

**MULTI-FUNCTION  
WELD MONITORS**

**WELD THRU  
CURRENT & FORCE**

**MINIATURE & HANDHELD  
WELD CHECKERS**

**ELECTRONIC  
FORCE GAUGES**

**DISPLACEMENT  
MONITORS**

**WINDOWS<sup>®</sup> PC  
DATA COLLECTION**

**HIGH SPEED  
PRINTERS**

**LARGE SELECTION OF  
TOROIDAL COILS**

## MONITOR & CHECKER DELIVERABLES

- **Lower scrap rate**
- **Improved process control**
- **ISO 9000 Data collection**
- **NIST traceable certification**
- **Decreased machine downtime**
- **Accurate machine set up**
- **Weld optimization and Design of Experiments (DoE)**
- **Welding process diagnostics**

## WELD CHECKERS<sup>®</sup> FOR RESISTANCE WELDING



*In any production process, knowledge and information are the keys to control!*

## WHY MONITOR?

Resistance welding derives its ability to form a proper weld nugget from the simple formula for heat:  $H = I^2 \times R \times T$ , where "I" is the current, "R" is the resistance, and "T" is the time. The ability to keep these variables within predefined limits allows the process to be maintained. Weld consistency can vary over time due to a number of variables, which affect the heat delivered to the weld. The changes can result in:

- Poor quality welds
- Machine downtime
- High maintenance costs
- Lost revenue

Miyachi's range of checkers provide the ability to monitor the variables that result in changes in weld heat such as current and time. Other factors that affect weld quality can also be monitored, such as voltage, displacement and force.





# HANDHELD WELD TESTER - CURRENT & FORCE

## MM-360A

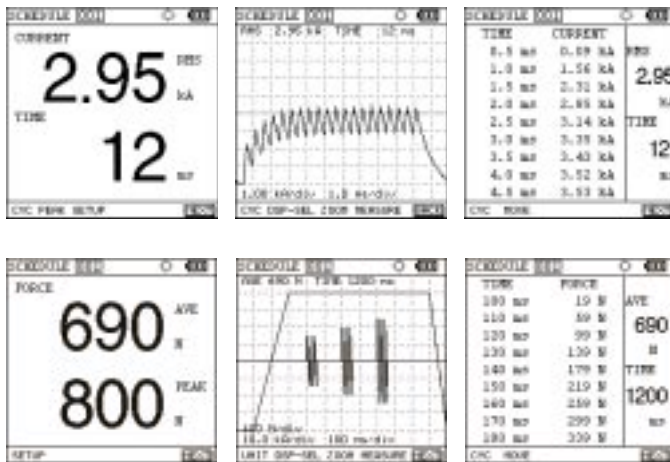
### KEY FEATURES

- Measures current, time and force
- RS-232 and printer outputs
- Works like a digital oscilloscope
- Perfect for squeeze and forge timing
- Battery powered for portability
- Measures current from 0.30 – 199.9 kA
- 1 – 2100 lbs (select force sensor)

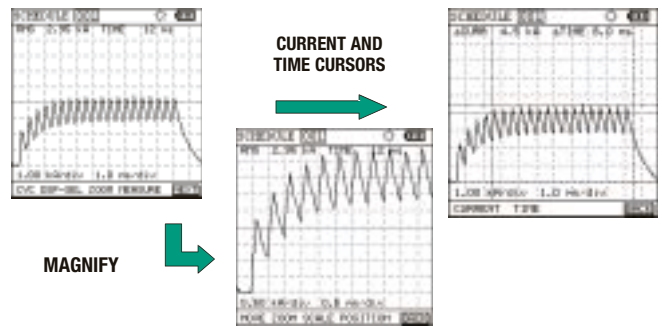
The MM-360A can measure and display current using a toroidal coil or measure current and force *simultaneously* with the unique weld-thru sensor; machine set-up and schedule verification become easy! The large LCD graphic display makes it simple to optimize squeeze time; printouts serve as verification. Alternately, the unit has a large memory of weld data allowing stored waveforms and data to be transferred via RS-232 connection once the user has returned to the office environment. Its ergonomic design and state-of-the-art feature set provide for the ultimate flexibility in use.



