of the Sensor over 5 mm. The internal signal line may be broken.
- Do not put anything other than a workpiece, e.g., a tool, a screw, etc., between the electrodes. It can cause a malfunction.
- Clean the outside of the Sensor 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 Sensor.

2. Features

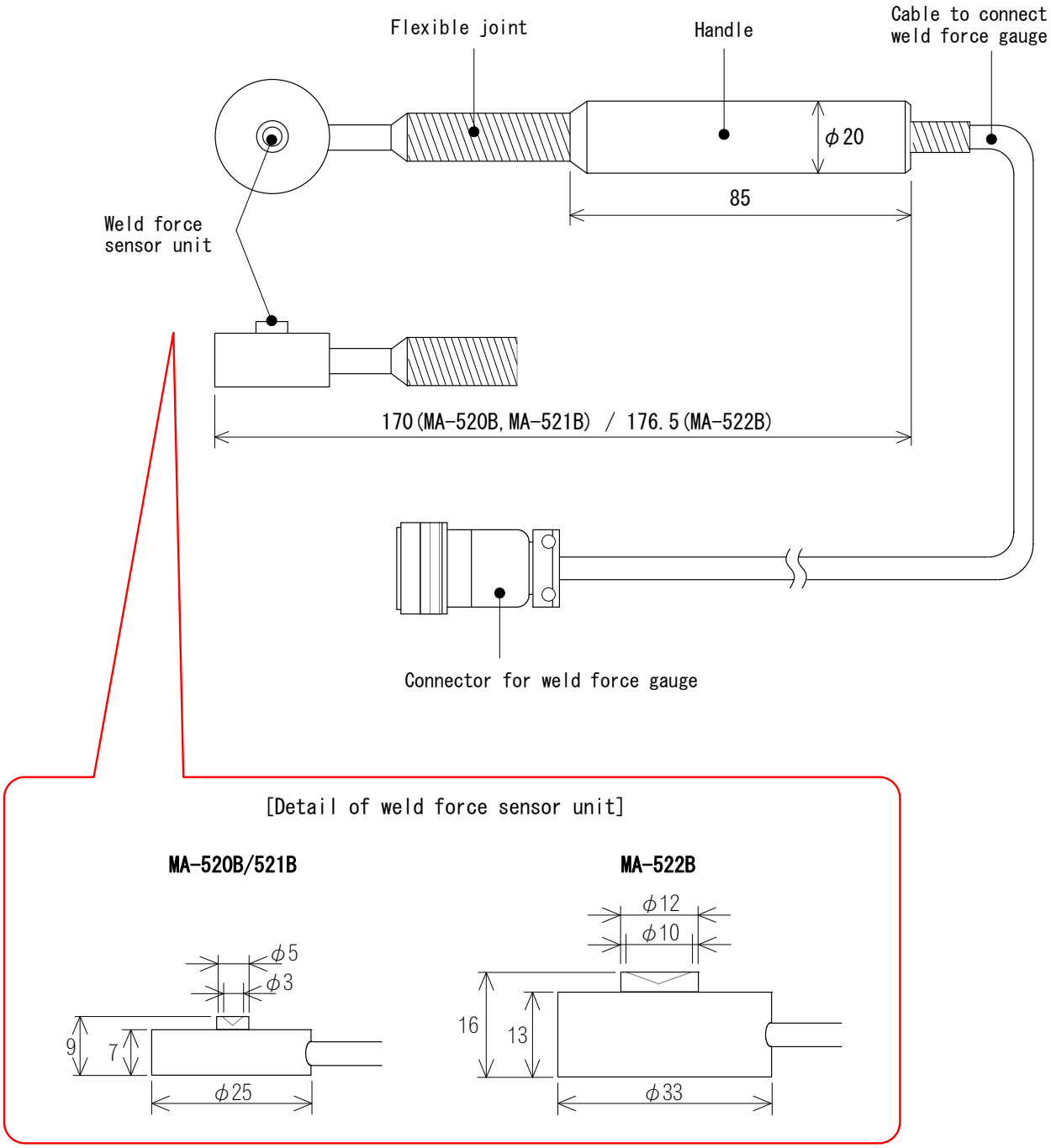
MA-520B/521B/522B is an electrode force sensor for resistance welding machine.
By connecting this sensor to the special weld force gauge sold separately (**MM-400A**), the weld force over a wide range can be measured easily.
This sensor can be carried easily, since it is both small and light.

