

From manual operation to automated machine mounting, a wide range of production site needs can be handled.

# Air-pulse dispenser

Air-pulse type is the most popular dispenser thanks to its high versatility, economy, and maintainability. From models for manual operation with excellent cost performance to models for automated machines with high accuracy and high speed cycles that are equipped with various automatic compensation and communication functions, models are available to meet a wide range of production site needs. In each segment, MUSASHI Air-pulse dispensers continue to be No. 1.

Manual processes

Cellular manufacturing system

Fully automated dispensing machine



MS-1/MS-1D



ML-6000X



ML-6000XPro



ML-8000X



MUSASHI ENGINEERING, INC.

## Syringe system

### Standard system for small volume dispensing

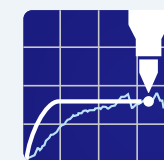
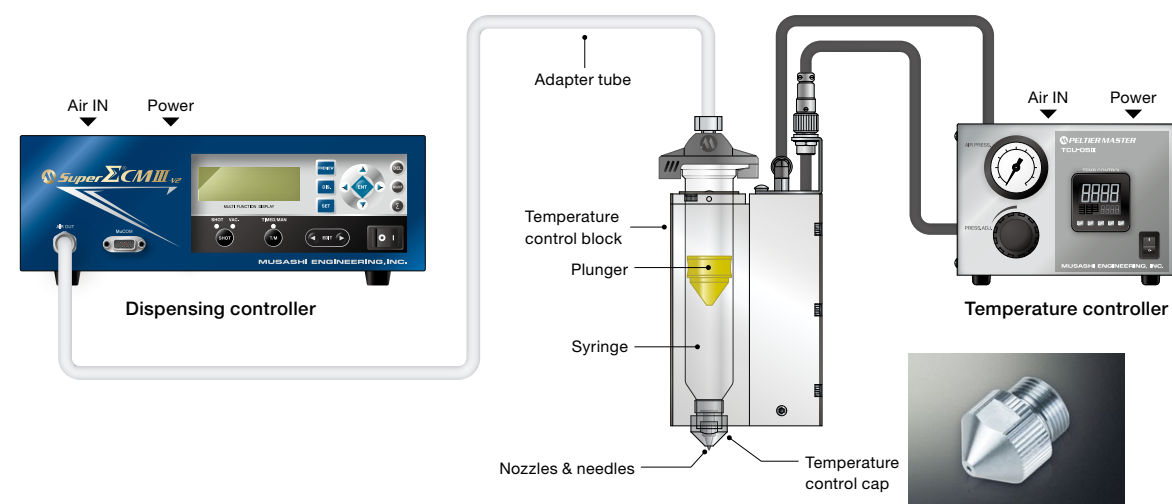
This is the most common dispenser system that can be used for various dispensing operations from manual operation to installation in an automated machine. By combining this system with disposable type syringes and needles, maintenance is much easier. There are nine syringe sizes, from 1 mL to



## Quick Reference Table by Specifications and Applications

| Performance | Super ΣCMIII                            |                     |
|-------------|-----------------------------------------|---------------------|
|             | Air-pulse stabilization circuit mounted |                     |
| High        | ML-6000XPro                             | ML-8000X            |
| Low         | MS-1 MS-1D                              | ML-6000X            |
|             | manual labor                            | FA dispense machine |

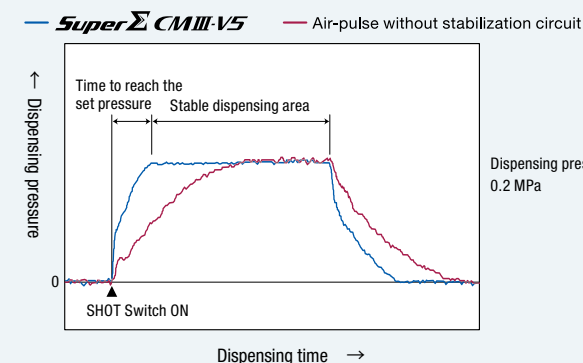
## Air-pulse system Connection system configuration diagram



