WSI WELD SYSTEMS INTEGRATORS, INC.

RESISTANCE WELDING. SOLVED.

MM-315B

HANDHELD RESISTANCE WELD CHECKER

OPERATION MANUAL

AMADA®

AMADA WELD TECH

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MM-315B

Thank you for your purchase of the Amada Miyachi Weld Tester **MM-315B**.
Please read this manual carefully to ensure correct use. Keep the manual handy after reading for future reference.

Contents

1. Special Notes

(1) Safety Precautions

Prior to use, read these “Safety Precautions” carefully to gain a full understanding of the proper method of use.

- The precautions listed here are designed to ensure safe use and proactively prevent risks and damage to the user and other people.
- All precautions are critical for safety. Please read them all.
- The hazard signs have the following meanings:

 DANGER	Indicates a high risk of death or serious injury if precautions are not correctly observed.
 WARNING	Indicates a risk of death or serious injury if precautions are not correctly observed.
 CAUTION	Mishandling may cause risk of injury and physical damage.
	These symbols indicate “prohibition.” They are warnings concerning actions out of the scope of the warranty of the product.
	These symbols indicate actions that operators must take.
	Each symbol with a triangle indicates a DANGER, WARNING, or CAUTION to the operator.

DANGER

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

WARNING

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

Do not touch any welded part or electrode during welding or just after completion of welding.
The welded parts of a workpiece, electrodes, and the arm are very hot.
Do not touch them; burns may result.

Apply the specified supply voltage.
Application of a voltage outside the specified range may result in fire or electric shock.

Use the specified cables and connect them securely.
Failure to do so or improper connection may result in a fire or electric shock.

Keep the power and connection cables free of damage.
Do not walk on, twist or tug the cables.
Damaged cable may result in an electric shock, short circuit, or fire.
For repair or replacement, contact your dealer or Amada Miyachi Co., Ltd.

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 Amada Miyachi Co., Ltd. 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.

Protective gear must be worn.
Put on protective gear such as protective gloves, long-sleeve jacket, leather apron, etc. Spatters can burn the skin if they touch the skin.

Wear protective glasses.
If you look at the flash directly during welding, your eyes may be damaged.
If any spatter gets in your eye, you may lose your eyesight.

CAUTION

Do not expose to water or other liquid.
Exposing electrical components to water or other liquid may result in electric shock or short-circuiting.

Keep combustible matter away from the device.
Spatter may ignite combustible matter. If it is impossible to remove all combustible matter, cover it with non-combustible material.

Do not cover the device with a blanket, cloth, etc.
Do not cover the device with a blanket, cloth, etc. while it is in use. The cover may be overheated and burned.

Wipe off dust from the power plug and securely insert it all the way.
Dust or improper insertion may lead to the plug heat up and catch fire.

Hold the power plug when removing or inserting it.
Removing the power plug by pulling on the cable may damage the power cable, resulting in an electric shock or causing the cable to catch fire.

If you do not use the device for extended periods, remove the power plug from the outlet.
Failure to do so may deteriorate the insulation, resulting in an electric shock, current leakage or fire.

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

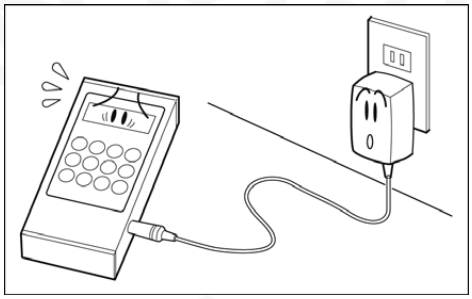
Maintain and inspect the device periodically.
Maintain and inspect the device periodically, and repair any damage nearby before starting operation.

Use ear protectors.
Loud noises can damage hearing.

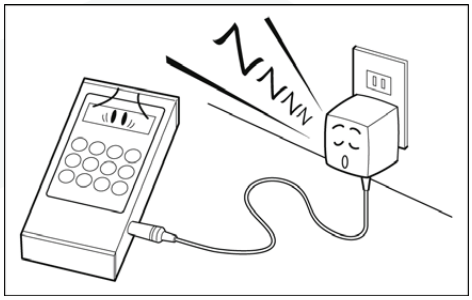
(2) Handling Precautions

- Avoid the following locations when installing the device:
  - Humid location (humidity of above 90%)
  - Extremely hot (above 40°C) or cold (below 0°C) locations
  - Near a high noise source
  - Location where chemical substances, etc. are handled
  - Location where condensation occurs
  - Dusty location
  - Location exposed to direct sunlight
  - Location that is inclined, insecure, unstable, or weak
- Check the voltage and power frequency before installation.
- Keep the exterior clean with a soft cloth or cloth lightly dampened with water. For stains, clean them off using a diluted neutral detergent or alcohol.

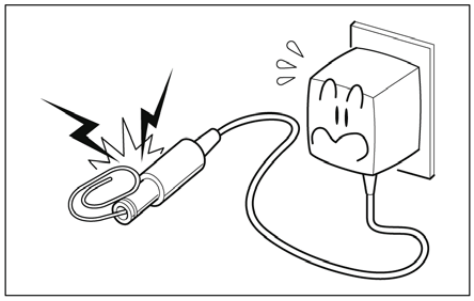
  Do not use thinner or benzene as they may cause discoloration or deformation.
- To prevent malfunction, do not allow any foreign objects such as screws or coins to enter the device.
- Operate the device according to the procedure described in the Operation Manual.
- Operate the buttons with care. Rough operation or the use of a tool or pen tip may result in damage or malfunction.
- Use fully charged batteries. Even if the display does not prompt you to charge the batteries, using batteries that are not fully charged may result in degraded measurement accuracy. (Before using the tester for the first time, always charge the batteries.)
- Use only the included or specified chargers.



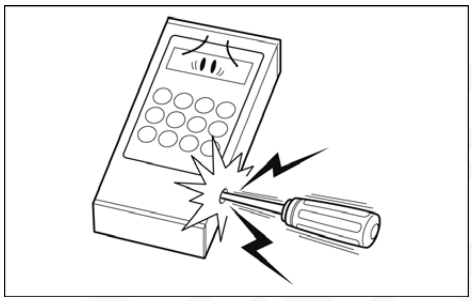
- Do not charge for more than 48 hours.



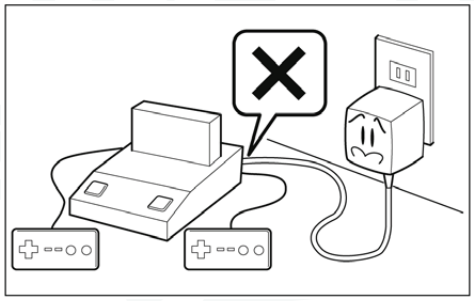
- Do not short-circuit the plug while the charger is connected to an outlet.



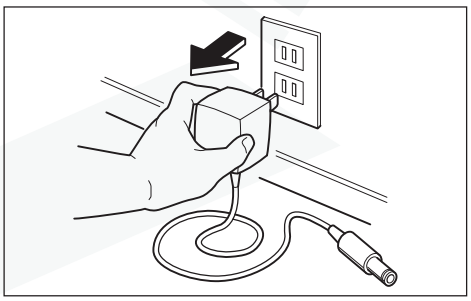
- Do not short-circuit the connector of the charger using a screwdriver, etc.



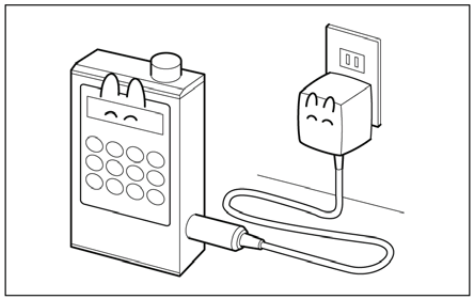
- Do not use the accessory charger for any unit other than the MM-315B.



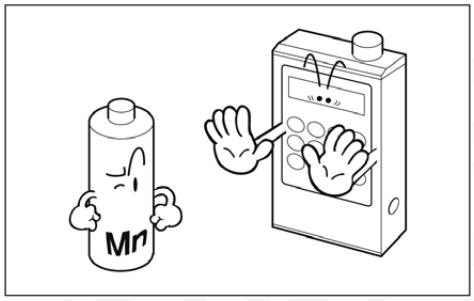
- Remove the charger from the outlet when it is not in use.



- Even if the unit is not used for an extended period, charge it once every six months.



- Do not use disposable alkaline batteries.



