

# Operating Precautions

## 1) Hysteresis

The displacement of MechaTrans® to be generated by increasing voltage a little bit differs from decreasing voltage. The difference, namely hysteresis comes from the inherent characteristics of piezoelectric devices. If it is required to control the displacement more precisely, it is recommended to add a displacement sensor onto the system.

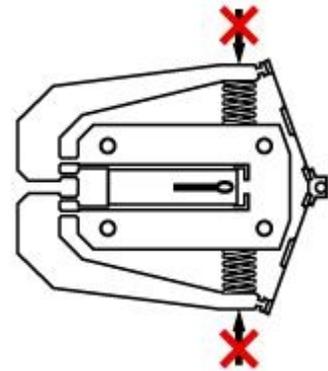
As an example, the hysteresis loop of MechaTrans® MTA02S200F2 is shown in [Fig. 8](#).

## 2) Continuous DC voltage under high humidity

When DC voltage is supplied to MechaTrans® for a long time under over 60% humid environment, the piezoelectric device may result in an electrical short circuit which is said migration phenomenon. It is recommended to operate MechaTrans® under dry environment such as clean room. But In case of an intermittent operation, possibility of the migration may be very small even though under high humid environment.

## 3) Avoid excess tensile force against PZT and/or compression force to the arm

An excess outer force to the piezoelectric device and the arm portion must be avoided. Because the piezoelectric device is weak against a tensile force due to not only being made from a ceramic material, also an initial pre-tension force given to the piezoelectric device itself. If an outer force is given to the piezoelectric device through the arm, the force should be amplified by the lever structure.



## 4) Do not superimpose DC voltage instantaneously

If DC voltage is directly supplied to MechaTrans® by using a switch and unless any resistor is added onto MechaTrans® in series, the maximum displacement may be twice, compared to the displacement under static conditions, and then MechaTrans® may be damaged. In that case, it is recommended to add a suitable resistor onto MechaTrans®, to increase DC voltage gradually, or to control the voltage less than 80V.

## 5) Ambient temperature

If ambient temperature is increased +1 [°C], the displacement at the mechanical output point of MechaTrans® should be the almost same as -1 [V] supply and the displacement direction is opposite to [Fig.3](#). If MechaTrans® is used under a changeable ambient temperature and its displacement amount cannot be so small to the system. Please contact us for the solution.

## 6) Polarization

If the polarity of the power supply is opposite to normal, the displacement should have the minus(-) direction up to approximately 20V. But when the power supply is more than 20V, the displacement direction changes to plus(+) because of polarization of the piezoelectric device. If an alternating voltage is supplied to MechaTrans® for a long time, the piezoelectric device may be destroyed. The right polarity connection of the power supply should be required except for a special occasion. The red color lead wire is normally connected to the plus(+) polarity.

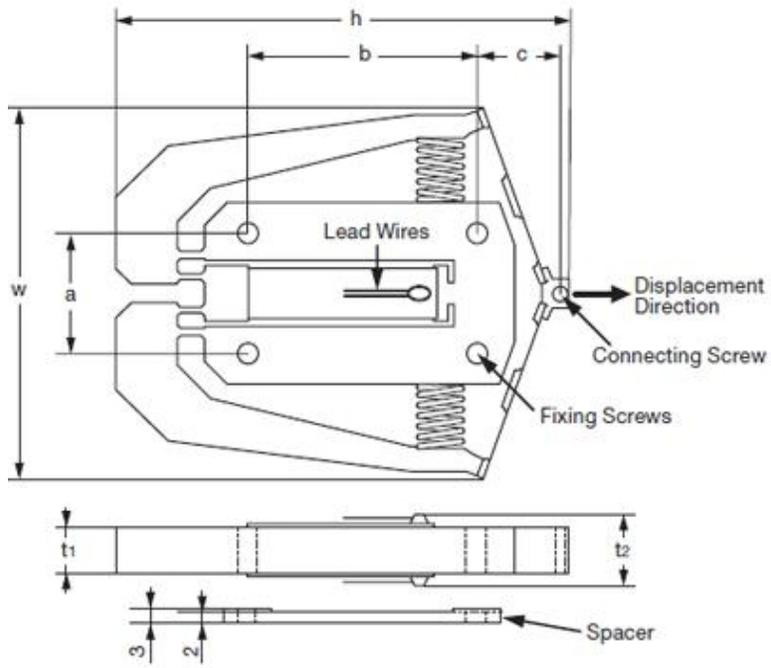


Fig. 3

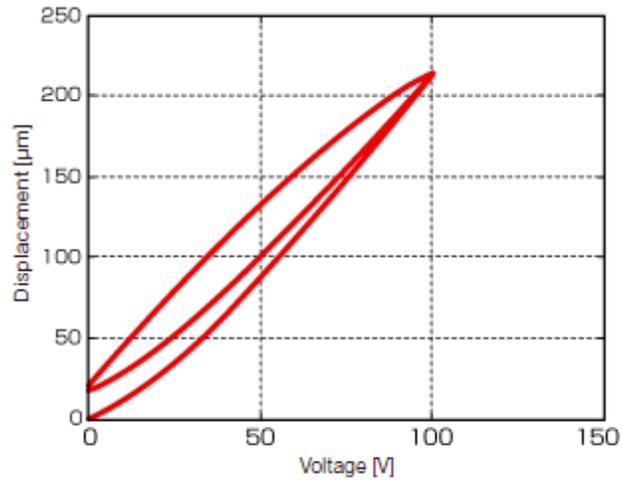


Fig. 8 MTA02S200F2