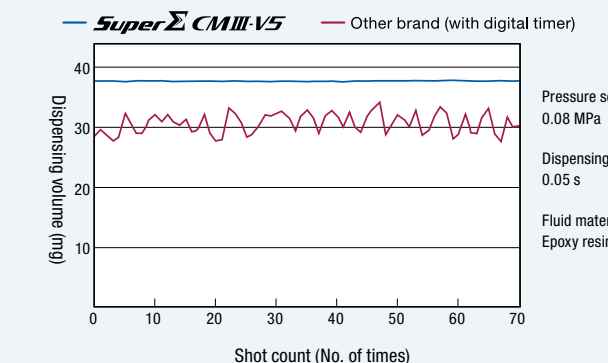
## Air-pulse stabilization circuit PAT.

MUSASHI's unique, air-pulse stabilizing circuit raises the pressure faster, providing good response. Accordingly, the stable dispensing area becomes wider to eliminate fluctuations in dispensing volume.

### Effect of the air-pulse stabilizing circuit



### Dispensing precision comparison table



## Example of system mounting





Into the core of automated production lines The  $\Sigma$  series dominates the field of ultra-precision, super-fine point dispensing.



## Enhanced dispensing stability, demonstration of global standards.

Our  $\Sigma$  series have been highly valued for their high-precision micro volume dispensing capability and automatized unmanned production lines accompanied with building up overwhelming accomplishments. "Three Major  $\Sigma$  Functions" have solved difficult problems all together such as fluid dripping, volume reduction, and remaining volume alert. These functions provide excellent performance in various production processes including semiconductor manufacturing and electronic component manufacturing, for example, ultra-precision dispensing of as little as 0.01 mg and high-speed dispensing at minimum cycle time of 0.1 s or less.

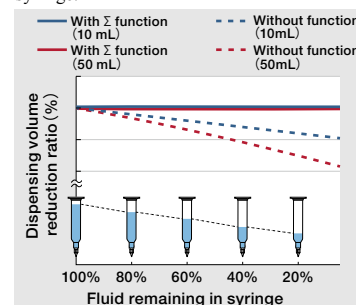
Higher-precision and higher-stability dispensing has been successfully achieved thanks to further improvement in dispensing stability and remaining volume detection accuracy. Storage capacity of as many as 100 types of operation patterns allows users to manage product variety completely without any difficulty. In addition, the dedicated software,

"**MuCOM for SuperSigma CM series**", provides editability of dispensing conditions on a PC, dramatically improving accuracy and efficiency of operations.

## " $\Sigma$ 3 major functions" help to improve yield and contribute to a smarter production line

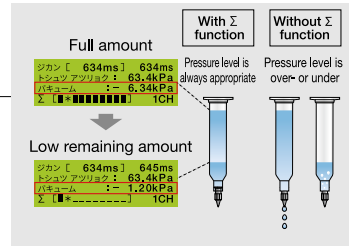
### Function 1 Automatic correction of volume reduction

Compensates for the decrease in dispensing volume due to the effect of the difference in hydraulic head. Stable, high-precision dispensing is achieved through a single syringe.



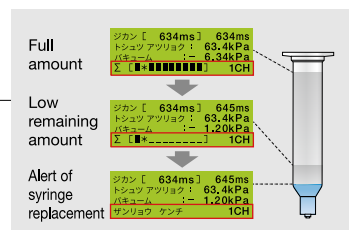
### Function 2 Automatic dripping prevention function

Improved stability of dispensing accuracy by automatically adjusting the vacuum volume to the optimum level at all times according to the amount of remaining fluid.



### Function 3 Automatic low fluid alarm

Highly precise detection and constant monitoring of the amount of fluid remaining in the syringe. Outputs a warning sound (signal) when the remaining fluid level reaches the set value.



