

LV-6 (for L=6%) 10-100kvar / 150-500kvar

| Rated Voltage (V) | Combined Output (kvar) | Rated Output (kvar) | Rated Frequency (Hz) | Part Number   | Rated Current (A) |            | Dimensions (mm) |     |     | Gross mass (kg) |
|-------------------|------------------------|---------------------|----------------------|---------------|-------------------|------------|-----------------|-----|-----|-----------------|
|                   |                        |                     |                      |               | 3300V             | 6600V      | C               | F   | N   |                 |
| 7020 or 3510      | 10/12                  | 10.6/12.8           | 50/60                | LV6★CC010R26E | 1.75/2.10         | 0.875/1.05 | 150             | 350 | -   | 15              |
|                   | 15/18                  | 16.0/19.1           | 50/60                | LV6★CC015R26E | 2.62/3.15         | 1.31/1.57  | 150             | 350 | -   | 15              |
|                   | 20/24                  | 21.3/25.5           | 50/60                | LV6★CC020R26E | 3.50/4.20         | 1.75/2.10  | 150             | 350 | -   | 15              |
|                   | 25/30                  | 26.6/31.9           | 50/60                | LV6★CC025R26E | 4.37/5.25         | 2.19/2.62  | 150             | 350 | -   | 15              |
|                   | 30/36                  | 31.9/38.3           | 50/60                | LV6★CC030R26E | 5.25/6.30         | 2.62/3.15  | 170             | 370 | -   | 16              |
|                   | 50                     | 53.2                | 60                   | LV6★C5050R26E | 8.75              | 4.37       | 220             | 420 | 140 | 19              |
|                   |                        |                     |                      | LV6★C6050R26E |                   |            | 200             | 400 | 120 | 18              |
|                   |                        |                     |                      | LV6★C5075R26E |                   |            | 310             | 510 | 220 | 25              |
|                   | 75                     | 79.8                | 60                   | LV6★C6075R26E | 13.1              | 6.56       | 275             | 475 | 200 | 23              |
|                   |                        |                     |                      | LV6★C5100R26E |                   |            | 375             | 575 | 290 | 30              |
| 100               | 106                    | 60                  | LV6★C6100R26E        | 17.5          | 8.75              | 335        | 535             | 230 | 27  |                 |

