

**MEIDEN**

# EDLC

## Electric Double Layer Capacitor

Bipolar Laminate Type

**Fast Charge/Discharge Enabled**



*Empower for new days*

# A New Type of Energy Storage Device: EDLC

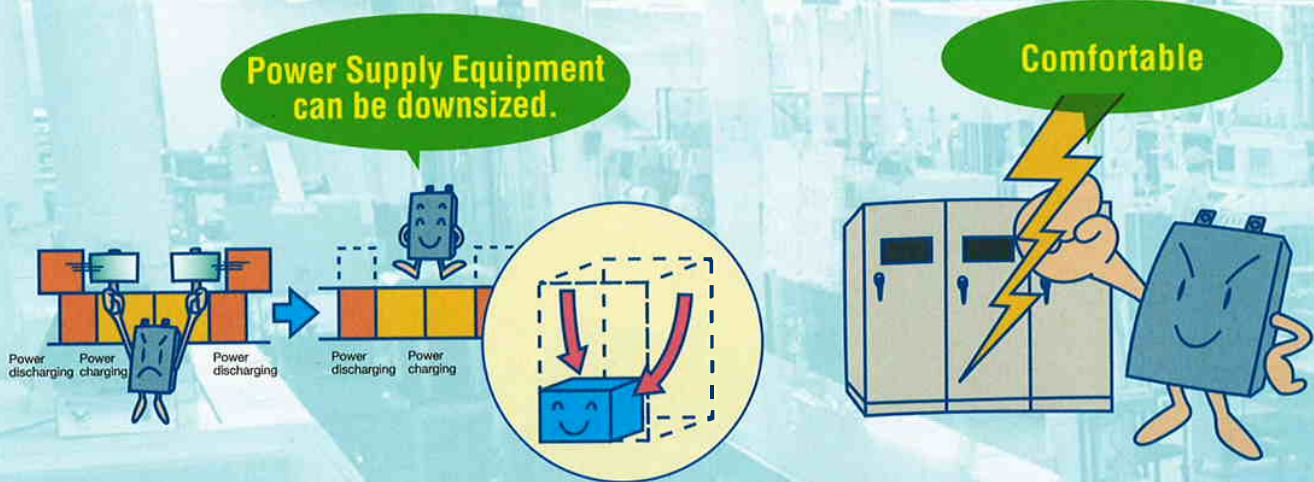


The Bipolar Laminate Type MEIDEN EDLC (Electric Double Layer Capacitor) is a new type of energy storage device with fast charge/discharge abilities and is designed to be friendly to the environment.

The EDLC meets all possible needs by making full use of its fast charge/discharge abilities.

## Major application fields and benefits of the EDLC:

The EDLC revolutionizes the image of power storage devices. It consists of a variety of advantages.



### PEAK CUT : Downsizing the facility

Peak load is covered by the capacitor, so that the rated intake power can be reduced and downsized.

### BACK UP : Improve the reliability

EDLC as DC based power source will increase the reliability of overall power supply system.

## Features of EDLC

### Easy application for the high voltage system

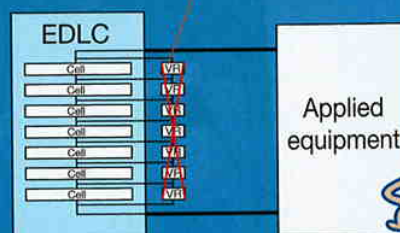
Example: In case of system voltage of 640V, 4nos. of 160V capacitor can be applied.



640V can be configured with 4nos. of EDLC

### VR circuits can be eliminated.

No VR is required.



(Note) VR: Voltage Regulator

For single EDLC unit or units in parallel connection

### The simple construction and the less number of parts realizes high reliability.

More effectiveness can be expected for applications to larger capacities.