Fully automated dispensing machine with  
**SuperSigma CMIII**



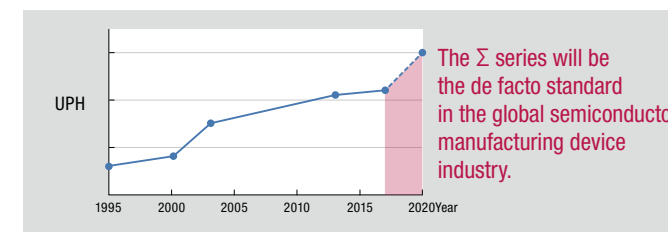
## Digital Control Dispenser with Correction Function



### Ultra-stable dispensing with faster cycle time and smaller volume.

- Greater performance with the  $\Sigma$  3 major functions
- Better durability and easier maintenance.
- Compatible Standards: CE marking (Low Voltage Directive, EMC Directive), EU RoHS2.
- Air-pulse stabilization circuit (PAT) mounted [For details, see P37]

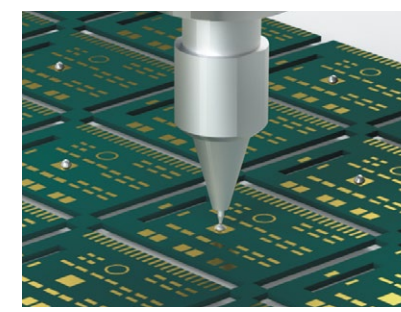
## Delivering higher throughput for the global semiconductor manufacturing device industry.



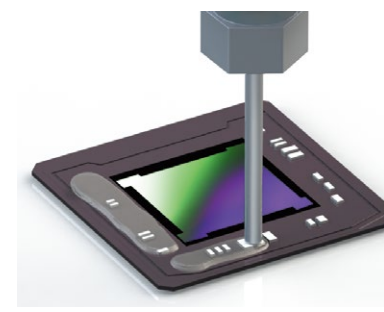
## Enable even smaller micro-dispensing.



## Applications



Ag paste dispensing in die bonding



Dust trapping agent dispensing on camera modules



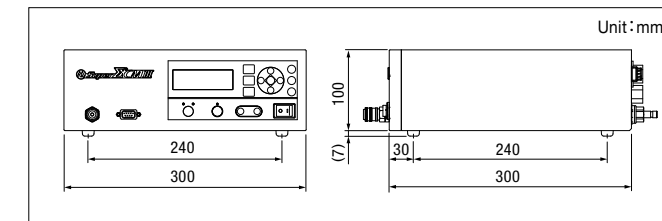
Conductive Ag paste dispensing on touch panels

## Specifications

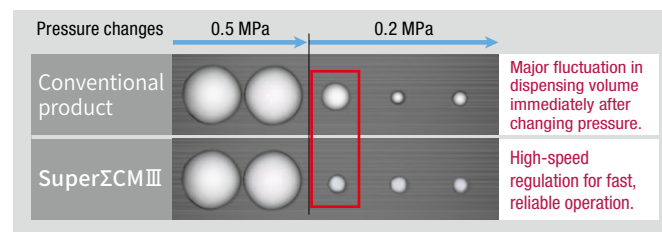
|                                   |                                             |                                             |
|-----------------------------------|---------------------------------------------|---------------------------------------------|
| Item name                         | Fully digital controlled dispenser          |                                             |
| Model                             | S-SIGMA-CM3-V5                              | S-SIGMA-CM3-V2                              |
| Dispensing system                 | Air-pulse system                            |                                             |
| Air-pulse stabilization circuit   | Mounted                                     |                                             |
| Dispensing pressure setting range | 0.030 to 0.500 MPa                          | 0.005 to 0.200 MPa                          |
| Dispensing time setting range     | 0.001 to 9,999.999 s                        |                                             |
| Vacuum pressure setting range     | 0.00 to -0.020 MPa                          |                                             |
| Source pressure range             | 0.200 to 0.700 MPa<br>(600 MPa recommended) | 0.200 to 0.400 MPa<br>(300 MPa recommended) |
| Rated voltage and frequency       | AC100-240 V 50/60 Hz                        |                                             |
| Power consumption                 | 30 W                                        |                                             |
| External dimensions               | W300×D300×H107 mm                           |                                             |
| Weight                            | 5.8 kg                                      |                                             |

Note: When using syringes or cartridges larger than 70mL, please contact us.