*The most advanced handheld checker ever built – perfect for machine set-up, troubleshooting and process verification.*



Actual Screens



## SPECIFICATIONS

<b>Power Supply</b>	Li-ion battery, AC adapter 100-240 VAC
<b>Current Sensor</b>	Toroidal coil or weld thru (see table in this brochure)
<b>Current Range</b>	Auto range setting 0.30-5.99kA, 1.00-19.99kA, 10.0-199.9kA
<b>Monitored Value</b>	RMS or PEAK (current), Arithmetic Mean or Peak (force)
<b>Time Range</b>	0-2000 mS / 0 – 99.5 cycles AC; 0-2000 mS DC
<b>Conduction Angle</b>	30°–180°
<b>Force</b>	Weld thru: MA-710A, MA-711A, Non weld thru: MA-520, 21, 22: 1-2100 lbs., depending on sensor
<b>Data Output</b>	RS-232 or printer
<b>Dimensions W x D x H Inches (mm)</b>	3.9 x 2.1 x 9.8 (100 x 53 x 250)
<b>Weight Lbs. (Kg)</b>	1.1 (0.5)
<b>Ordering</b>	Individual units or complete kits

# MULTI-FUNCTION WELD MONITORS - CURRENT, TIME, VOLTAGE

## MM-326B/336A

### KEY FEATURES

- Measures current, weld time and voltage (most power supply types)
- 15 schedules with limits
- Integral printer and weld card data storage
  - Current and voltage waveforms 1/2 cycle or millisecond – numeric data
  - Standard deviation, failure rate,  $\bar{X}R$  control charts, histograms
- Comprehensive I/O with analog output for waveforms
- Clock function for time-stamping
- Counter can signal electrode change
- Good/no-good machine outputs

The MM-336A and MM-326B measure current, weld time, conduction angle and voltage. They are designed to monitor most types of power supplies and provide 15 schedules with limits. The integral printer, Weld Card, and optional RS-232/422 provide all the information required for process data collection.



**MM-326B:** The industry standard in process monitoring.

## SPECIFICATIONS

Model	MM-336A	MM-326B
Current /Voltage Range	0.100 kA – 1.999 kA 1.00 kA – 19.99 kA 0.5 V – 9.99 V	1.00 kA – 19.99 kA 10.0 kA – 199.9 kA 0.5 V – 9.99 V
Time Range	1-999mS 0.5–99.5 cycles	0.5-99.5 cycles
Power Supply	110, 230 VAC $\pm$ 10% 50/60 Hz	
Current Sensor	Toroidal coil (see table in this brochure)	
Counter	1 – 99999 welds	
Monitored Value	RMS or PEAK (current and voltage)	
Conduction Angle	30° – 180°	
Data Output (Optional)	RS-232 or 422	
Dimensions W x D x H Inches (mm)	6.8 x 12.4 x 10.6 (172 x 315 x 269)	
Weight Lbs. (Kg)	15 (6.8)	

## DISPLACEMENT MONITOR

### MM-730A

#### KEY FEATURES

- Simple displacement measurement
- Resolution to 1 micron
- Programmable limits with error signaling
- Stores 15 weld schedules
- Weld interrupt signaling
- Weld card data storage
- RS-422 external data output
- Follow up speed – 0.3 m/sec.
- Displacement level machine outputs



The MM730A provides simple measurement of the weld collapse (displacement). The unit uses a current coil to trigger measurement and also measures weld time. The MM-730A can send a weld interrupt signal to a power supply and therefore weld to displacement time can provide a useful quality indicator.

