

## NFL Series

• 105°C 8,000~12,000Hrs assured.

- Non-solvent proof.
- High Ripple, Long Life.
- For ballasts stabilizer and other long life required applications.
- RoHS compliant.
- Halogen-free capacitors are also available.



## SPECIFICATIONS

| Item                                                  | Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------|---------------------------------|----------------|-----------------|---------|------------------|-----------------|--------|------------------|------------------|---|---|---|
| Rated Voltage Range                                   | 160~400 V <sub>DC</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 450~500 V <sub>DC</sub> |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Operating Temperature Range                           | -40~+105℃                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -25~+105℃               |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Capacitance Tolerance                                 | ±20%(M) (at 20℃, 120Hz)                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Leakage Current                                       | <table><tr><th><div>C・V</div><div>Time</div></th><th>After 1 minute</th><th>After 5 minutes</th></tr><tr><td>≤ 1000</td><td>I = 0.1CV + 40</td><td>I = 0.03CV + 15</td></tr><tr><td>&gt; 1000</td><td>I = 0.04CV + 100</td><td>I = 0.02CV + 25</td></tr></table> <p>Where, I:Max. Leakage current(μA) C:Nominal capacitance(μF) V:Rated voltage(V<sub>DC</sub>) (at 20℃)</p>                                                                                                      |                         |         | <div>C・V</div> <div>Time</div>  | After 1 minute | After 5 minutes | ≤ 1000  | I = 0.1CV + 40   | I = 0.03CV + 15 | > 1000 | I = 0.04CV + 100 | I = 0.02CV + 25  |   |   |   |
| <div>C・V</div> <div>Time</div>                        | After 1 minute                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | After 5 minutes         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| ≤ 1000                                                | I = 0.1CV + 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | I = 0.03CV + 15         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| > 1000                                                | I = 0.04CV + 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | I = 0.02CV + 25         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Dissipation Factor(Tanδ)                              | <table><tr><td>Rated Voltage(V<sub>DC</sub>)</td><td>160~250</td><td colspan="2">350~500</td></tr><tr><td>Tanδ(Max.)</td><td>0.20</td><td colspan="2">0.24</td></tr></table> (at 20℃, 120Hz)                                                                                                                                                                                                                                                                                      |                         |         | Rated Voltage(V <sub>DC</sub> ) | 160~250        | 350~500         |         | Tanδ(Max.)       | 0.20            | 0.24   |                  |                  |   |   |   |
| Rated Voltage(V <sub>DC</sub> )                       | 160~250                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 350~500                 |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Tanδ(Max.)                                            | 0.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0.24                    |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Temperature Characteristics<br>(Max. Impedance ratio) | <table><tr><td>Rated Voltage(V<sub>DC</sub>)</td><td>160~250</td><td>350~400</td><td>450~500</td></tr><tr><td>Z( - 25℃)/Z(20℃)</td><td>3</td><td>5</td><td>6</td></tr><tr><td>Z( - 40℃)/Z(20℃)</td><td>6</td><td>6</td><td>-</td></tr></table> (at 120Hz)                                                                                                                                                                                                                         |                         |         | Rated Voltage(V <sub>DC</sub> ) | 160~250        | 350~400         | 450~500 | Z( - 25℃)/Z(20℃) | 3               | 5      | 6                | Z( - 40℃)/Z(20℃) | 6 | 6 | - |
| Rated Voltage(V <sub>DC</sub> )                       | 160~250                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 350~400                 | 450~500 |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Z( - 25℃)/Z(20℃)                                      | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 5                       | 6       |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Z( - 40℃)/Z(20℃)                                      | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 6                       | -       |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Load Life                                             | The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage with the rated ripple current is applied (the peak voltage shall not exceed the rated voltage) for 12,000 hours at 105℃. (where, 8,000 hours for ø8, 10,000 hours for ø10, ø8x50L)<br>Capacitance change ≤ ±20% of the initial value<br>Tanδ ≤ 200% of the initial specified value<br>Leakage current ≤ The initial specified value                               |                         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Shelf Life                                            | The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them for 1,000 hours at 105℃ without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.<br><br>Capacitance change ≤ ±20% of the initial value<br>Tanδ ≤ 200% of the initial specified value<br>Leakage current ≤ 500% of the initial specified value |                         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |
| Others                                                | Satisfied characteristics KS C IEC 60384-4                                                                                                                                                                                                                                                                                                                                                                                                                                        |                         |         |                                 |                |                 |         |                  |                 |        |                  |                  |   |   |   |

## DIMENSIONS OF NFL Series

Unit(mm)

Technical drawing of a capacitor showing side and cross-sectional views with dimensions:

- Side View:**
  - Safety vent:** Indicated by a dashed line on the left side.
  - Sleeve:** Indicated by a dashed line on the right side.
  - øD':** Dimension across the top of the capacitor body.
  - L':** Length of the capacitor body.
  - 15min.:** Dimension from the end of the body to the start of the sleeve.
  - 4min.:** Dimension of the sleeve length.
  - ød ±0.05:** Dimension of the sleeve diameter.
- Cross-sectional Views:**
  - Left:** Shows a circular cross-section with a diameter of  $\leq 10$  and a thickness of  $F \pm 0.5$ .
  - Middle:** Shows a circular cross-section with a diameter of  $\geq \phi 12.5$  and a thickness of  $F \pm 0.5$ .
  - Right:** Shows a circular cross-section with a diameter of  $\phi 20$  and a thickness of  $F \pm 0.5$ .