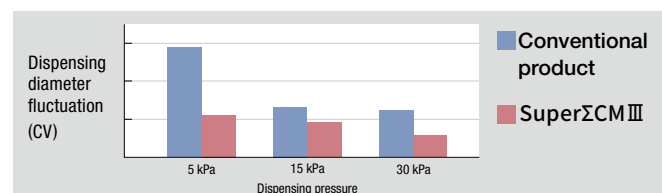
## External dimensions



## Better coverage of pressure changes.



## Better reliability for low-viscosity liquid.





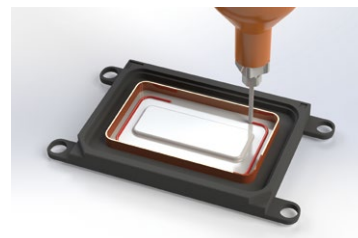
Automatic control of the vacuum is adopted to achieve full-function digital control. Enhanced logging and self-diagnostic functions for FA mounting.



## Industry 4.0 “complete support”, dispensing platformer is born.

In recent years, there has been a growing need for digital management of production sites in order to achieve "Smart Factories". The newly developed full-function digital control dispenser **ML-8000X** is complete support with Industry 4.0. Enhanced production management functions with logging and self-diagnostic functions. In addition, 4.3 inch color touch panel enables smartphone-like operation. As a platform for dispensing condition management, it contributes to improving the performance of automated production lines.

### Applications



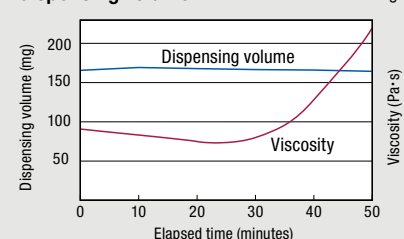
Speaker Vibration Membrane Attachment



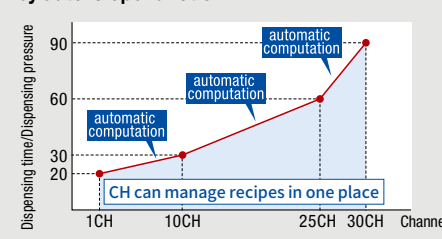
Dispensing Ag Paste on optical communication module

### Automatic pressure switching to adapt to viscosity changes

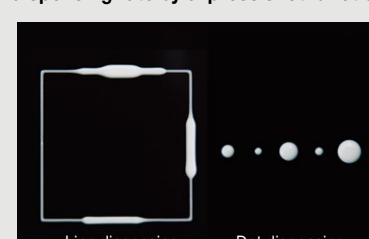
Auto increment function to correct dispensing volume (Automatic channel switching)



Automatic calculation of dispensing conditions by auto-slope function



Variable dispensing volume at a constant dispensing rate by express shot function



### Industry 4.0 complete support Fully digital controlled dispenser

#### ML-8000X



Next-generation dispenser suitable for installation in automated machines

- **Industry 4.0 “complete” support**  
Instantly displays errors, logs, and the number of productions.  
Minimize defects by working with higher levels.
- **Recipes and channels can be imported/exported via USB port.**  
Easy backup up to PCs and other devices.
- **Compatible Standards:** CE marking (Low Voltage Directive, EMC Directive), EU RoHS2.
- **Standard lineup includes PNP specifications for I/O input/output signals.**
- **Air-pulse stabilization circuit (PAT) mounted** For details, see P37