## SPECIFICATIONS

Power Supply	110, 230 VAC $\pm$ 10%
Current Sensor	Toroidal coil
Displacement Range	0 – 29.999 mm
Time Measurement	1 – 999 mS
Time Range	0 – 999 mS / 0 – 99.5 cycles
Data Output	RS-422
Dimensions	4.2 x 11.7 x 10.6
W x D x H In (mm)	(107 x 297 x 269)
Weight Lbs. (Kg)	9.9 (4.5)

# WELD ANALYZER

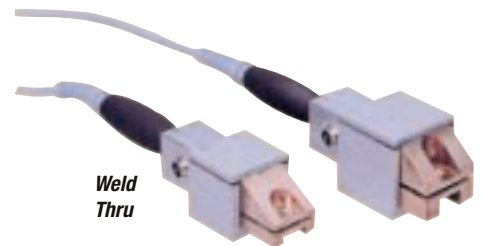
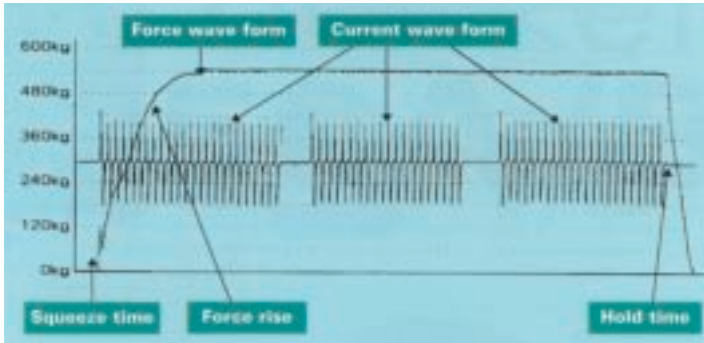
## MM-356A/B

### KEY FEATURES

- Built-in battery or AC power
- Measures current, force, voltage and time
- Perfect for squeeze and forge timing
- Forge can be timed to match voltage drop
- Uses weld thru current and force sensor (MM-356B) or non weld thru (MM-356A)
- Built-in printer
- Good/no-good machine outputs

The MM-356A/B measures secondary current, voltage and weld time. Current and Force can be measured simultaneously on the MM-356B by using a weld-thru force sensor, displayed on the LCD, and printed on the built-in printer. Additionally the unit can store up to 150,000 welds for download via serial link to a PC.

*Integrated welding variable measurement.*



## SPECIFICATIONS

<b>Power Supply</b>	110, 230 VAC $\pm$ 10%, 50/60 Hz (switching over automatically)
<b>Battery</b>	12 V; 2.2 Ah
<b>Power Consumption</b>	18 VA; printing 30 VA
<b>Current Range</b>	01.00 – 19.99 kA and 010.0 – 199.9 kA
<b>Voltage between tips</b>	0.50 V – 9.99 V
<b>Electrode Force (MM-356B)</b>	0.2 to 5kN (45 to 1124 lbs.), 0.5 to 10kN (112 to 2248 lbs.) depending on sensor
<b>Electrode Force (MM-356A)</b>	MA-520: 0.20-9.50kg (0.44-20.9 lbs.); MA-521: 2.0-95.0kg (4.4-209 lbs.), MA-522:20-950kg (44.1-2094 lbs.)
<b>Welding Time</b>	0.5 – 99.5 cycles, or DC mode 001 – 999 mS (mS measurement on MM-356B only)
<b>Force-squeeze Time</b>	001 – 199 mS
<b>Conduction Angle</b>	0 – 180° (only AC)
<b>Monitor Setting</b>	15 welding schedules
<b>Current</b>	00.00 – 19.99 kA or 000.0 – 199.9 kA
<b>Voltage</b>	0.00 – 9.99 V
<b>Time</b>	00.0 – 99.5 cycles or 000 – 999 mS
<b>Pre-set Counter</b>	1 – 99999 count setting
<b>Interface (MM-356B):</b>	RS-422 (option); RS-232 (option)
<b>Printer</b>	Thermal printer
<b>Printing of</b>	Measurement and program data, date, time, waveforms of current, voltage, electrode force, histogram
<b>Printing speed</b>	16 lines/second
<b>Operation Temperature</b>	0 – 40°C
<b>Dimensions Inches (mm)</b> (H x W x D)	10.6 x 6.8 x 12.4 (269 x 172 x 315)
<b>Weight lbs. (kg)</b>	15 (6.8)