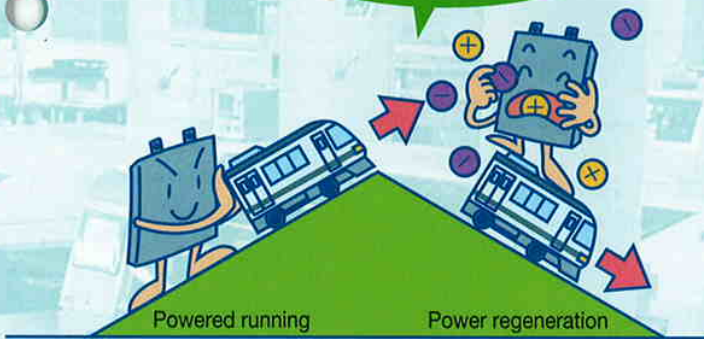


Reliability is very high!



Environment-friendly

Operating time is really extended!



EDLC Batteries



### RECYCLING OF POWER REGENERATION

: Energy conservation

Energy obtained during power regeneration is used to charge the EDLC. This power is discharged during powered running so that the regenerative energy can be utilized effectively.

### ASSISTING BATTERY : Improvement of operating factor

EDLC assists to share the heavy current demand, which improve the availability of power supply system and equipment life including battery.

### Rapid charging and discharging of heavy current is possible.

Terminals and terminal construction are both well designed to cope with heavy currents.

### Long life

State-of-the-art-design realized the less maintenance and long life.

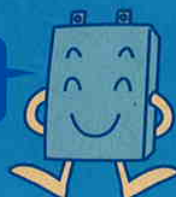
### Feasible Life Diagnosis

This feature is useful in the detection and judgment of errors in the applied unit.

### High safety

There is no danger of explosion as a result of overcharging, punctures, etc. There are no malfunctions even in the case of external short-circuiting.

Long life



High safety



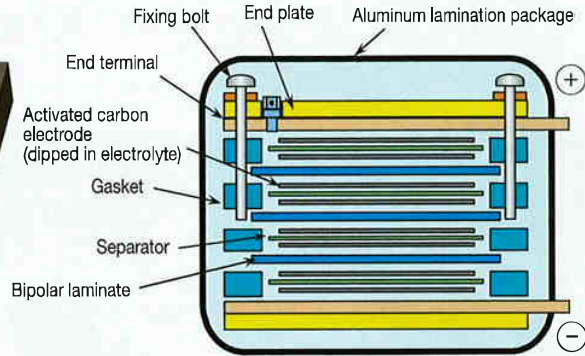
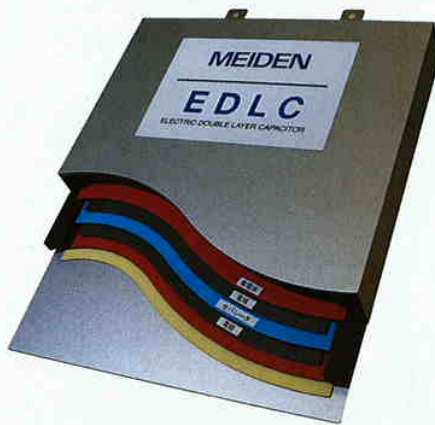


# What is the EDLC?

The EDLC is an electric double layer capacitor in a construction of serially connected cells that permit applications for large-scale power equipment (high voltages, large capacities). It is compact and light mass, with minimal number of parts used. This product assures high reliability.

## EDLC construction

### Bipolar laminate type



**Bipolar:**  
The front surface is positive and the back surface is negative.

In its construction (see example), four cells are laminated into a unified body (in stacks).

A single cell is composed of a pair of bipolar laminates, a pair of activated carbon electrodes (dipped in electrolyte), and separators, provided with terminals. Both sides of the laminated stacks are sandwiched by end plates and tightened by bolts. The overall assembly is hermetically sealed in an aluminum lamination package.