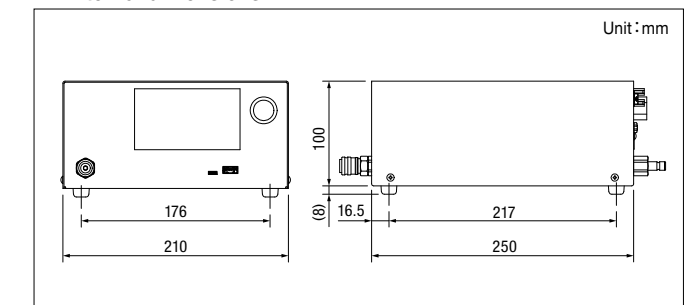
Example on equipments

### Specifications

|                                   |                   |                                                                          |                   |                   |                   |
|-----------------------------------|-------------------|--------------------------------------------------------------------------|-------------------|-------------------|-------------------|
| Item name                         |                   | Supports upper-level communication<br>Fully digital controlled dispenser |                   |                   |                   |
| Model                             |                   | ML-8000X-CTR-V7-N                                                        | ML-8000X-CTR-V7-P | ML-8000X-CTR-V2-N | ML-8000X-CTR-V2-P |
| Dispensing system                 |                   | Air-pulse system                                                         |                   |                   |                   |
| Air-pulse stabilization circuit   |                   | Mounted                                                                  |                   |                   |                   |
| Dispensing pressure setting range |                   | 20.0 to 700.0 kPa                                                        |                   | 5.0 to 200.0 kPa  |                   |
| Dispensing time setting range     |                   | 0.010 to 9,999.999 s                                                     |                   |                   |                   |
| Vacuum pressure setting range     |                   | 0.00 to -5.00 kPa                                                        |                   |                   |                   |
| Source pressure range             |                   | 200 to 800 kPa                                                           |                   | 200 to 400 kPa    |                   |
| Signal Specifications             |                   | NPN                                                                      | PNP               | NPN               | PNP               |
| Supply power *1                   | Connector         | ACAT-3 dedicated connector, e-CON (3-pin socket) *2                      |                   |                   |                   |
|                                   | Rated voltage     | DC 24V ±10%                                                              |                   |                   |                   |
|                                   | Power consumption | 26 W                                                                     |                   |                   |                   |
| External dimensions               |                   | W210×D250×H108 mm (excluding protrusions)                                |                   |                   |                   |
| Weight                            |                   | 3.4 kg                                                                   |                   |                   |                   |

\*1 Please use a USB cable and power cable of 3 m or less.  
(In excess of 3 m, the product is outside the scope of the CE declaration of conformity for this product.)  
\*2 The AC adapter is not included in the product. Power should be supplied by one of the following methods.  
■ Use our ACAT-3 (input rating AC100 to 240 V 50 / 60 Hz).  
■ Use a SELV power supply that meets the CE marking LVD matching standard. (Compatible plug: e-CON 3-pin)

### External dimensions



### Features of ML-8000X

#### Improved functions

Vacuum pressure setting

#### Production control

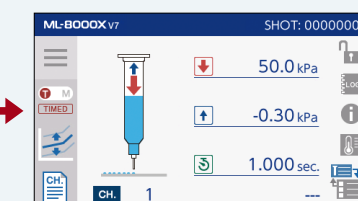
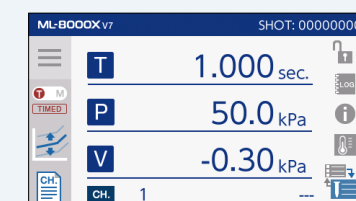
Equipped with log, self-diagnosis, emergency stop

#### Refined operability

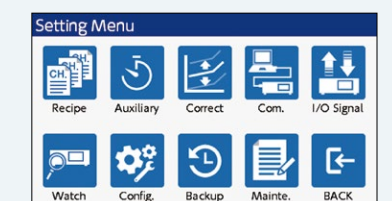
Equipped with a 4.3 inch touch panel

#### PC communication

Equipped with USB ports



Two types of main screens are available: “Parameter Operation” and “Visual Operation”.



Easy operation and setting by “screen touch” even with a pen or gloves.



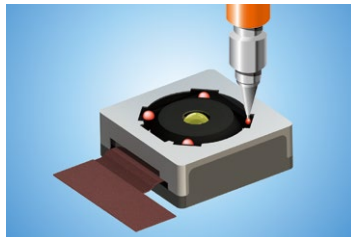
The long-selling ML-5000II has been redesigned with a simplified logging function. High-grade models also realize automatic control of dispensing pressure.