2. Features

The **MM-315B** Weld Tester is a handheld instrument for measuring weld current.

- Battery-driven type. Can be used anywhere freely.
- Small and light design for ease of use.
- Current, cycle and conduction degrees can be measured by connecting a toroidal coil (sold separately).
- Multi-step weld memory function.

3. Packing List

Check the contents of the package. In the case of damaged or missing items, please contact Amada Miyachi Co., Ltd.

(1) Main Body and Accessories

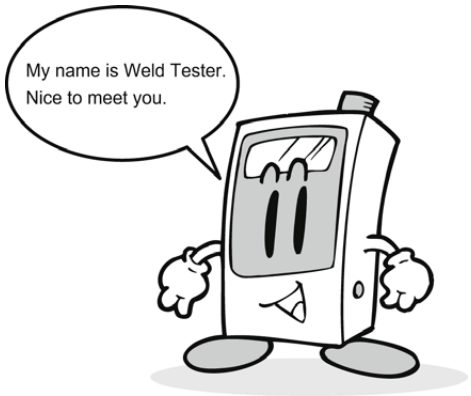
Item		Model	Item No.	Qty
Main body		MM-315B	-	1
Charger	MM-315B-00-00/02	UN305-7508	1158829	1
	MM-315B-00-05*1	-	-	-
Power plug for overseas, C type (MM-315B-00-02 only)		TI-64	1158830	1
Leather case		A3-02945-001	1034377	1
Carrying case		A3-02977	1034768	1
Japanese panel seal*2		P-0493	1030606	1
Operation manual		M0834E	1006873	1

*1 The MM-315B-00-05 does not come with a charger. Use a charger with the following specifications.
Output: 7 V±10%, 100 mA minimum
Polarity: Negative Center

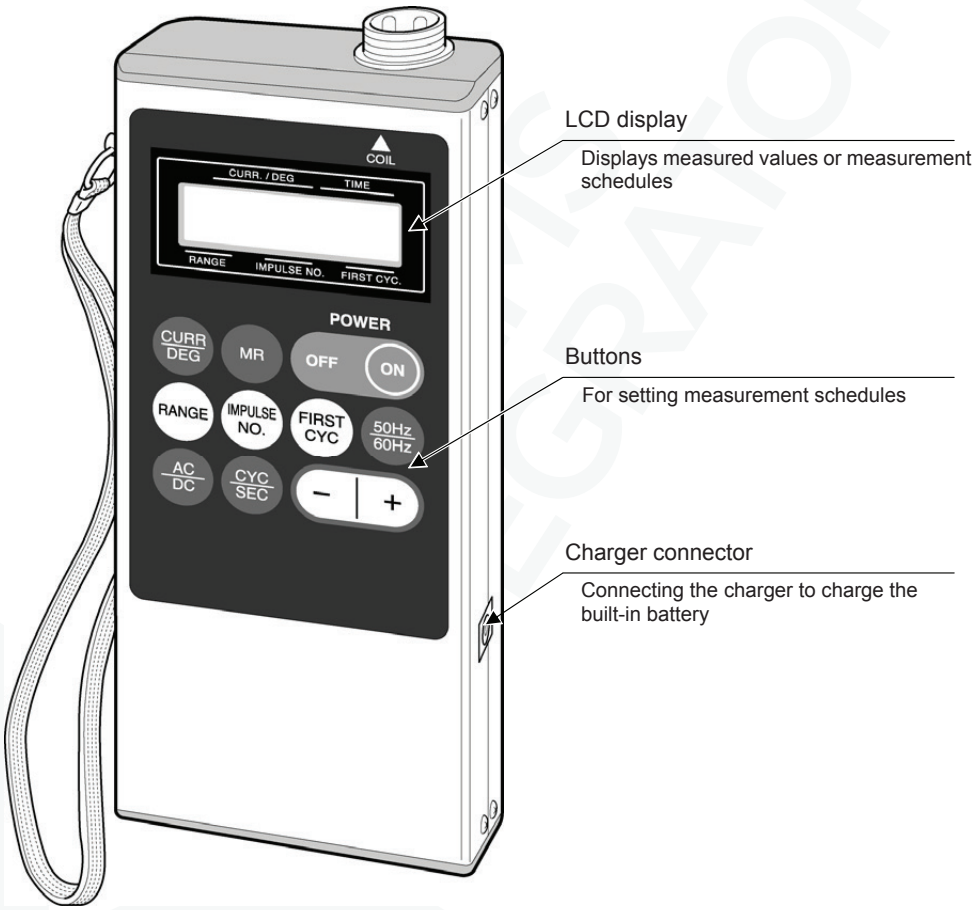
*2 The Japanese panel seal is for adding Japanese signage on the panel display. Put the seal on the panel sheet.

(2) Options

Item	Model	Item No.
Toroidal coil	MB-500-15-00	1001289



4. Names and Functions of Parts of the Weld Tester



5. Measurement

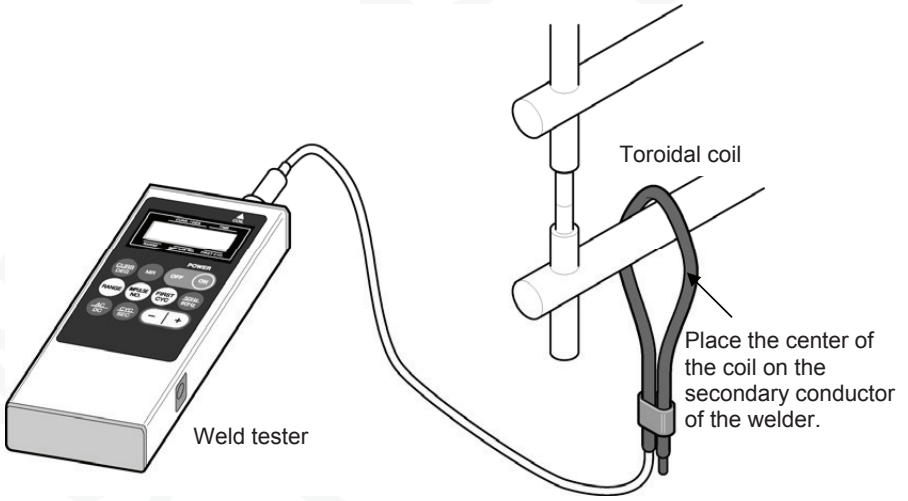
CAUTION

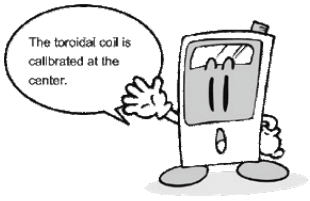
- Prior to using the tester for the first time, be sure to charge the batteries, which may not be sufficiently charged immediately after purchase. Refer to “Chapter 9 Charging the battery” for the battery-changing procedure.
- Measure an alternating current in AC mode and a direct current in DC mode. Accurate measurements may not be made in an improper mode.

Measure the weld current, using this instrument.

(1) Setting the Toroidal Coil

Mount the coil on the welder as shown below, and connect the cord to the connector of the MM-315B.



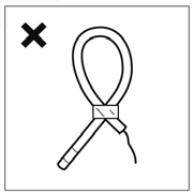


Line up the ends of the coil, and fasten both ends using the Velcro strips.

DO

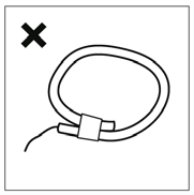
Match up the ends of the coil

DO NOT



Cross the coil

Fasten with tape



CAUTION

- To the extent possible, use the toroidal coil without changing its shape. Bending and unbending it repeatedly may result in breakage of the internal wires.

(2) Supplying Power

Press the ON button.

5	0	H	z		A	C	

The measurement conditions are displayed for 0.7 seconds, and then the unit buttons to the initial display. The above display shows the unit set at 50 Hz AC. When it is set to 60 Hz DC, the display shows the following:

6	0	H	z		D	C	

<Initial display>

CURR./DEG.					TIME		
0	.	0	0	K	0	0	C
Current value					Cycle value		

K refers to kA (used to measure current values), and C means CYCLES.