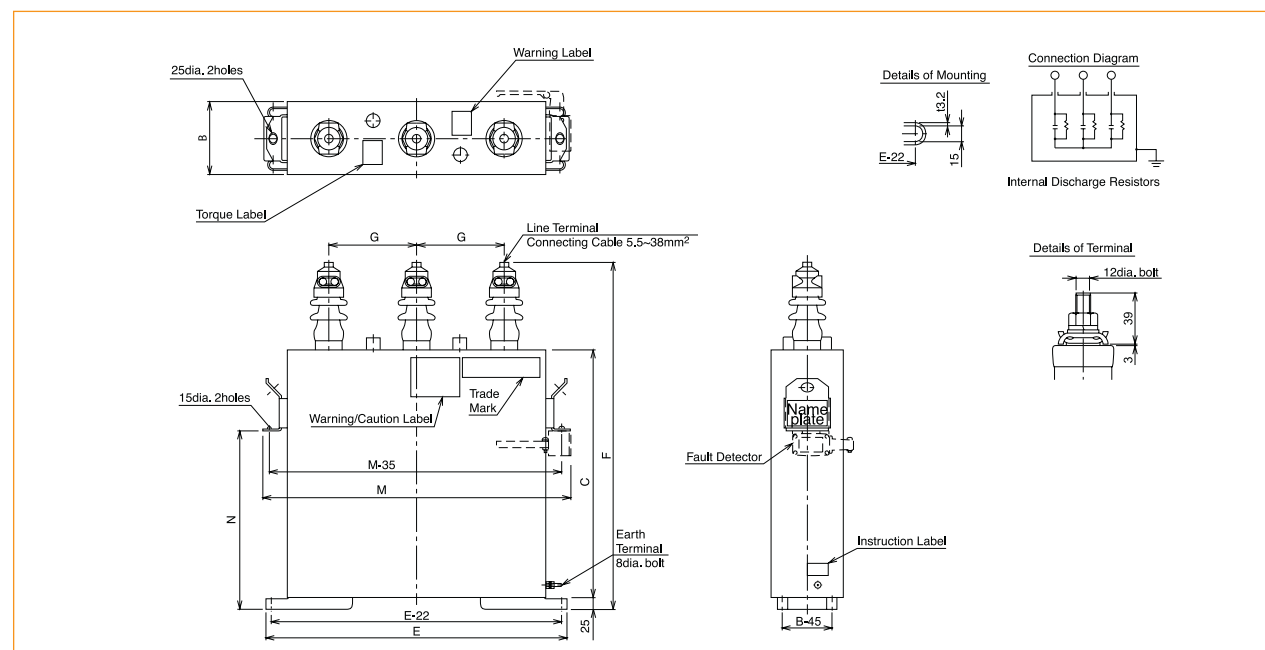
| Rated Voltage (V) | Combined Output (kvar) | Rated Output (kvar) | Rated Frequency (Hz) | Part Number   | Rated Current (A) |       | Dimensions (mm) |     |     |     |     |     | Gross mass (kg) |     |
|-------------------|------------------------|---------------------|----------------------|---------------|-------------------|-------|-----------------|-----|-----|-----|-----|-----|-----------------|-----|
|                   |                        |                     |                      |               | 3300V             | 6600V | B               | C   | E   | F   | G   | M   |                 | N   |
| 7020 or 3510      | 150                    | 160                 | 50                   | LV6★C5150R26E | 26.2              | 13.1  | 150             | 380 | 620 | 590 | 180 | 635 | 250             | 49  |
|                   |                        |                     | 60                   | LV6★C6150R26E |                   |       | 150             | 340 | 620 | 550 | 180 | 635 | 220             | 44  |
|                   | 200                    | 213                 | 50                   | LV6★C5200R26E | 35.0              | 17.5  | 150             | 450 | 620 | 660 | 180 | 635 | 320             | 57  |
|                   |                        |                     | 60                   | LV6★C6200R26E |                   |       | 150             | 410 | 620 | 620 | 180 | 635 | 270             | 53  |
|                   | 250                    | 266                 | 50                   | LV6★C5250R26E | 43.7              | 21.9  | 150             | 550 | 620 | 760 | 180 | 635 | 370             | 69  |
|                   |                        |                     | 60                   | LV6★C6250R26E |                   |       | 150             | 485 | 620 | 695 | 180 | 635 | 340             | 61  |
|                   | 300                    | 319                 | 50                   | LV6★C5300R26E | 52.5              | 26.2  | 150             | 620 | 620 | 830 | 180 | 635 | 450             | 77  |
|                   |                        |                     | 60                   | LV6★C6300R26E |                   |       | 150             | 550 | 620 | 760 | 180 | 635 | 370             | 69  |
|                   | 400                    | 426                 | 50                   | LV6★C5400R26E | 70.0              | 35.0  | 180             | 600 | 820 | 810 | 230 | 835 | 440             | 120 |
|                   |                        |                     | 60                   | LV6★C6400R26E |                   |       | 180             | 500 | 820 | 710 | 230 | 835 | 330             | 100 |
|                   | 500                    | 532                 | 50                   | LV6★C5500R26E | 87.5              | 43.7  | 180             | 780 | 820 | 990 | 230 | 835 | 500             | 146 |
|                   |                        |                     | 60                   | LV6★C6500R26E |                   |       | 180             | 600 | 820 | 810 | 230 | 835 | 440             | 120 |