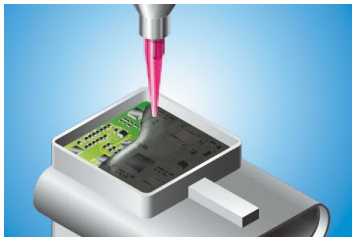
Industry 4.0 entry model, new!

The ML-5000XII high-precision digital dispenser is a long-seller with an overwhelming share of the global market. 「ML-6000X / ML-6000X Pro」 is an entry-level model compatible with Industry 4.0, developed and commercialized as its successor. The dispensing performance that surpasses the ML-5000XII, a new simple logging function, and a 2.4 inch color LCD display with greatly improved visibility contribute to the realization of a "Smart Factory".

Applications



UV dispensing on camera modules

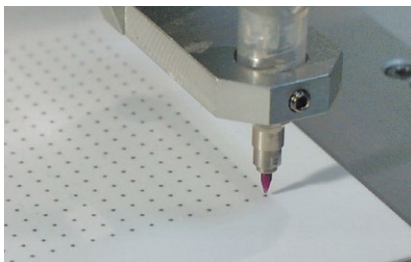


Pressure Sensor Potting

Features of next-generation dispenser

Excellent dispensing

Air-pulse stabilization circuit (PAT) mounted as standard. Eliminates dispensing volume variation and achieves excellent dispensing accuracy. [For details, see P37]



Next-generation Functions

Simple logging function (recording parameters: various pressures, dispensing time, channels, dispensing mode)

Other Enhanced Features Simple residual volume detection / Interval function channel registration / Channel switching error output / Alarm output



User-friendly

The 2.4 inch color graphic LCD display is easy to set up and operate. Multilingual (Japanese, English, Chinese) support.



High-precision digital dispenser

ML-6000X / ML-6000X Pro



Specifications

| Item name                            | High-precision digital dispenser                                                                    |                                                      |                                                         |                                                         |                                                         |                                                         |
|--------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Model                                | ML-6000X                                                                                            |                                                      | ML-6000X Pro                                            |                                                         |                                                         |                                                         |
|                                      | ML-6000X-CTR-N-VHR                                                                                  | ML-6000X-CTR-N-GP                                    | ML-6000XP-CTR-V5-N-VHR                                  | ML-6000XP-CTR-V2-N-VHR                                  | ML-6000XP-CTR-V5-N-GP                                   | ML-6000XP-CTR-V2-N-GP                                   |
| Dispensing system                    | Air-pulse system                                                                                    |                                                      |                                                         |                                                         |                                                         |                                                         |
| Air-pulse stabilization circuit      | Mounted                                                                                             |                                                      |                                                         |                                                         |                                                         |                                                         |
| Dispensing pressure regulating range | 5.0 to 700.0 kPa                                                                                    |                                                      | 30.0 to 500.0 kPa                                       | 5.0 to 200.0 kPa                                        | 30.0 to 500.0 kPa                                       | 5.0 to 200.0 kPa                                        |
| Dispensing time setting range        | 0.001 to 99.999 sec, 0.01 to 999.99 sec, 0.1 to 9,999.9 sec (digits can be switched by icon switch) |                                                      |                                                         |                                                         |                                                         |                                                         |
| Vacuum pressure setting range        | 0 to -20.0 kPa<br>(with air supply of 600 kPa)                                                      |                                                      | 0 to -20.0 kPa<br>(with air supply of 600 kPa)          | 0 to -10.0 kPa<br>(with air supply of 400 kPa)          | 0 to -20.0 kPa<br>(with air supply of 600 kPa)          | 0 to -10.0 kPa<br>(with air supply of 400 kPa)          |
| Vacuum pressure setting range        | Precision needle valve<br>(Approx. -1 kPa per a turn)                                               | Standard needle valve<br>(Approx. -4 kPa per a turn) | Precision needle valve<br>(Approx. -1 kPa per a turn)   |                                                         | Standard needle valve<br>(Approx. -4 kPa per a turn)    |                                                         |
| Source pressure range                | Max. 800 kPa<br>(Dispensing pressure + 100 kPa or more)                                             |                                                      | Max. 800 kPa<br>(Dispensing pressure + 100 kPa or more) | Max. 400 kPa<br>(Dispensing pressure + 100 kPa or more) | Max. 800 kPa<br>(Dispensing pressure + 100 kPa or more) | Max. 400 kPa<br>(Dispensing pressure + 100 kPa or more) |
| Rated voltage and frequency          | When supplying from DC24 V DSUB 25 pin, When supplying from a DC12 V DC jack *1 *2                  |                                                      |                                                         |                                                         |                                                         |                                                         |
| Power consumption                    | 12 W                                                                                                |                                                      |                                                         |                                                         |                                                         |                                                         |
| External dimensions                  | W180×D185×H83 mm (excluding protrusions)                                                            |                                                      |                                                         |                                                         |                                                         |                                                         |
| Weight                               | 2.2 kg                                                                                              | 2.1 kg                                               | 2.2 kg                                                  |                                                         | 2.0 kg                                                  |                                                         |