# POCKET WELD TESTERS

## MM-315A CURRENT/TIME

### KEY FEATURES

- Simple current measurement in the palm of your hand
- For AC and Inverter power supplies
- Measures current, cycles, milliseconds and conduction degrees
- Impulse memory, 9 welds
- Rechargeable batteries or AC
- Includes coil, charger and carrying case
- Easy-view LCD
- Memory function for easy recall



*The perfect pocket size troubleshooter.*

## SPECIFICATIONS

<b>Power Supply</b>	Ni-Cad battery and AC charger
<b>Current Sensor</b>	Toroidal coil (see table in this brochure)
<b>Current Range</b>	1.00-9.99A, 5.0-49.9kA
<b>Time Range</b>	1 – 99 cycles or 0.01 – 0.80 sec
<b>Conduction Angle</b>	30° – 180°
<b>Dimensions W x D x H In (mm)</b>	2.95 x 1.18 x 6.7 (75 x 30 x 170 )
<b>Weight Lbs. (Kg)</b>	1.1 (0.5) inc. Ni-Cad cells

# ELECTRONIC FORCE GAUGE

## MM-601A

### KEY FEATURES

- Simple and accurate handheld force measurement
- Hold and zero functions
- One touch tare setting
- Rechargeable batteries or AC
- External I/O for analog out and measurement hold
- Easy-view LCD
- Analog force output



*Portable force setting and verification tool.*

## SPECIFICATIONS

<b>Power Supply</b>	Ni-Cad battery and AC charger
<b>Force Sensor</b>	MA-520 max: 9.50 kg (20.9 lbs.) MA-521 max: 95.0 kg (209 lbs.) MA-522 max: 950 kg (2094 lbs.)
<b>Accuracy</b>	±3% full range
<b>Measurement Speed</b>	Approx. 4 times per second
<b>Dimensions W x D x H In (mm)</b>	2.95 x 1.18 x 6.7 (75 x 30 x 170)
<b>Weight Lbs. (Kg)</b>	1.1 (0.5)

## TOROIDAL COIL SPECIFICATIONS



<b>MB-400K</b>	400mm long 1.0 x sensitivity, 5 In. I.D.* (127mm)
<b>MB-800K</b>	800mm long 1.0 x sensitivity, 10 In. I.D. (254mm)
<b>MB-25E</b>	1.0 x sensitivity, 1" I.D. (25mm)
<b>MB-29F</b>	10 x sensitivity, 1 1/8" I.D. (29mm)
<b>MB-35E</b>	1.0 x sensitivity, 1 3/8" I.D. (35mm)
<b>MB-45F</b>	10 x sensitivity, 1 3/4" I.D. (45mm)
<b>MB-60E</b>	1.0 x sensitivity, 2 3/8" I.D. (60mm)
<b>MB-40-40</b>	1.0 x sensitivity, 1 1/2" square hole (40 x 40mm)
<b>MB-500-15</b>	500mm long 1.0 x sensitivity, 3" I.D. (76mm)
<b>MB-200-13</b>	200mm long 1.0 x sensitivity, 1 1/8" I.D. (29mm)

Extension cables for toroidal coils are optional.  
\*Inner Diameter

- For use with all current monitors.

## FORCE SENSORS & ACCESSORIES

### Force and Current Sensors



Part Number	Description	Product
<b>MA-520</b>	Force sensor 0.20-9.50kg (0.44-20.9 lbs.)	MM-601, MM-356A, MM-360A
<b>MA-521</b>	Force sensor 2.0-95.0kg (4.4-209 lbs.)	MM-601, MM-356A, MM-360A
<b>MA-522</b>	Force sensor 20-950kg (44.1-2094 lbs.)	MM-601, MM-356A, MM-360A
<b>MS-500A</b>	Current/force sensor. Force range 0.2-5kN (45-1124 lbs)	MM-356B
<b>MS-1000A</b>	Current/force sensor. Force range 0.5-10kN (112-2248 lbs)	MM-356B
<b>MA-710A</b>	Current/force sensor. Force range 0.2-5kN (45-1124 lbs)	MM-360A
<b>MA-711A</b>	Current/force sensor. Force range 0.5-10kN (112-2248 lbs)	MM-360A