LV-6 (for L=13%) 10-500kvar

| Rated Voltage (V) | Combined Output (kvar) | Rated Output (kvar) | Rated Frequency (Hz) | Part Number   | Rated Current (A) |            | Dimensions (mm) |     |     | Gross mass (kg) |
|-------------------|------------------------|---------------------|----------------------|---------------|-------------------|------------|-----------------|-----|-----|-----------------|
|                   |                        |                     |                      |               | 3300V             | 6600V      | C               | F   | N   |                 |
| 7590 or 3790      | 10/12                  | 11.5/13.8           | 50/60                | LV6★CC010R13E | 1.75/2.10         | 0.875/1.05 | 150             | 350 | -   | 15              |
|                   | 15/18                  | 17.2/20.7           | 50/60                | LV6★CC015R13E | 2.62/3.15         | 1.31/1.57  | 150             | 350 | -   | 15              |
|                   | 20/24                  | 23.0/27.6           | 50/60                | LV6★CC020R13E | 3.50/4.20         | 1.75/2.10  | 150             | 350 | -   | 15              |
|                   | 25/30                  | 28.7/34.5           | 50/60                | LV6★CC025R13E | 4.37/5.25         | 2.19/2.62  | 150             | 350 | -   | 15              |
|                   | 30/36                  | 34.5/41.4           | 50/60                | LV6★CC030R13E | 5.25/6.30         | 2.62/3.15  | 170             | 370 | -   | 16              |
|                   | 50                     | 57.5                | 60                   | LV6★C5050R13E | 8.75              | 4.37       | 250             | 450 | 170 | 21              |
|                   |                        |                     |                      | LV6★C6050R13E |                   |            | 210             | 410 | 130 | 19              |
|                   | 75                     | 86.2                | 60                   | LV6★C5075R13E | 13.1              | 6.56       | 335             | 535 | 230 | 27              |
|                   |                        |                     |                      | LV6★C6075R13E |                   |            | 310             | 510 | 220 | 25              |
|                   | 100                    | 115                 | 60                   | LV6★C5100R13E | 17.5              | 8.75       | 440             | 640 | 330 | 33              |
|                   |                        |                     |                      | LV6★C6100R13E |                   |            | 360             | 560 | 240 | 28              |
|                   | 150                    | 172                 | 60                   | LV6★C5150R13E | 26.2              | 13.1       | 400             | 610 | 270 | 51              |
|                   |                        |                     |                      | LV6★C6150R13E |                   |            | 360             | 570 | 220 | 47              |
|                   | 200                    | 230                 | 60                   | LV6★C5200R13E | 35.0              | 17.5       | 510             | 720 | 370 | 64              |
|                   |                        |                     |                      | LV6★C6200R13E |                   |            | 430             | 640 | 270 | 54              |
|                   | 250                    | 287                 | 60                   | LV6★C5250R13E | 43.7              | 21.9       | 590             | 800 | 430 | 73              |
|                   |                        |                     |                      | LV6★C6250R13E |                   |            | 520             | 730 | 370 | 65              |
|                   | 300                    | 345                 | 60                   | LV6★C5300R13E | 52.5              | 26.2       | 690             | 900 | 450 | 85              |
| LV6★C6300R13E     |                        |                     |                      | 590           |                   |            | 800             | 430 | 73  |                 |
| 400               | 460                    | 60                  | LV6★C5400R13E        | 70.0          | 35.0              | 680        | 890             | 450 | 135 |                 |
|                   |                        |                     | LV6★C6400R13E        |               |                   | 540        | 750             | 390 | 108 |                 |
| 500               | 575                    | 60                  | LV6★C5500R13E        | 87.5          | 43.7              | 840        | 1050            | 550 | 165 |                 |
|                   |                        |                     | LV6★C6500R13E        |               |                   | 720        | 930             | 500 | 142 |                 |

Note : The asterisk ★ denotes voltage. 33 and 66 represent 3300V and 6600V respectively.

DIMENSIONS (mm)



(Notes) 1. To assemble two or more capacitors, secure the spacing of 80mm or more between the units for the combined output of 150-300kvar and 100mm or more for 400-500kvar.  
2. Permissible limit for bulge (one side) in case is 20mm for combined output of 150-300kvar and 25mm for 400-500kvar.