## Reference: Comparison between electric double layer capacitors and other power storage devices

| Electrolytic capacitors  | Electric double layer capacitors (EDLCs)   | Lead storage batteries   |
|--|--|--|
| <b>Rapid charge/discharge: sufficient</b><br><b>Amount of electrical energy: small</b> | <b>Rapid charge/discharge :sufficient</b><br><b>Amount of electrical energy: large</b> | <b>Rapid charge/discharge: insufficient</b><br><b>Amount of electrical energy: large</b> |

The best solution of power storage for the large-capacity and rapid performance is EDLC (Electric Double Layer Capacitor)

| Item                      | Electrolytic capacitor | EDLC             | Secondary battery (lead) |
|---------------------------|------------------------|------------------|--------------------------|
| Energy density (Wh/kg)    | 0.1 or less            | 1~10             | 10~40                    |
| Output density (W/kg)     | 10,000~100,000         | 100~5000         | 50~130                   |
| Discharge time            | 0.1sec                 | 1sec~1min        | 10min~10h                |
| Life cycle (times)        | 100,000 or above       | 100,000 or above | 200~2000                 |
| Environmental performance | Not harmful            | Not harmful      | Heavy metals             |

(Note) For automobile applications, the following image is applicable:


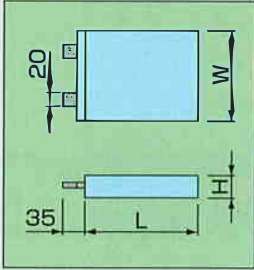

Energy density  $\approx$  Endurance  
Output density  $\approx$  Acceleration



## General specifications of the EDLC

| Item  |                                       | Performance characteristics   |  |
|---|---------------------------------------|---|--|
| Operating temperature range                   |                                       | -25~+60°C   |  |
| Tolerance of capacitance                      |                                       | ±10%  |  |
| Thermal characteristics                       | Rate of change in capacitance         | Within ±30% of values at +20°C  |  |
|   | Rate of change in internal resistance | Below 10 times the values at +20°C  |  |
| Durability                                    |                                       | Value at +20°C after 2000 hours of application of rated voltage at +60°C                          |  |
|   |                                       | Rate of change in capacitance   | Within ±30% of initial performance values  |
|   |                                       | Rate of change in internal resistance   | Below twice the initial performance values |
| High temperature no-load characteristic       |                                       | Conforming to the above durability performance after exposure to 60°C for 500 hours               |  |
| High temperature high humidity characteristic |                                       | Conforming to the above durability performance after exposure to 55°C and 90-95% RH for 500 hours |  |

## EDLC characteristics

| Type                             | 600S1-70C   | 600L1-70C    | 150S1-38C  | 150S2-32C   |
|----------------------------------|---|--------------|--|---|
| No. of connected cells           | 70cells   | 70cells      | 38cells  | 32cells   |
| External dimensions (W×H×L)      | 266×43×316mm  | 266×43×316mm | 158×27×176mm   | 158×30×176mm  |
| Mass                             | 5.7kg   | 5.7kg        | 1.1kg  | 1.3kg   |
| Rated voltage (continuous)       | 160V  | 160V         | 85V  | 72V   |
| Max. voltage during regeneration | 175V  | 175V         | 95V  | 80V   |
| Capacitance                      | 4.5F  | 3.7F         | 2.0F   | 4.0F  |
| Internal resistance (25°C)       | 0.58Ω   | 0.45Ω        | 2.0Ω   | 1.9Ω  |
| DC resistance (25°C)             | 0.29Ω   | 0.23Ω        | 0.9Ω   | 0.7Ω  |
| External appearance              |  |              |  |  <p>Optional connector is available.</p> |

DC resistance denotes a resistance value calculated based on the IR drop shortly after discharge. Internal resistance is resistance with a diffused resistance component appearing with a slight time lag.

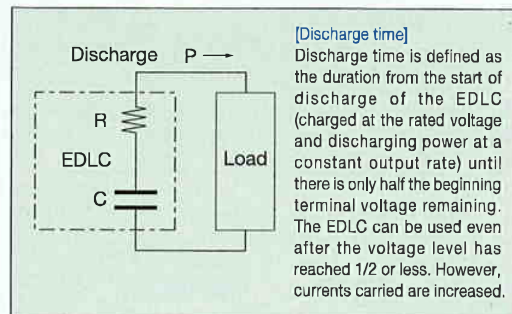
The above values are a typical example. Please consult us if different rated voltages are required.