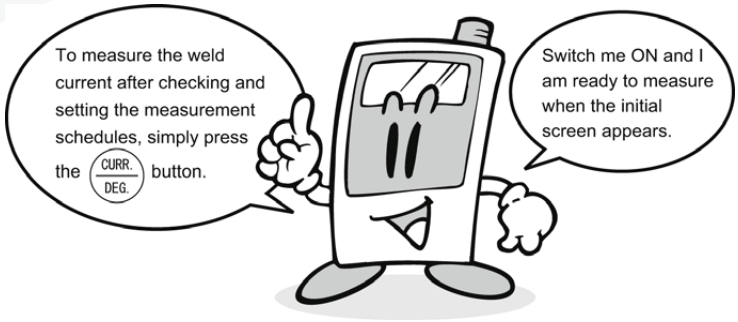
The position of the decimal point indicates that the Low range (the 9.99-kA range) has been selected. For DC welding, when measurement in seconds (SEC) has been selected, the following display appears:

CURR./DEG.					TIME		
0	.	0	0	K	.	0	0
Current value					Seconds		

Time is measured in seconds.

After switching ON, when the initial display is shown, the unit is ready for measurement. The measurement schedules are those set before the OFF button was pressed. The weld current can be measured when the initial display is shown. If the initial display is shown after the unit has been turned on, the unit is ready for measurement. When the impulse No. is 0, all impulses are monitored.

When the weld current is to be measured after the measurement schedules are checked and set as specified in “Chapter 4 (3)”, “Chapter 4 (4)”, press the CURR./DEG. button to show the initial display.



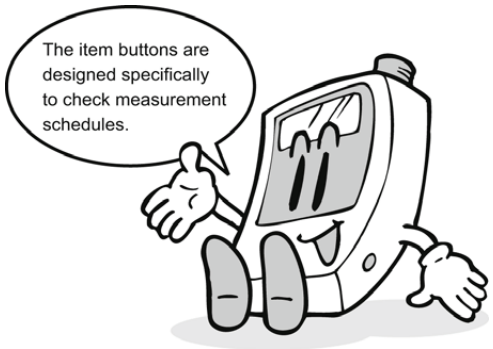
(3) Checking Measurement Setting

Measurement setting can be checked as follows.

Press the (RANGE) button.	The following display appears: L o 0 0 1 RANGE IMPULSE NO. FIRST CYC. RANGE FIRST CYCLE --- First cycle to be measured. 1-99 cycles IMPULSE NO.--- Number of impulses to be measured. Shows all impulses when set to 0. Lo: 9.99-kA range Hi: 49.9-kA range Above, the Low range and Impulse No. 0 are shown, and the First Cycle is 1.

The above display will be shown when the (IMPUSE NO.) or (FIRST CYC.) button is pushed. In addition, when the (50Hz / 60Hz), (AC / DC), or (CYC. / SEC.) button is pushed, the setting of each can be checked. To change these settings, follow the procedures specified in “Chapter 4 (4)”. Item buttons are only for checking measurement schedules.

To measure the weld current, press the (CURR. / DEG.) button to show the initial display.



(4) Measurement Settings

Measurement values can be set as follows.

To set the measurement values, use the RANGE, IMPUSE NO., and FIRST CYC. buttons (white) to select each mode. Use the + and − buttons to set data.

a. Range Setting

The cursor is in the Lo range, at Chapter 4 (3), indicating that this mode can be set. Press + in this situation.

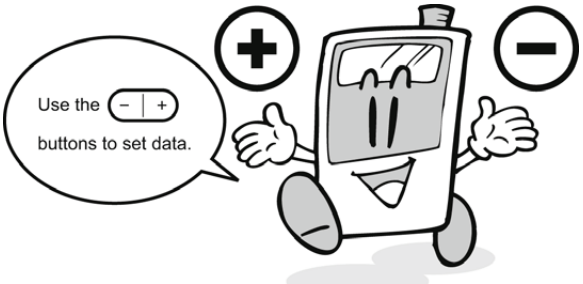
Press +.	H i 0 0 1 RANGE IMPULSE NO. FIRST CYC.

The range display changes from Lo to Hi, indicating that the 49.9-kA range has been selected. Next, press the − button.

Press −.	L o 0 0 1 RANGE IMPULSE NO. FIRST CYC. The range changes to Lo again.

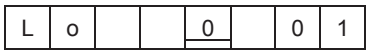
Current Ranges:

Lo range:	1.00 kA - 9.99 kA
Hi range:	5.0 kA - 49.9 kA

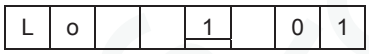


b. Impulse No. Setting

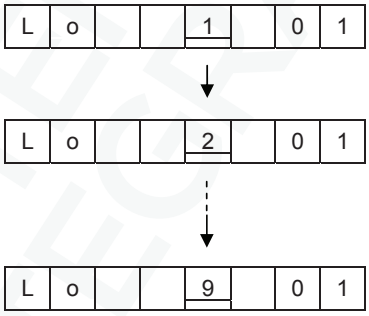
To set the Impulse No. to 1, press (IMPUSE NO.).

Press (IMPUSE NO.).	 RANGE IMPULSE NO. FIRST CYC. Cursor moves to IMPULSE NO.

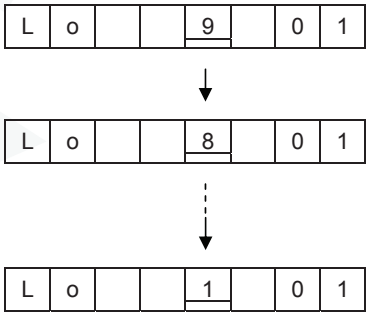
Next, press the (+) button.

Press (+).	 The Impulse No. becomes 1.

The Impulse No. is set to 1. Hold down the (+) button until the figure reaches 9.

Press (+).	 The number increases to 9.

To return to 1, press the (−) button. Hold down the (−) button until the figure reaches 1.

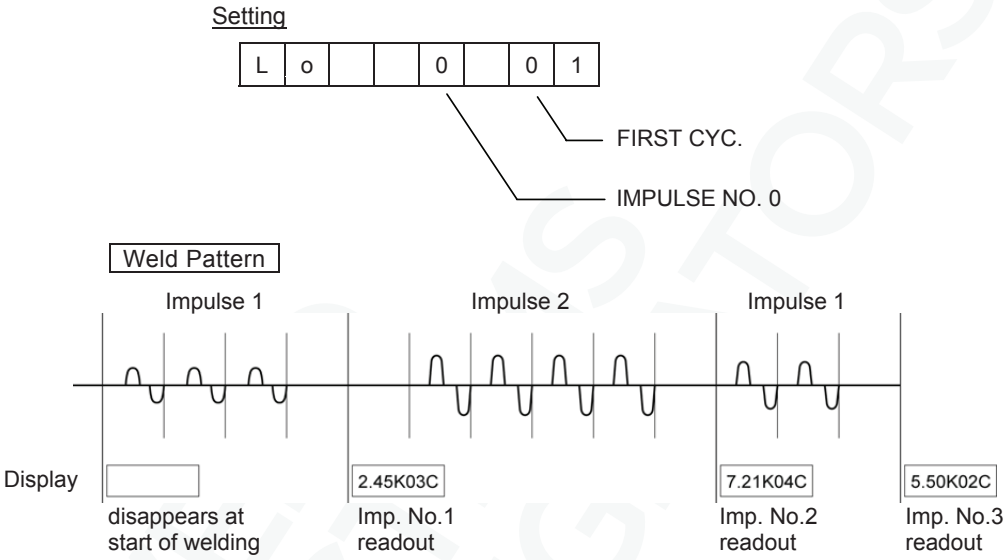
Press (−).	 The Impulse No. becomes 1.

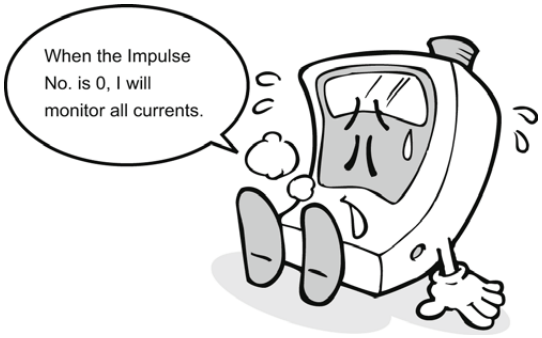
NOTE1. Impulse No. Setting and Display

When the Impulse No. is 0

When the Impulse No. is 0, the display will disappear to signal the start of the welding, and the Checker monitors all impulses.

For example, suppose the following settings were used to monitor the weld shown below.