# MEDIUM VOLTAGE POWER CAPACITOR TYPE LV-6



The most reliable capacitor for medium voltage power system

● APPLICABLE STANDARD :

JIS C 4902-1 or IEC60871-1

● OPERATING CONDITIONS

- |                        |  |
|------------------------|--|
| 1. Installation        | Indoor and Outdoor                         |
| 2. Ambient temperature | -20°C - +50°C                              |
| 3. Altitude            | Not exceeding 2,000 meters above sea level |
| 4. Loss rate           | 0.025% or below                            |

● TYPE AND RATINGS

- |                       |                                 |
|-----------------------|---------------------------------|
| 1. Type               | LV-6                            |
| 2. Rated voltage      | 3,300V to 22,000V               |
| 3. Combined output    | 10kvar to 600kvar               |
| 4. Rated frequency    | 50Hz or 60Hz                    |
| 5. Phase              | Three (3) phase or Single phase |
| 6. Designed life span | 20 years (Not Warranty Value)   |

# MEDIUM VOLTAGE POWER CAPACITOR TYPE LV-6

## MEDIUM VOLTAGE POWER CAPACITOR

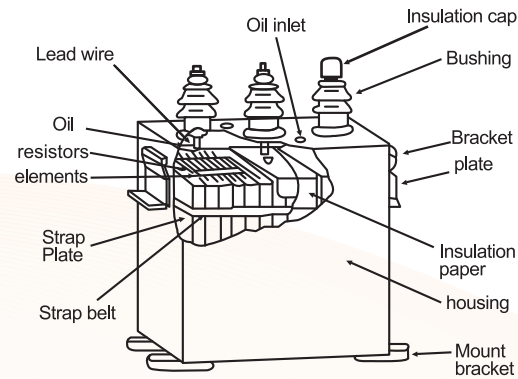
Type LV-6 medium voltage power factor correction capacitor employs the plastic film only having superior dielectric strength and utilize the electrodes of unique construction, achieving low loss (as low as approx. 1/3 of our conventional capacitors) and significantly high allowable current.

### -Internal structure

Type LV-6 oil filled medium voltage power capacitor is enclosed by welded thin steel-sheet case to adapt to the filler oil expansion/compression.

Bushings are made of porcelain insulator, which are sealed by pressure bonding.

\*Larger kvar products are sealed by soldering.



## FEATURES

### ① Extremely low loss to save energy

The use of all plastic film dielectrics and proprietary electrode construction has reduced the loss of film itself to approximately 1/3 of our conventional design, offering significant saving in capacitor operation cost.

### ② Higher safety factor for temperature against harmonics

Temperature rise has been reduced considerably (to approximately 1/2 of our conventional design) due to lower loss, providing a higher safety factor for temperature against overload caused by harmonic currents. In addition, the capacitor can be operated at up to 50°C (temperature class B) due to lower temperature rise during operation.

### ③ Enhanced allowable current

The proprietary extended foil construction has enhanced greatly the capability to handle inrush current appearing when the capacitor is switched on or off.

### ④ Superior reliability

The use of polypropylene film dielectrics with excellent electrical performances has enhanced dielectric strength and reliability.

### ⑤ Fault detector (MDA-1) for 150kvar or more

The fault detector is free of leaks to provide high reliability, with its simple construction to facilitate maintenance and easy mounting.

## EXTREMELY LOWER FAILURE RATE "20 FIT"

Type LV-6 medium voltage capacitor is designed 20 FIT of failure rate.

(What is FIT?)

FIT is unit for expressing the expected failure rate of semiconductors and other electronic devices. One FIT equals one failure per billion (10<sup>9</sup>) hours (once in about 114,155 years) and is statistically projected from the results of accelerated test procedures.

20 years = 24 hrs/day x 365 days/year x 20 years = 175,200 hrs

Failure rate % in 20 years = 175,200 hrs x 0.000002%/hr.

**= 0.35%/20 years**

\*Type LV-6 is designed life span for 20 years.