Specifications and dimensions are subject to change without preliminary notice.

## Application standard

For initial characteristics (25°C)

| Output (W) | Discharge time |           | Output (W) | Discharge time |           |
|------------|----------------|-----------|------------|----------------|-----------|
|            | 600S1-70C      | 600L1-70C |            | 150S1-38C      | 150S2-32C |
| 9000       | 0.5sec         | 1sec      | 600        | 2sec           | 1sec      |
| 5000       | 4sec           | 4sec      | 500        | 4sec           | 3sec      |
| 4000       | 6sec           | 6sec      | 400        | 7sec           | 7sec      |
| 3000       | 10sec          | 9sec      | 300        | 11sec          | 13sec     |
| 2000       | 17sec          | 15sec     | 200        | 20sec          | 26sec     |
| 1000       | 38sec          | 33sec     | 100        | 47sec          | 65sec     |



Type 600L1 is low resistance type which suits to rapid charge / discharge.



# Examples of EDLC Applications

The ceaseless approach has been taken to develop and commercialize the low resistance and large capacity system. Please consult us for further query.

## PEAK CUT

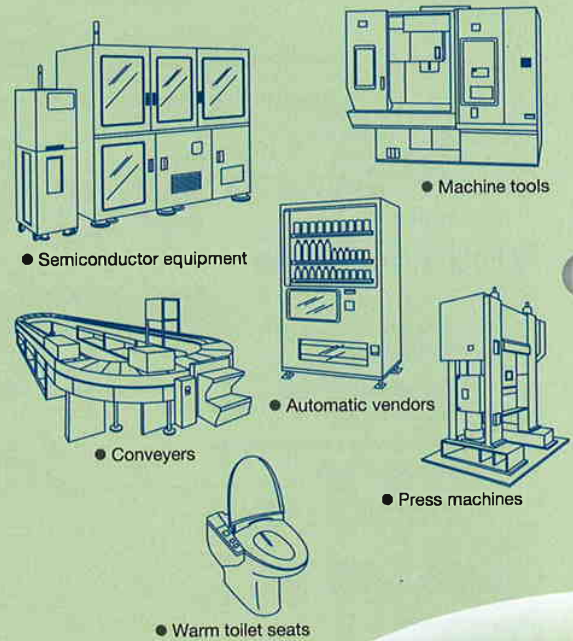
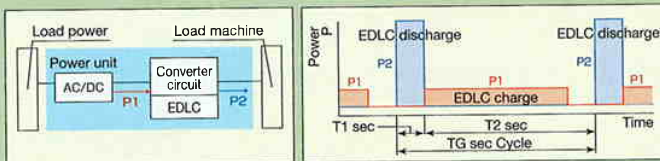


Peak load is covered by the capacitor.

The rated intake power can be reduced and downsized.

### Applicable products:

- Semiconductor equipment
- Machine tools
- Automatic vendors
- Conveyers
- Press machines
- Warm toilet seats



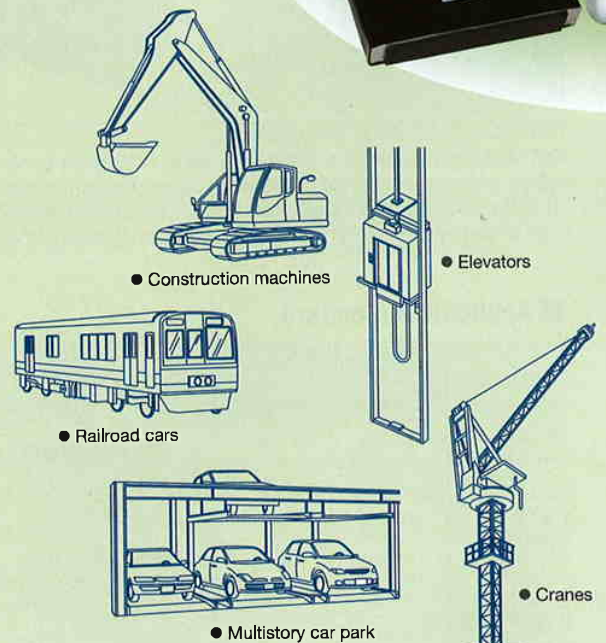
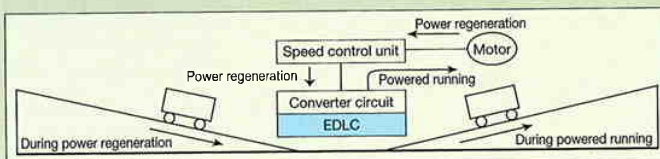
## RECYCLING OF POWER REGENERATION