When the Impulse No. is 1-9

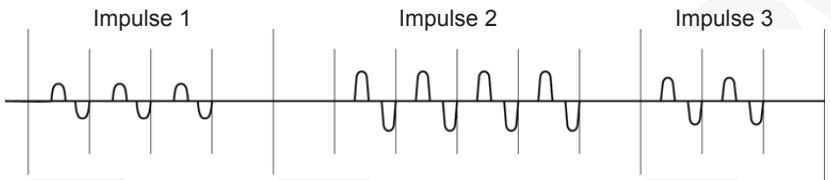
The display shows the information only for the number that has been set when the Impulse No. is 1 to 9. For example, when the Imp. No. is set to 2 and the weld pattern is the same as Imp. No. 0, the following is displayed:

Setting

L	o			2		0	1

Impulse No. 2

Weld Pattern

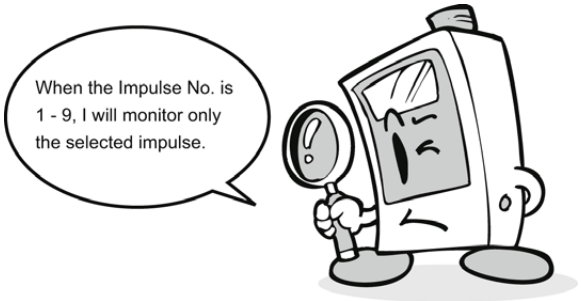


Display	5.50K02C		7.21K04C	
	Displays previous readout	Disappears at the beginning of Impulse 2	readout of Imp.2	Display does not change

When the CURR./DEG. button is pressed for measurement, and there is no impulse for the number set,

*	S	E	T		E	R	R

is displayed. As to judgment of the Impulse No., refer to All Impulse Memory in “Chapter 5 (7)”.



c. Setting of the First Cycle

Now press the (FIRST CYC.) button.

Press (FIRST CYC.).	L o 0 1 0 1

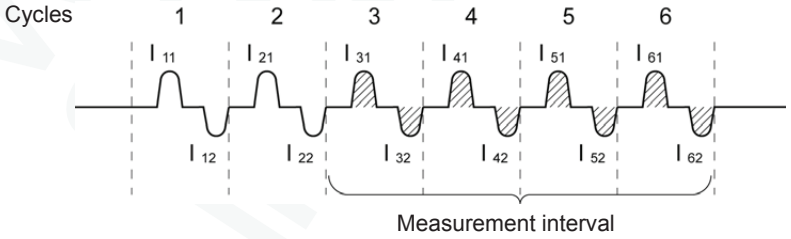
The cursor moves to FIRST CYC. Press (+) and set the First Cycle to 3.

Press (+).	L o 0 1 0 1 → L o 0 1 0 2 → L o 0 1 0 3

The First Cycle is set to the 3rd cycle.

To measure weld the current, press the (CURR./DEG.) button to show the initial display.

When the First Cycle is set to 3, if the following current is supplied, the measured interval will be as follows:



$$\text{Displayed current} = \text{Average true values} = \frac{I_{31} + I_{32} + I_{41} + I_{42} + I_{51} + I_{52} + I_{61} + I_{62}}{8}$$

Measurement starts at the third cycle; the first and second cycles are ignored. With the above procedure, measurement settings are complete.

To measure the weld current, be sure to press the (CURR./DEG.) button to show the initial display.

d. Setting of the Last Cycle

Press the (FIRST CYC.) button.

Press (FIRST CYC.).	L o 0 1 0 1

The cursor moves to FIRST CYC.

Next, hold down the (FIRST CYC.) button for three seconds. The display shows the following for two seconds and returns. Hold down this button for three seconds to switch between LAST OFF and LAST ON.

Hold down (FIRST CYC.) for three seconds.	L A S T O F F or L A S T O N

LAST OFF: Does not include the Last Cycle.

LAST ON: Includes the Last Cycle.

To measure the weld current, be sure to press the (CURR./DEG.) button to show the initial display.

(5) Checking Conduction Degrees

After the weld current is measured, press CURR./DEG. while the current value is displayed. The conduction degrees can be checked.

Press CURR./DEG..	5 . 5 0 K 1 0 C The Current and Cycles are shown.
	1 0 6 ° 1 0 C The conduction degrees are shown.

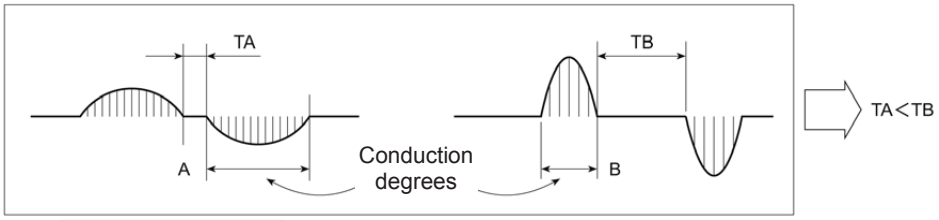
Press CURR./DEG. again; the current and cycle values are shown. The current and conduction degrees are measured at the same time. Be sure to check both displays by pressing CURR./DEG..

In DC measurement, the conduction degrees will be as follows:

* * * ° 1 0 C In DC measurement, the conduction degrees are shown.

About Conduction Degrees:

For single-phase AC welders, waveforms A and B, which have the same RMS value, are shown below.



Though the RMS current values are the same, the time during which the current doesn't flow differs (TA in A, TB in B).

This causes the heated workpiece to cool. In other words, A is more likely to produce spatter-free, high-quality welds due to the shorter period of time with no current flow. On the other hand, with B, the weld transformer has a greater remaining capacity, so the weld current can be increased.

(6) Current Measurement of Frequency-Inverter Welders

Current measurement of frequency-inverter welders is described here.

First, press the AC/DC button.

Press AC/DC.	A C The present setting is shown.

Press + to enter DC mode.

Press +.	D C

Next, press the CYC./SEC. button to show the time-display SEC.

Press CYC./SEC..	C Y C _.

Press +; SEC is shown.

Press +.	S E C _.

Now, the time display will be 0.00 seconds when the CURR./DEG. button is pressed.

The CYC./SEC. button does not function when the unit is not in DC mode.

Next, it is time to set the start of measurement.

Press the FIRST CYC. button.

Press FIRST CYC..	L o 1 0 1

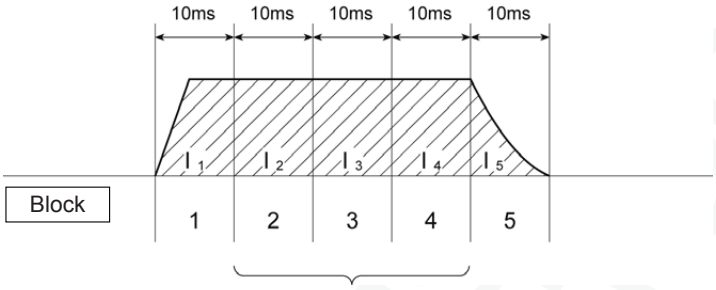
With the above procedure, setting of the measurement conditions is complete.

To measure the current, press the CURR./DEG. button to show the initial display.

When the time shows SEC (seconds), the weld time is divided into 10-ms blocks from the start of the weld, and the number in FIRST CYC shows at which block the measurement begins as shown in the figure below.

For example, when this number is set to 2, the measurement interval is as shown below.

The blocks from 2 on will be measured.



$$\text{Displayed current values} = \frac{I_2 + I_3 + I_4}{3}$$
$$\text{Average true values}$$

In the case of DC measurement, when I_5 becomes less than 75% of I_4, measurement is complete.

Measured readout	4 . 5 0 K . 0 4

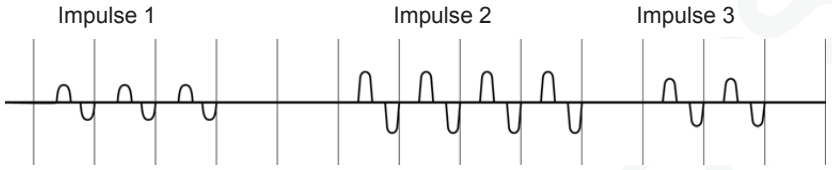
The above shows a current value of 4.50 kA, and a weld time of 0.04 s (40 ms).

(7) All Impulse Memory

Storing data:

The MM-315B is able to store up to 9 pulsations with more than 1 cool cycle in the memory.