⚠ CAUTION
Use the force sensor so that the welding current does not flow on it since it is not insulated, otherwise the sensor will be broken.

3. Specifications

Model No.		MA-520B	MA-521B	MA-522B
Rated load		9.8daN (10kgf)	98daN (100kgf)	980.6daN (1000kgf)
Effective measurement range		0.2daN–9.8daN (0.2kgf–10kgf)	2.0daN–98daN (2.0kgf–100kgf)	20daN–980.6daN (20kgf–1000kgf)
Acceptable load		1.5 times of rated load		
Measurement accuracy		±3% of rated load		
Using temperature range		0 – +40°C		
External dimensions	Overall length of body	Approx. 170 mm		Approx. 177 mm
	Diameter of sensor unit x thickness	φ25 mm x 9 mm		φ33 mm x 16 mm
	Cable length	Approx. 1000 mm		
Weight (including cable and connector)		200 g		250 g
Option (See Chapter 6.)		Jig for simultaneous force application and welding (A-04860-001)		-

4. Name of Each Section



(Dimensions in mm)

5. Measurement Method

Before measuring the weld force, be sure to turn off the welding machine and confirm that the power is not applied. If the welding power is applied while the weld force is measured, the sensor may be broken.

(1) Connection to Weld Force Gauge

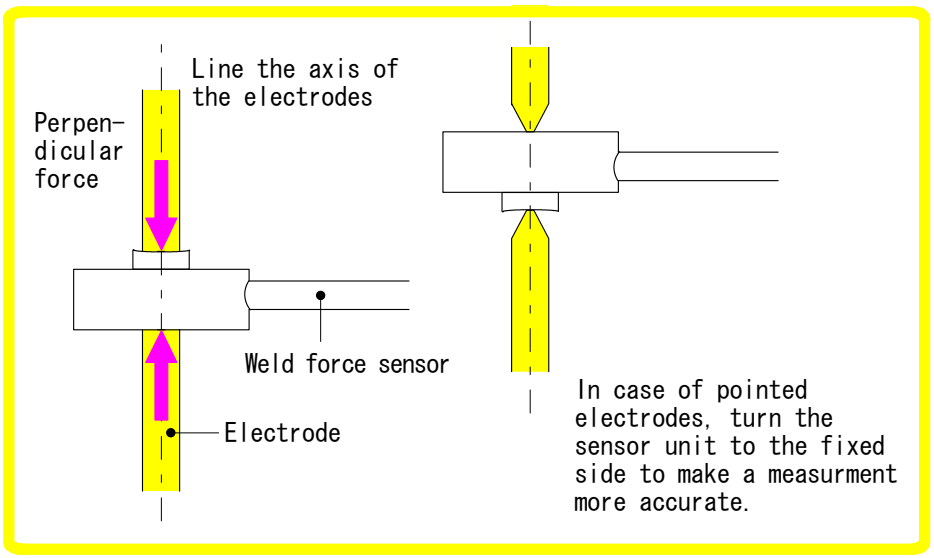
Confirm that the weld force to be measured is in the effective measurement range of the sensor, then connect the sensor to the weld force gauge securely.

For weld force gauges other than **MM-601**, there are setting items of sensor type and span value. The span value is indicated on the seal attached to each weld force sensor. For details, refer to the Operation Manual for the Weld Force Gauge to be connected.

(2) Application of Weld Force

- Preparation of weld force sensor
  Hold the weld force sensor so that it will be aligned with the electrodes of the welding machine and the weld force will be applied to the sensor normally (see figure below).