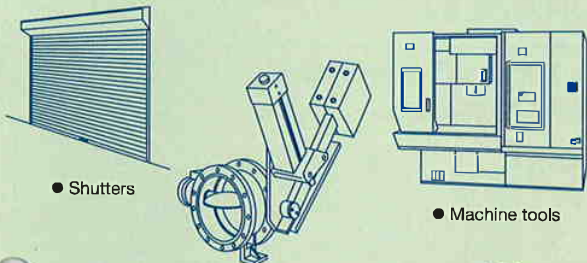


The regenerated energy is charged into the EDLC and discharged during powered running and recycled.

### Applicable products:

- Construction machines
- Elevators
- Cranes
- Railroad cars
- Multistory car park

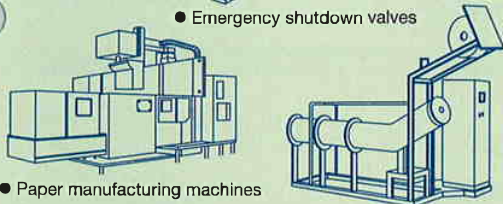




● Shutters

● Machine tools

● Emergency shutdown valves



● Paper manufacturing machines

● Spinning & fabric machines



● Fireproof doors



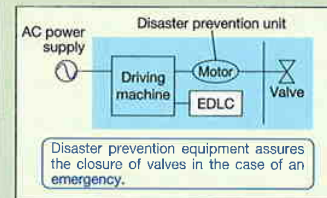
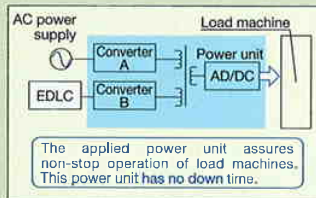
## BACK UP



EDLC as DC based power source will increase the reliability of overall power supply system.

### Applicable products:

- Emergency shutdown valves
- Paper manufacturing machines
- Spinning & fabric machines
- Shutters
- UPS
- Fireproof doors
- Machine tools



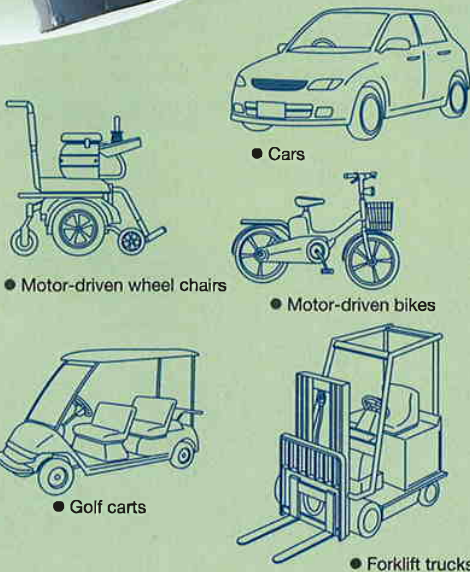
## ASSISTING BATTERY



EDLC assists to share the heavy current demand which improve the availability of power supply system and equipment life including battery.

### Applicable products:

- Cars
- Golf carts
- Motor-driven wheel chairs
- Forklift trucks
- Motor-driven bikes



● Cars

● Motor-driven wheel chairs

● Motor-driven bikes

● Golf carts

● Forklift trucks