Weld pattern



The following table shows the weld pattern:

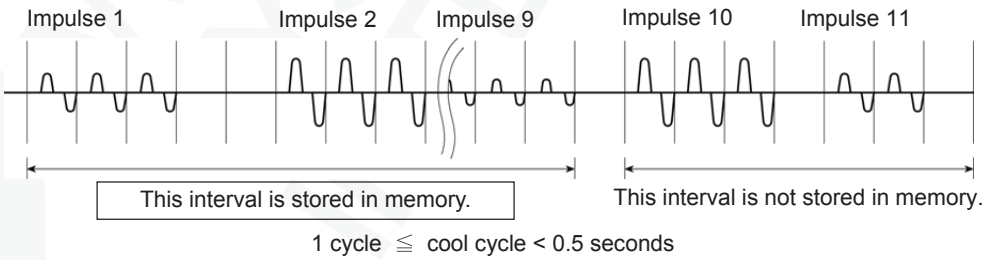
Display / Impulse No.	Current	Time	Conduction Degrees
1	2.45 kA	3 cycles	84
2	7.21 kA	4 cycles	137
3	5.50 kA	2 cycles	118

The unit stores current, time, and conduction-degree values in its memory for up to 9 pulses.

Those from 10 on are not stored.

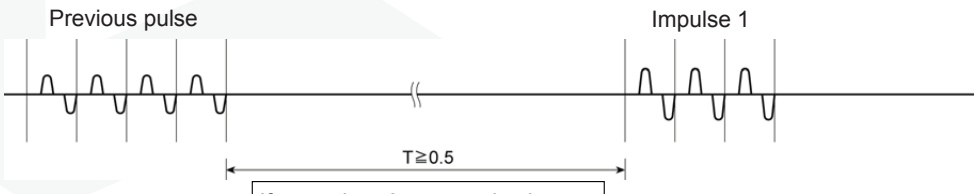
In addition, when the interval between impulses is more than 0.5 seconds, the following weld is considered Impulse No. 1 and stored.

Stored interval



1 cycle ≦ cool cycle < 0.5 seconds

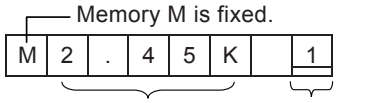
The basis for determining Impulse 1 is as follows:



All previous memory information is cleared when the power is shut off or a new weld is performed.

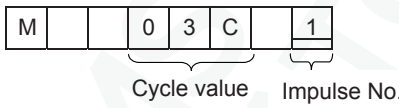
Confirmation of All Impulse Memory

After the weld is performed using the previous weld schedule, press the MR button.

Press MR.	

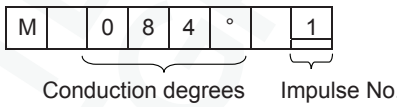
The Impulse No. 1 current value is shown.

To check the time, press MR again.

Press MR.	

The cycle value of Impulse No. 1 is shown.

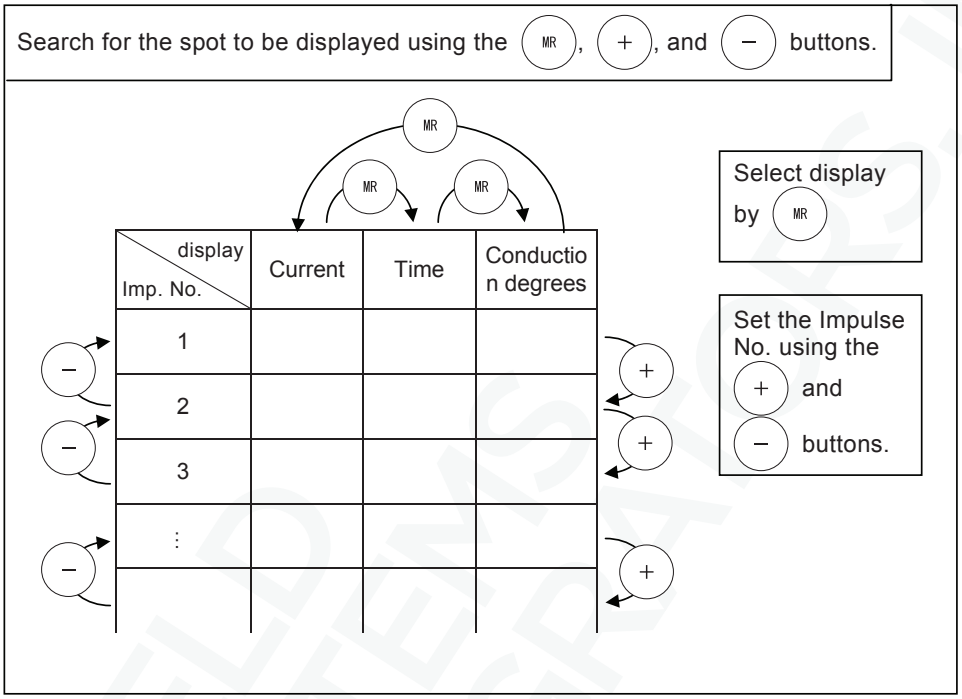
To check the conduction degrees, press MR again.

Press MR.	

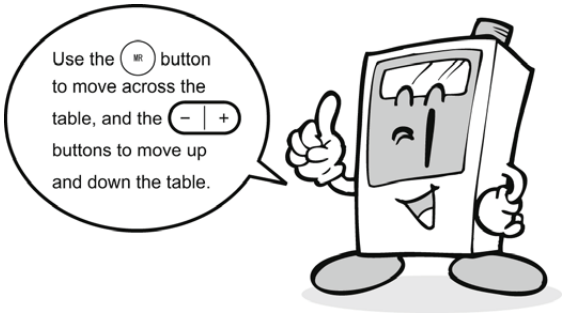
The conduction degrees of Impulse No. 1 are shown.

By using the + and − buttons, the Impulse No. can be changed and the values checked.

In other words, the MR button is used to select the current, time, and conduction-degree displays. The + and − buttons are used to set the impulse No.



Press the CURR./DEG. button to measure the current.



(8) Display in Unit of Half Cycle

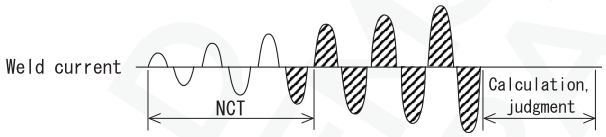
A half-cycle weld is indicated by adding a decimal point to the left of the cycle symbol C. The point indicates 0.5 cycles, such as when a 12.5-cycle weld is performed, the display will be as follows:

8	.	5	0	K	1	2	.C

The decimal point indicates 0.5 cycles.

(9) Forced Measurement Cycle

If a current value is low in the early period of welding, it may not be measured. (It tends to occur when an upslope is used.)
In this case, set a current higher than the level at the end of measurement in the setting cycle of NCT. Once a current higher than the level at the end of measurement flows, the setting of NCT becomes invalid, and the measurement is complete with a current lower than the level at the end of measurement.



(10) Overflow Display

When the measured current values exceed the maximum setting range, the overflow mark (↑) will be displayed. In addition, when the time exceeds 99 cycles in AC and 40 cycles in DC, the overflow mark (↑) will be shown in the time display.

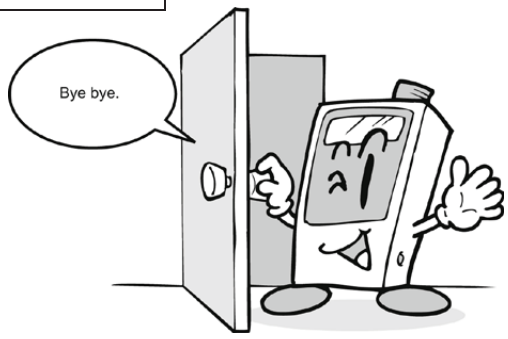
(Example)

↑	.	↑	↑	K	1	2	C
↑	↑	.	↑	K	1	2	C
8	.	6	0	K	↑	↑	C

The current is over the limit in the Lo range.
The current is over the limit in the Hi range.
The time is over the limit in the Lo range.