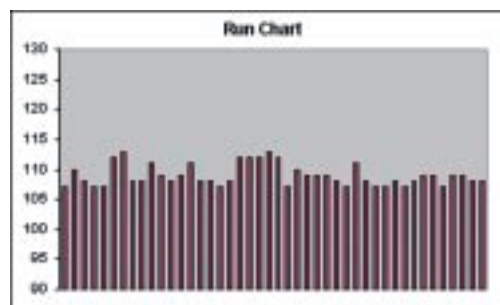
### Accessories

Part Number	Description	Product
<b>145-013</b>	Rechargeable battery, 1.2V 500MAH (4 required for checker)	MM-315A, MM-601A
<b>QCK-620B1</b>	Battery charger	MM-315, MA-601A
<b>TP-50KM-A60</b>	Printer paper, 60mm x 25mm (W x L)	MM-326B, MM-336A, MM-356A/B
<b>18-042-01</b>	Toroidal coil extension (specify length)	All Checkers

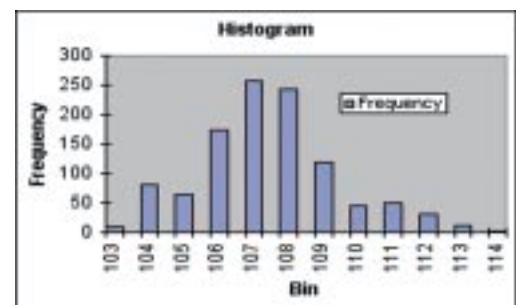
## DATA COLLECTION SOFTWARE-WINWEDGE®

Taltech Winwedge software can be used to collect data from most checker models. Miyachi has written some front-end programs that accept basic data to start you on the road to process control and data collection.

- Exports data directly into Microsoft Excel®
- Histogram, run charts
- Process logging
- Trend analysis



Excel Run Chart



Histogram

<b>Applicable Models</b>	MM-122A, MM-356B, MM-360A, MM-326B/RS232, MM-336A/RS232, MM-730A
<b>Part Number</b>	10-900-02

# MONITOR & CHECKER SELECTION TABLE

MODEL	MM-122A	MM-360A	MM-326B	MM-336A	MM-356A/B	MM-730A	MM-315A	MM-601A
Current	√	√	√	√	√	-	√	-
Voltage	-	-	√	√	√	-	-	-
Time	√	√	√	√	√	√	√	-
Force	-	√	-	-	√	-	-	√
Displacement	-	-	-	-	-	√	-	-
Schedules	31	256	15	15	15	15	-	-
Stand-Alone	√	-	√	√	√	√	-	-
Hand Held	-	√	-	-	-	-	√	√
Pocket	-	-	-	-	-	-	√	√
Communications	232/485	232	232/422 Option	232 /422 Option	232/422 Option*	422 Option	-	-
Printer	Option	Option	√	√	√	-	-	-
Memory Card	-	-	√	√	-	√	-	-
Battery Powered	-	√	-	-	√	-	√	√
Line Powered	√	√	√	√	√	√	√	√

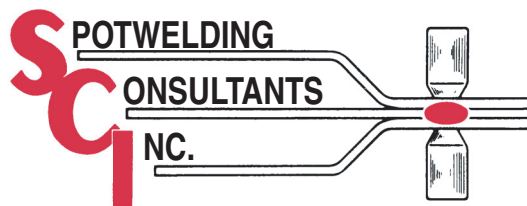
\*MM-356A not available with RS-232/422.