## PROTECTION OF MEDIUM VOLTAGE CAPACITOR

Medium voltage power capacitor can be said to be a static apparatus with extremely high reliability. However, overheat, burning out, short circuit or case rupture may occur, should a capacitor fail due to service conditions including overvoltage and excessive harmonics. Therefore, it is required that capacitor be protected against failure. Protection should be coordinated with failure characteristics of capacitor equipment and the following protections are recommended.

| Rated Equipment Output               | Recommended Protection  |
|--------------------------------------|---|
| 10kvar - 100kvar / 150kvar - 500kvar | Current limiting fuses & thermal sensors                        |
| 150kvar - 500kvar                    | Fault Detector (MDA-1), current limiting fuses & thermal sensor |

(Notes) 1. For recommended rated current of fuses, refer to the recommendation of the fuse manufacturers.  
2. Install fuses at the power supply side of series reactors.  
3. Capacitor rated at 200kvar or more can be supplied with double star connection.

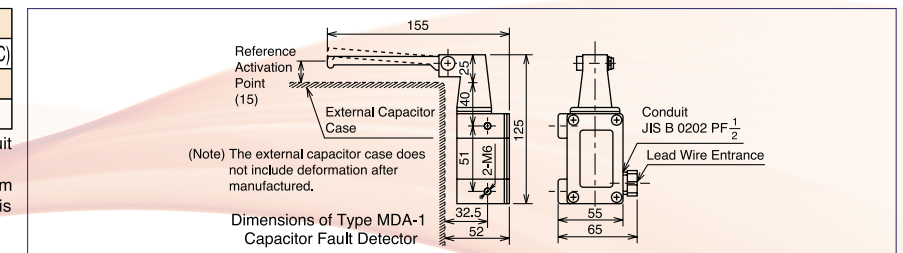
## FAULT DETECTORS (MDA-1)

Large kvar capacitor will develop a zone where the case rupture can not be protected by current limiting fuses if the breakdown will last for a long time. Conveniently, it is known that the larger the capacitor kvar or for capacitor with star connection, the more the case bulges. Type MDA-1 fault detector will sense the bulge in case to protect the case rupture. Excessive bulge in the case caused by failure in the capacitor will activate the micro switch which will then generate the signal to trip a circuit breaker.



| Type of Contact             | 1a+1b             |         |         |         |
|-----------------------------|-------------------|---------|---------|---------|
| Contact Voltage(V)          | 125(AC)           | 250(AC) | 110(DC) | 220(DC) |
| Contact Capacity Current(A) | 10                | 10      | 5       | 5       |
| Dielectric Strength         | 2000VAC, 1 minute |         |         |         |

(Notes) 1. The currents are momentary when the circuit breaker is tripped.  
2. The fault detector is packed separately from the capacitor. Mount it when the capacitor is installed.



## TYPICAL CONNECTION OF FAULT DETECTOR TO CIRCUIT BREAKER

| Breaker Trip Method | Connection of fault detector to breaker | Remark  |
|---------------------|---|---|
| Voltage Trip Method |   | The fault detector is connected direct to a trip coil |

## SELECTION OF RATED VOLTAGE AND CAPACITOR

-JIS C 4902 strongly recommends series reactor with L=6% to be installed for power capacitor with a rated voltage rise by a reactor swell. Accordingly, the capacitor terminal voltage should be 106% to the source voltage for capacitor with L=6%, and 115% with L=13% reactor.

The capacitor voltage can be calculated by the following formula.

$$\text{Capacitor voltage} = \frac{1}{1 - \frac{\text{reactance}(\%)}{100}} \times \text{Source voltage}$$

-The rated capacity of capacitor would be defined as the output capacity as a phase advancer equipment, which consists of the capacitor and the series reactor, by adding the series reactor capacity. The rated capacity and the output capacity may be defined by the following formula.

$$\text{Rated capacity} = \frac{1}{1 - \frac{\text{reactance}(\%)}{100}} \times \text{Rated output capacity}$$