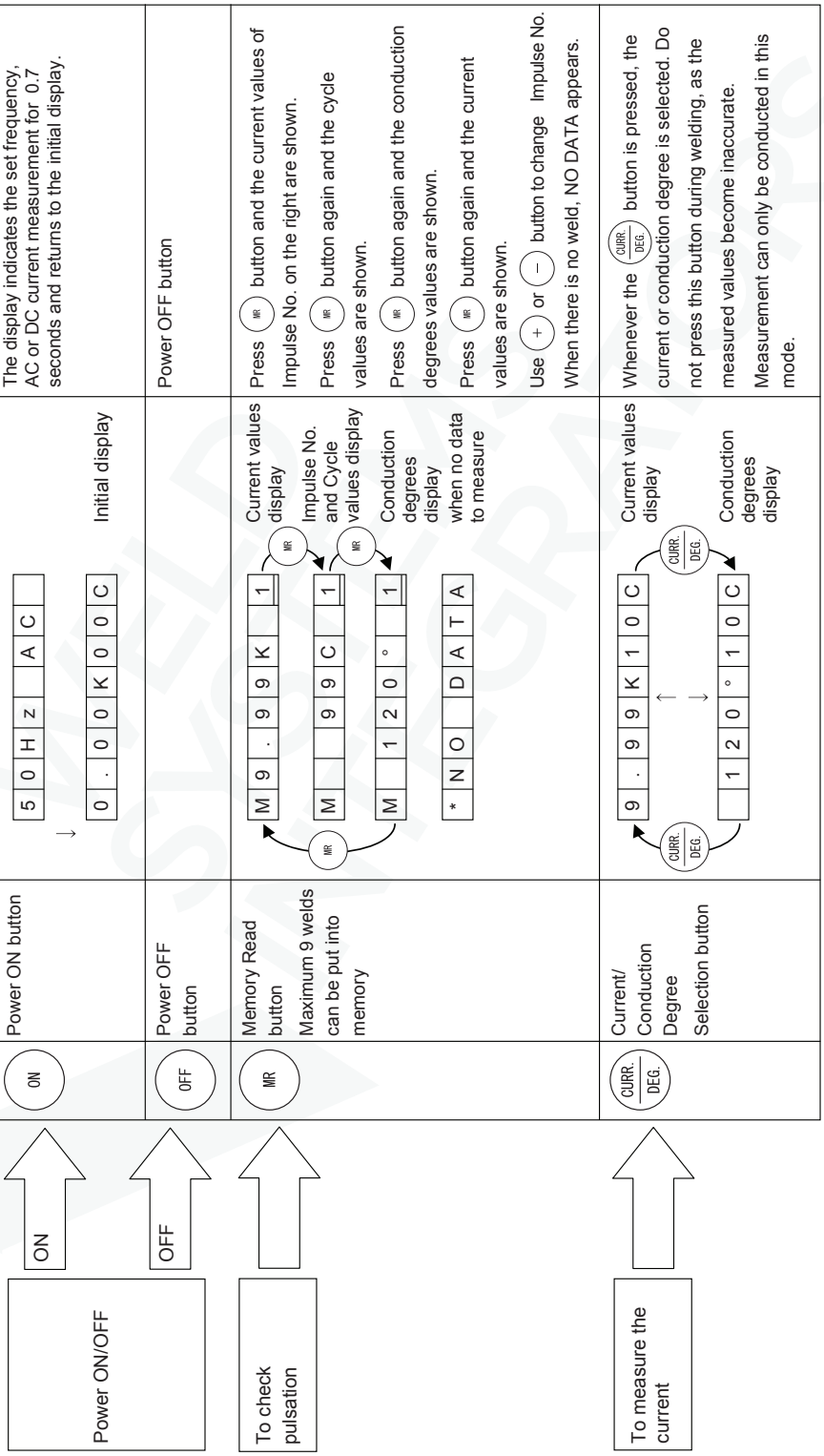
Overflow-mark display standards

Current values	Low range		> 9.99 kA
	High range		> 49.9 kA
Time	AC		> 99 CYCLES
	DC	CYC.	> 40 CYCLES
		SEC.	> 0.80