## ORDERING INFORMATION

Part Number	Description
MM-122A	Weld Checker AC/DC/CD current (RMS and PEAK), cycles/mS, counter, data output (RS-232/485),31 measuring schedules. Current 0.100-1.999KA, 1.00-19.99KA, 10-199.9KA 1 x coil, sold separately
MM-360A-00-01	Weld Checker, hand-held, built-in lithium ion battery requires a 1 x coil, sold separately.
10-600-02	MM-360A FIELD KIT with 500 Kg sensor consisting of the following: MM-360A hand held unit, SWA0902W AC adapter, power cord, MA-710 500 Kg force and current sensor.
10-600-03	MM-360A FIELD KIT with 1000 Kg sensor consisting of the following: MM-360A hand held unit, SWA0902W AC adapter, power cord, MA-711 1000 Kg force and current sensor.
10-600-04	MM-360A PREMIUM KIT includes the following available features and options – MM-360A, SWA0902W, A-03581-001, BL-58RII, A-03166-002, UR-100, BL-100W, MA-713, AC-100U, C06-09FS-09FS-CROSS-WS15, MA-710. PREMIUM KIT with 500Kg force and current sensor.
10-600-05	MM-360A PREMIUM KIT includes the following features and options – MM-360A, SWA0902W, A-03581-001, BL-58RII, A-03166-002, UR-100, BL-100W, MA-713, AC-100U, C06-09FS-09FS-CROSS-WS15, MA-711. PREMIUM KIT with 1000Kg force and current sensor
MM-326B	Weld Checker AC/DC current/volts, (RMS/PEAK), measures cycles, voltage 0.5-9.99V, current 1-19.99 and 10-199.9 kA printer outputs waveforms and charts. Includes Welcard. Includes MB-800K coil.
MM-326B/RS232	Weld Checker AC/DC current/volts (RMS/PEAK), measures cycles, voltage 0.5-9.99V, current 1-19.99 and 10-199.9 kA printer outputs waveforms and charts. Includes Welcard, RS-232 Option. Includes MB-800K coil.
MM-336A	Weld Checker AC/DC current/volts, (RMS/PEAK), cycles and mS, voltage 0.5-9.99V, current 0.1-1.999 and 1.0-19.99 kA printer outputs waveforms and charts. Includes Welcard. Includes MB-400K coil.
MM-336A/RS232	Weld Checker AC/DC current/volts, (RMS/PEAK), cycles and mS, voltage 0.5-9.99V, current 0.1-1.999 and 1.0-19.99 kA printer outputs waveforms and charts. Includes Welcard, RS-232 option. Includes MB-400K coil.
MM-356A	Weld Checker AC/DC current/volts, (RMS/PEAK), cycles, force, voltage 0.5-9.99V, current 1-19.99 and 10-199.9 kA printer gives waveforms and charts. Graphic LCD, AC or battery powered. Includes MB-800K. Requires MA-520, 521 or 522 (sold separately).
MM-356B	Weld Checker AC/DC current/volts, (RMS/PEAK), cycles, force, voltage 0.5-9.99V, current 1-19.99 and 10-199.9 kA printer gives waveforms and charts. Graphic LCD, AC or battery powered. Includes MB-800K. Requires MS-500A or MS-1000A for simultaneous current/force.
MM-730A	Weld Checker with displacement sensor, 115 VAC Includes GS-1630 displacement sensor. Coil sold separately.
MM-601A	Weld pressure gauge, analog output, hold output. Includes: battery charger and carrying case. Force sensor sold separately. Requires MA-520, MA-521 or MA-522.
MM-315A	Weld Checker, pocket-size, AC/DC current, memory up to 9 impulses. Measure conduction angle, cycles, and RMS current. Dual range: 1-9.99 and 5-49.9 kA Includes MB-500-15 coil, battery charger, carrying case.

## OPTIONAL MM-360A COMPONENTS (SOLD SEPARATELY)

SWA0902W	AC adapter, (needs AC-100U power cord).	MA-713	Carrying case
A-03581-001	Force sensor adapter for MA-520, 521, 522	AC-100U	AC adapter power cord
BL-58 RII	Thermal printer	C06-09FS-09FX-Cross-WS15	RS-232C cable
A-03166-002	Cable to printer	MA-710A	Force sensor, 0.2 to 5kN, (45 to 1120 lbs)
UR-100	Li-Ion battery	MA-711A	Force sensor, 0.5 to 10kN, (112 to 2250 lbs)
BL-100 W	AC adapter for printer, (needs AC-100U power cord).		



Contact Spotwelding Consultants  
for additional information and pricing.

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