\*1 The AC adapter is not included in the product.

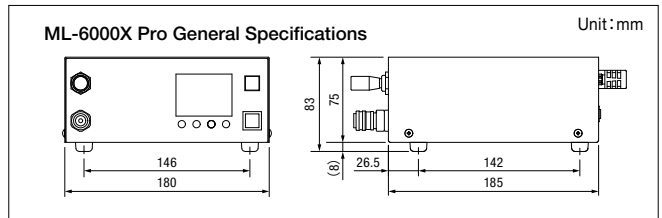
\*2 When supplying from a DC plug, Use one of the following methods to supply power.

- Use our ACAT-2 (input rating AC100-240V 50 / 60Hz).
- Use an AC adapter that conforms to EN-62368-1: 2014. (Compatible plug  $\phi 5.5 \times 2.1$  L = 9.5, Center Plus)
- Use a SELV power supply that meets the CE marking LVD matching standard.

New generation digital dispenser

- Compatible with Industry 4.0 and outputs various kinds of abnormal errors.
- Channel registration is possible for a variety of products.
- General-purpose and vacuum high-resolution specifications lined up.
- ML-6000X Pro
  - Enables pressure setting from the device side.
  - Two types of dispensing pressure are selectable.
- Compatible Standards: CE marking (Low Voltage Directive, EMC Directive), EU RoHS2.
- Air-pulse stabilization circuit (PAT) mounted [For details, see P37]

External dimensions



Highly functional ECO Dispenser

SMART SHOT MS-1 / MS-1D



Outstanding cost-effective performance.

- Power consumption 1/2 — Cut power consumption by 50%.
- Significant accuracy improvement — Dispense accuracy is improved to 130% compared to conventional model.
- Multifunctional machine — Equipped with set up function for dispense condition.
- Ultra-light weight and compact design.
- Compatible Standards: CE marking (Low Voltage Directive, EMC Directive), EU RoHS2.



Specifications

| Item name                         | Highly functional ECO Dispenser SMART SHOT              |           |
|-----------------------------------|---------------------------------------------------------|-----------|
|                                   | MS-1-CTR                                                | MS-1D-CTR |
| Air-pulse stabilization circuit   | None                                                    |           |
| Dispensing pressure setting range | 0.02 to 0.70 MPa                                        |           |
| Dispensing time setting range     | 0.010 to 9,999 s                                        |           |
| Vacuum pressure setting range     | 0 to -20 kPa (Source pressure 600 kPa)                  |           |
| Source pressure range             | Max. 800 kPa (Dispensing pressure + 100 kPa or more)    |           |
| Rated voltage and frequency       | AC100 to 240 V 50/60 Hz (dedicated AC adapter included) |           |
| Power consumption                 | 12 W                                                    |           |
| External dimensions               | W142×D138.5×H103 mm (excluding protrusions)             |           |
| Weight                            | 790 g                                                   |           |

External dimensions