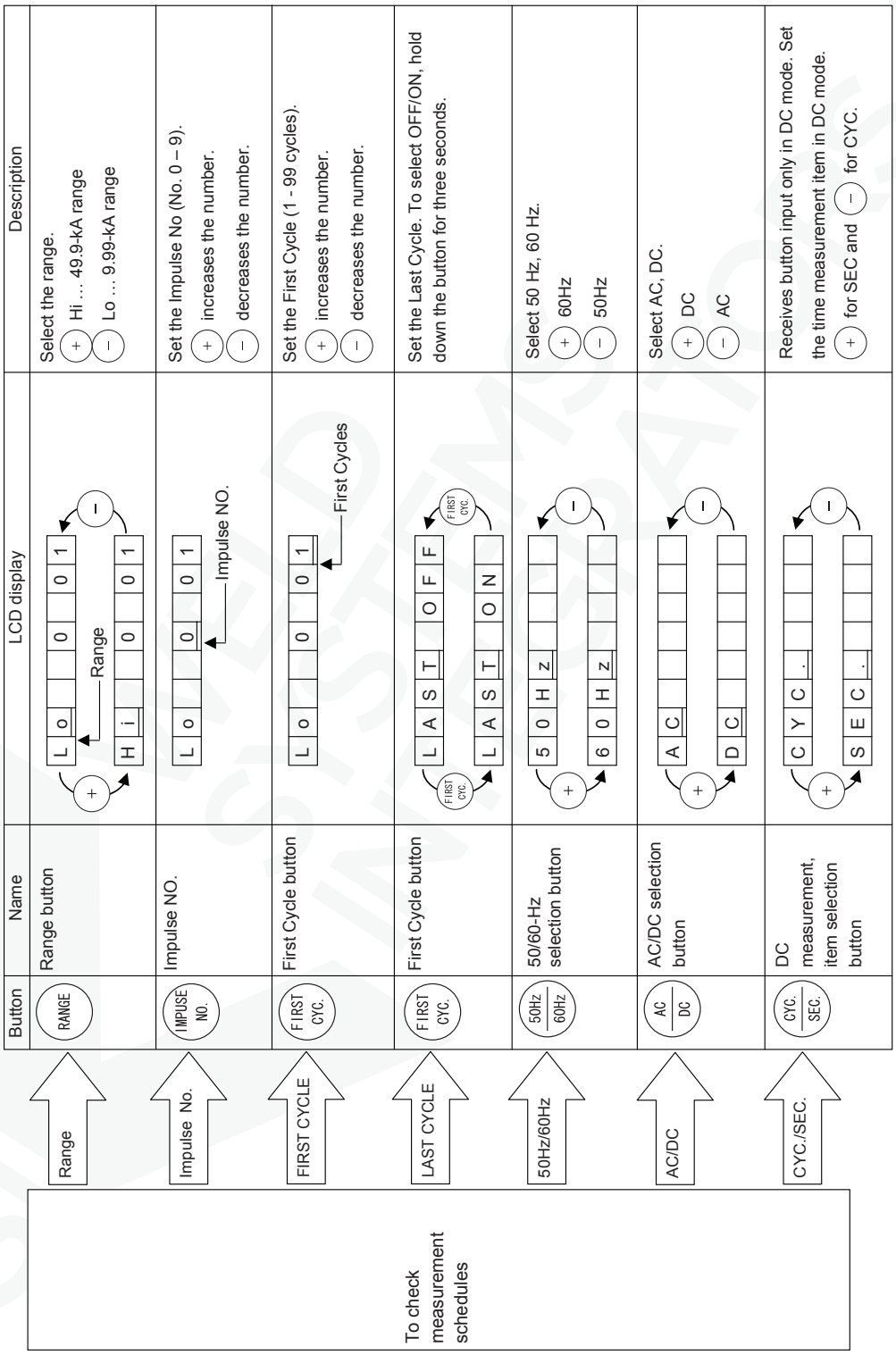


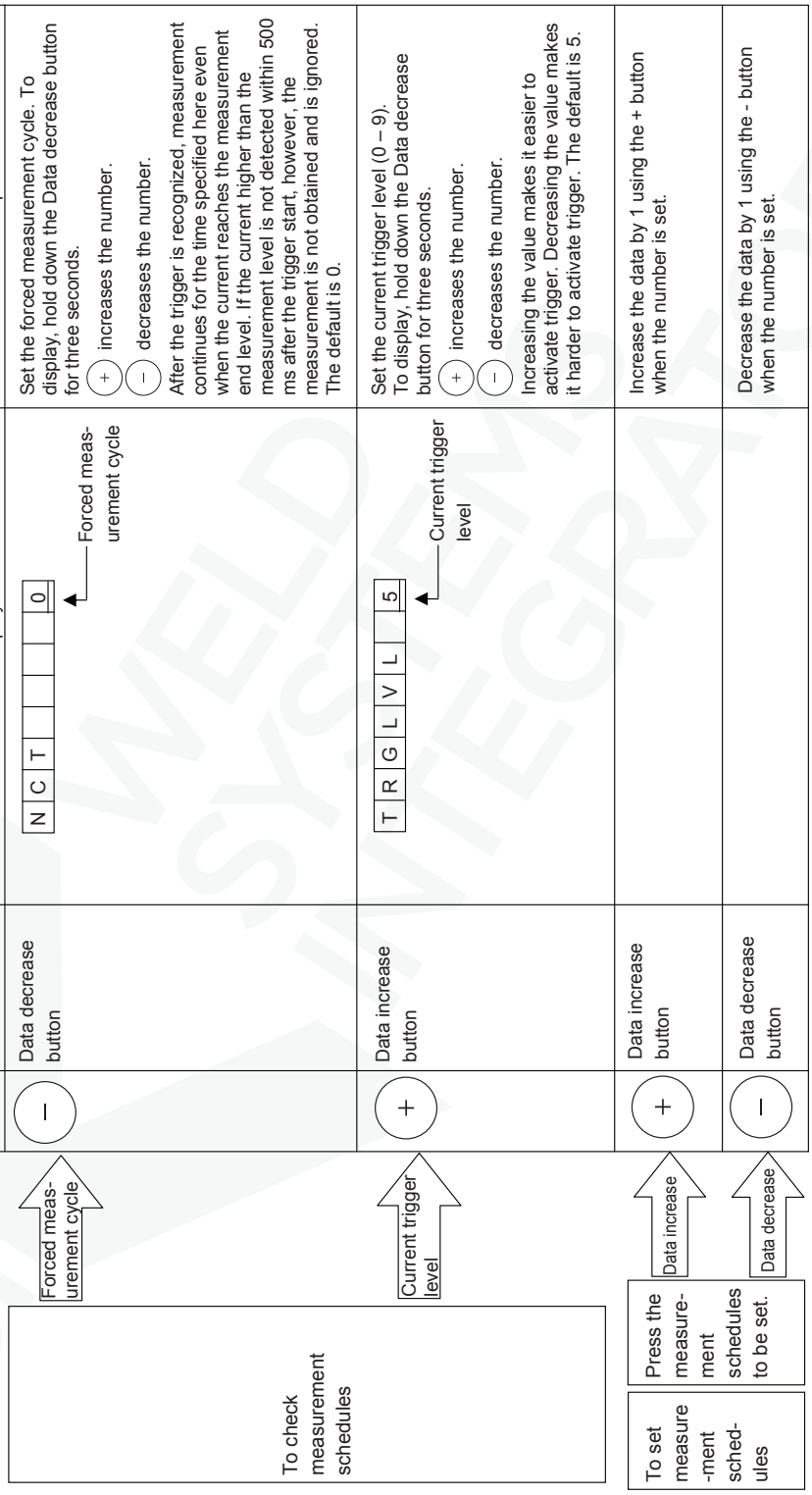
MM-315B

6. Button and Functions



MM-315B


To check measurement schedules
Range
Impulse No.
FIRST CYCLE
LAST CYCLE
50Hz/60Hz
AC/DC
CYC./SEC.
Button
Name
LCD display
Description
RANGE
Range button
Lo
Range
Hi
Select the range.
Hi ... 49.9-kA range
Lo ... 9.99-kA range
IMPUSE NO.
Impulse NO.
Impulse NO.
Set the Impulse No (No. 0 – 9).
increases the number.
decreases the number.
FIRST CYC.
First Cycle button
First Cycles
Set the First Cycle (1 - 99 cycles).
increases the number.
decreases the number.
First Cycle button
LAST OFF
LAST ON
Set the Last Cycle. To select OFF/ON, hold down the button for three seconds.
50/60-Hz selection button
50Hz
60Hz
Select 50 Hz, 60 Hz.
60Hz
50Hz
AC/DC selection button
AC
DC
Select AC, DC.
DC
AC
DC measurement, item selection button
CYC.
SEC.
Receives button input only in DC mode. Set the time measurement item in DC mode.
for SEC and
for CYC.


To check measurement schedules
Forced measurement cycle
Current trigger level
To set measurement schedules
Press the measurement schedules to be set.
Data increase
Data decrease
Button
Name
LCD display
Description
Data decrease button
NCT 0
Forced measurement cycle
Set the forced measurement cycle. To display, hold down the Data decrease button for three seconds.
+ increases the number.
− decreases the number.
After the trigger is recognized, measurement continues for the time specified here even when the current reaches the measurement end level. If the current higher than the measurement level is not detected within 500 ms after the trigger start, however, the measurement is not obtained and is ignored. The default is 0.
Data increase button
TRGLVL 5
Current trigger level
Set the current trigger level (0 – 9). To display, hold down the Data decrease button for three seconds.
+ increases the number.
− decreases the number.
Increasing the value makes it easier to activate trigger. Decreasing the value makes it harder to activate trigger. The default is 5.
Data increase button
Increase the data by 1 using the + button when the number is set.
Data decrease button
Decrease the data by 1 using the - button when the number is set.