- Application of weld force
  Slowly apply the weld force. Avoid applying any large shocks to the sensor.



Do not apply the weld force to any part other than the sensor unit. Do not apply a weld force larger than the rated load of the sensor. If they are applied, the sensor may be broken.

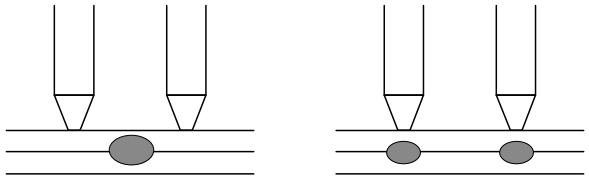
For the details of the measurement method, see the Operation Manual for the Weld Force Gauge.

6. Option

In this chapter, we will explain about the optional jig for simultaneous force application and welding (A-04860-001).
This jig can be used for **MA-520B/521B** only. (This cannot be mounted to **MA-522B**.)

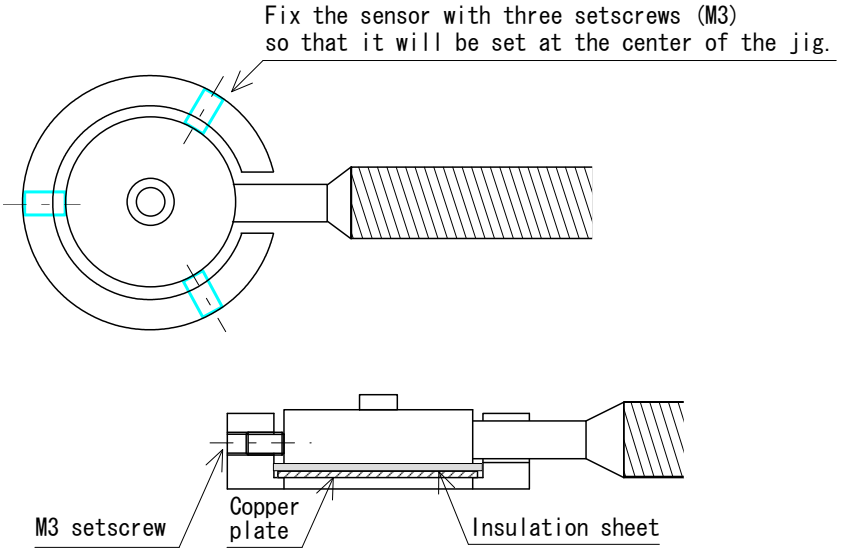
(1) Introduction

This is a jig for measuring the weld force of the welding head which has two electrodes such as parallel gap welding and series welding.
Also, when this jig is mounted, a measurement can be done even if the welding current flows.

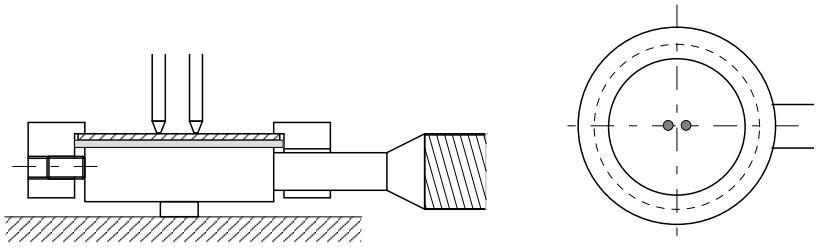


Parallel gap welding　　Series welding

(2) Mounting Method



(3) Usage



- Set the electrodes at the center as much as possible.
- Put the electrodes on the weld force sensor as perpendicularly as possible. Remove oxide and any extraneous substances from the surface of electrodes to smoothen the surface, and then make a measurement.
  If the welding current flows without the electrodes close to the copper plate, surface flash and expulsion may be generated.

(4) Maintenance Parts

Item	Model No.
Maintenance parts set ・Copper plate ・Insulation sheet	A-04888-001