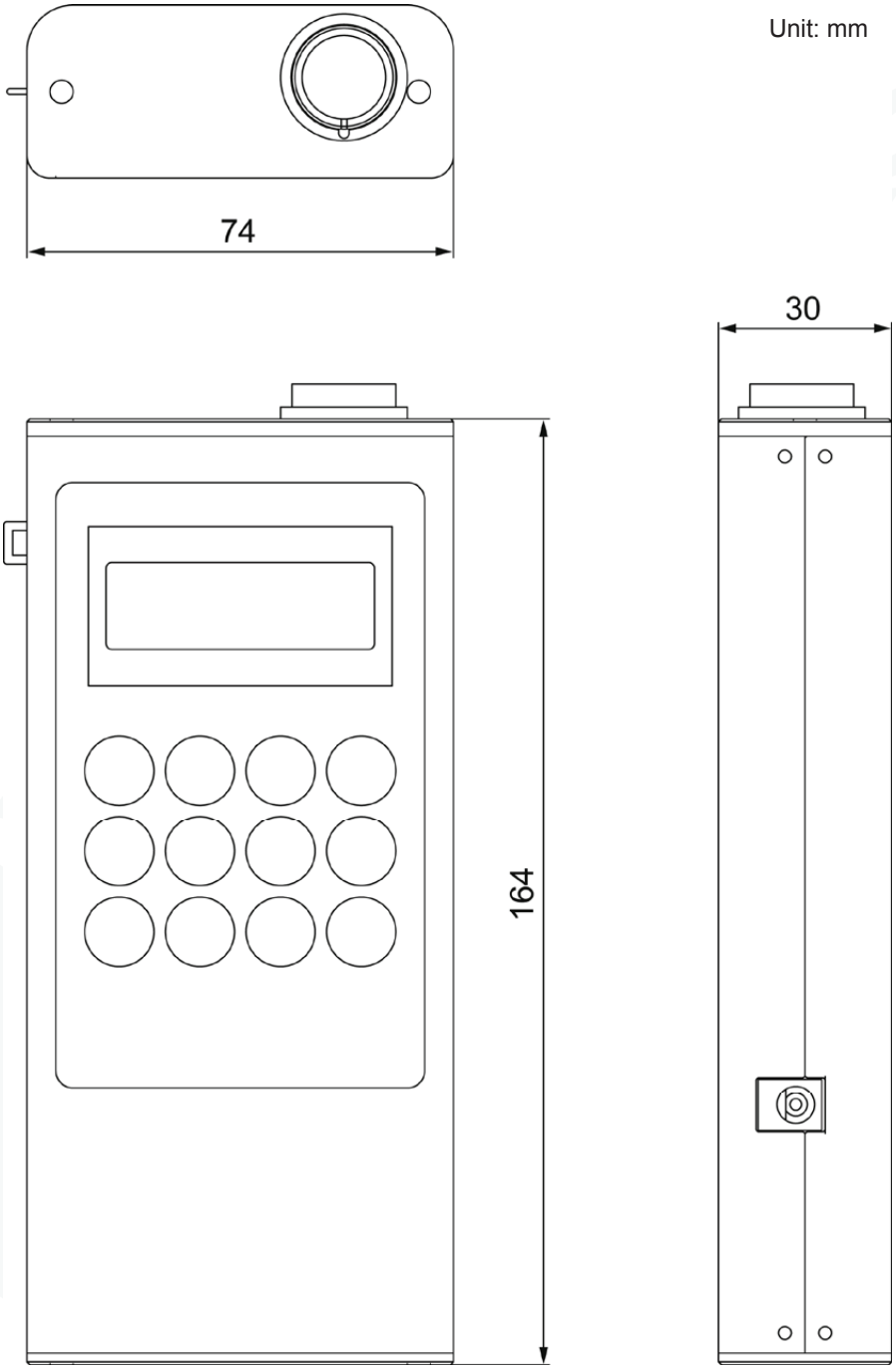
7. Specifications

Pickup	By the toroidal coil (MB-500-15) (optional)		
Measurement	Current	Measurement Range	1 kA - 9.99 kA (9.99 - kA range, Lo range) 5 kA - 49.9 kA (49.9 - kA range, Hi range)
		Measured Values	Root mean square (RMS)
		Accuracy	<9.99kA range> • Single-phase AC welding power supply ± (1%rdg+9dgt) • DC inverter welding power supply ± (1%rdg+15dgt) <49.9kA range> • Single-phase AC welding power supply ± (1%rdg+3dgt) • DC inverter welding power supply ± (1%rdg+5dgt)
		Impulse No.	0 - 9
		First Cycles	1 - 99 cycles
		Measurement End	AC Less than 2% of full scale DC Less than 75% of the preceding cycle
		Display	3-digit
	Weld Time	Measurement Range	AC 1 - 99 cycles DC Cycles 1 - 40 cycles Seconds 0.01 - 0.80 seconds
		Measured Values	Number of cycles or time required for a full welding cycle
		Accuracy	±0 cycles / ±0.01 seconds
		Display	2-digit
	Conduction Degrees	Measurement Range	30 - 180°
		Measured Values	Maximum conduction degrees of the measured interval
		Accuracy	±9°
		Display	3-digit
	Multi-Step Weld Memory Function	Impulse No.	Up to 9 steps are stored in memory. The Impulse No. is reset to the initial setting with more than 0.5 seconds of cooling time.
Mass	500 g (including 4 nickel-hydrogen batteries)		
Outer Dimensions	164 (H) × 74 (W) × 30 (D) mm (excluding projections)		
Power Supply	Nickel-hydrogen batteries, 1.2V × 4		
Ambient Temperature	0 - 40°C		
Accessory Charger*	Input 100 V to 240 V AC, 50/60 Hz (MM-315B-00-00/02)		
Automatic Power Off	When there is no button operation or no current measurement is performed for seven minutes.		

* The MM-315B-00-05 does not come with a charger. Use a charger with the following specifications.
Output: 7 V±10%, 100 mA minimum
Polarity: Negative Center

8. Appearance

Unit: mm

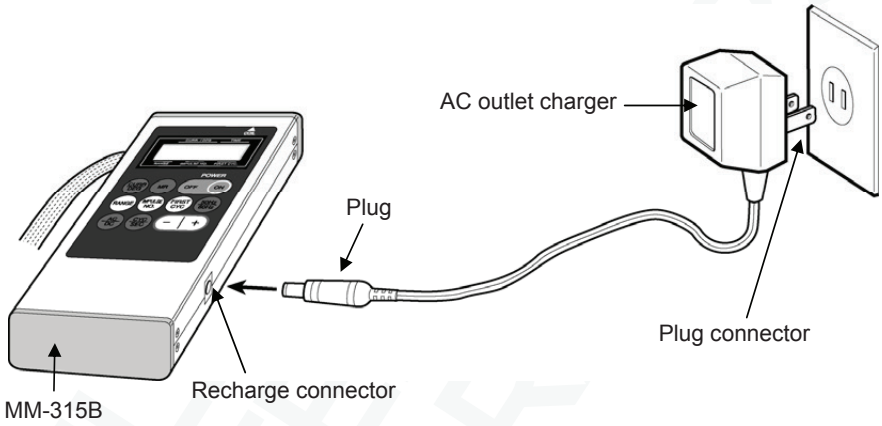


9. Charging the Battery

(1) Connecting the Unit and Charger

This tester is designed specifically for use with nickel-hydrogen batteries. Recharging is performed by the charger.

Connecting the charger



Connect the plug to the recharge connector of the unit, and plug the charger into an outlet. Fifteen hours are required to fully recharge the unit. Do NOT charge for more than 48 hours. Excessive charging will shorten the service life of the batteries. Be sure to charge at a room temperature of 35°C or lower.

(2) When should the Unit be Recharged

Recharge the unit when the word shown below appears and the power is shut off.

B	A	T	T	E	R	Y	

When the battery discharge is excessive, the above display may not be shown.

(3) Measurement during Recharging

It is possible to conduct measurement with the recharge plug inserted into the unit, but in order to obtain more accurate measurement, it is recommended that measurement be conducted after recharging is complete and the plug has been removed.

(4) Service Life of the Nickel-Hydrogen Batteries

1) Cycle life of charge/discharge

More than 500 charges/discharges are possible with proper use. If the length of use becomes very short, even when the batteries have been charged properly, it may be necessary to change the batteries.

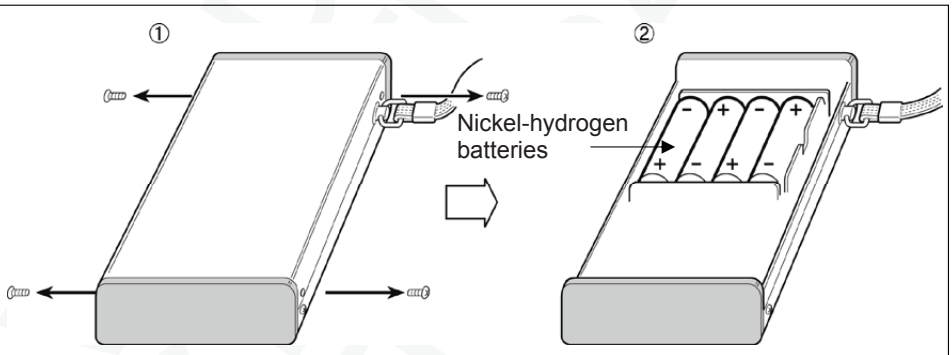
Refer to Replacing the Nickel-Hydrogen Batteries in “Chapter 9 (5)”.

2) Batteries after extended period of use

The batteries can normally be used for 3 to 5 years with proper use. However, if they are not used for an extended period, their life will be shortened.

(5) Replacing the Nickel-Hydrogen Batteries

It is possible to conduct measurement with the recharge plug inserted into the unit, but in order to obtain more accurate measurement, it is recommended that measurement be conducted after recharging is complete and the plug has been removed.



Remove the four screws from the rear cover.

When replacing the batteries, make sure their polarity is correct.

When changing the batteries, be sure to replace all four.

Battery

Item name	Item No.	Model	Specification
Nickel-hydrogen battery	1169000	210AAHCB-UC4	AA battery (UM-3) IEC/JIS model No.: HR6 Voltage: 1.2 V Capacity: 2050 mAh

⚠ WARNING

Do NOT short-circuit between positive and negative terminals; fire may result.

10. Calibration

To maintain the performance of the MM-315B, it is necessary to calibrate it periodically. The calibration is carried out at our factory. Send us your toroidal coil along with the MM-315B for calibration. As the conditions of degradation for the MM-315B differ depending on the operation environment, it is necessary to calibrate the toroidal coil and the MM-315B together.

Contact Amada Miyachi Co., Ltd. for details on calibration.

CE

AMADA MIYACHI CO., LTD.

EC Declaration of Conformity

The company/manufacturer: **AMADA MIYACHI CO., LTD.**
95-3, Futatsuka, Noda-City, 278-0016 JAPAN

Herewith declares in his own sole responsibility conformity of the product

Designation: **Weld Checker**

Types/Serial Number, etc.: **MM-315B**

With applicable regulations below

EC Directive: **Low Voltage Directive 2006/95/EC**
EMC Directive 2004/108/EC

Harmonized European/International Standards applied:

IEC 60204-1:2009、EN 61010-1:2010 (3rd) 、IEC 61326-1 Ed. 2.0:2012 (b)、EN-50178:1998、IEC 61000-6-2:2005、EN-55011:2009+A1:2010、

Importer Distributor in EU:
(please place distributor/importer stamp here)

AMADA MIYACHI EUROPE GmbH
Lindberghstrasse 1, DE-82178 Puchheim, GERMANY
Tel: + 49 8983 9403 - 0

Division: **AMADA MIYACHI CO., LTD.**

Mitsuaki Aoyama

Noda-City/Japan 2014-09-03
Place and Date

Mitsuaki Aoyama / Quality guarantee general manager
Name/Signature/Position

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