Marking : DARK BROWN SLEEVE, SILVER INK

|     |               |     |      |     |     |     |
|-----|---------------|-----|------|-----|-----|-----|
| øD  | 8             | 10  | 12.5 | 16  | 18  | 20  |
| ød  | 0.6           | 0.6 | 0.6  | 0.8 | 0.8 | 0.8 |
| F   | 3.5           | 5.0 | 5.0  | 7.5 | 7.5 | 7.5 |
| øD' | øD + 0.5 max. |     |      |     |     |     |
| L'  | L + 2.0 max.  |     |      |     |     |     |

※ ø8 x 11.5~20L, L' ≤ L+1.5

## RATINGS OF NFL Series

| V <sub>DC</sub> |              | 160                                          |              | 200                                          |  |
|-----------------|--------------|----------------------------------------------|--------------|----------------------------------------------|--|
| Items<br>μF     | ∅ D × L (mm) | Rated Ripple Current<br>(mArms/105°C, 120Hz) | ∅ D × L (mm) | Rated Ripple Current<br>(mArms/105°C, 120Hz) |  |
| 27              |              |                                              | 10 × 16      | 200                                          |  |
| 39              | 10 × 16      | 237                                          | 10 × 20      | 256                                          |  |
| 47              | 10 × 20      | 280                                          | 12.5 × 20    | 312                                          |  |
| 56              | 10 × 25      | 335                                          | 12.5 × 25    | 371                                          |  |
| 68              | 12.5 × 20    | 375                                          | 12.5 × 25    | 409                                          |  |
| 100             | 10 × 45      | 562                                          | 10 × 50      | 591                                          |  |
|                 | 12.5 × 25    | 496                                          | 16 × 25      | 550                                          |  |
| 150             | 16 × 31.5    | 724                                          | 12.5 × 50    | 786                                          |  |
|                 |              |                                              | 16 × 25      | 671                                          |  |
| 220             | 12.5 × 50    | 952                                          | 18 × 31.5    | 905                                          |  |
|                 | 16 × 31.5    | 876                                          |              |                                              |  |
| 270             | 16 × 35.5    | 992                                          | 18 × 35.5    | 1,036                                        |  |
| 330             | 16 × 40      | 1,132                                        | 18 × 40      | 1,164                                        |  |
|                 | 18 × 31.5    | 1,109                                        |              |                                              |  |
| 390             | 18 × 35.5    | 1,246                                        |              |                                              |  |
| 470             | 18 × 40      | 1,389                                        |              |                                              |  |

| V <sub>DC</sub> |              | 250                                          |              | 350                                          |  |
|-----------------|--------------|----------------------------------------------|--------------|----------------------------------------------|--|
| Items<br>μF     | ∅ D × L (mm) | Rated Ripple Current<br>(mArms/105°C, 120Hz) | ∅ D × L (mm) | Rated Ripple Current<br>(mArms/105°C, 120Hz) |  |
| 10              | 10 × 16      | 120                                          | 10 × 16      | 110                                          |  |
| 22              | 10 × 20      | 192                                          | 12.5 × 20    | 213                                          |  |
| 33              | 10 × 25      | 257                                          | 8 × 50       | 245                                          |  |
|                 |              |                                              | 12.5 × 25    | 285                                          |  |
| 39              | 10 × 30      | 290                                          | 10 × 40      | 340                                          |  |
| 47              | 8 × 50       | 250                                          | 10 × 50      | 405                                          |  |
|                 | 12.5 × 20    | 312                                          | 16 × 25      | 375                                          |  |
| 68              | 10 × 40      | 450                                          | 16 × 31.5    | 503                                          |  |
|                 | 12.5 × 30    | 441                                          | 18 × 25      | 488                                          |  |
| 82              | 10 × 50      | 536                                          | 12.5 × 45    | 571                                          |  |
| 100             | 10 × 50      | 585                                          | 18 × 31.5    | 610                                          |  |
|                 | 16 × 25      | 548                                          |              |                                              |  |
| 150             | 18 × 25      | 748                                          |              |                                              |  |
| 180             | 12.5 × 50    | 800                                          |              |                                              |  |
| 220             | 18 × 31.5    | 905                                          |              |                                              |  |

| V <sub>DC</sub> |              | 400                                          |              | 450                                          |  |
|-----------------|--------------|----------------------------------------------|--------------|----------------------------------------------|--|
| Items<br>μF     | ∅ D × L (mm) | Rated Ripple Current<br>(mArms/105°C, 120Hz) | ∅ D × L (mm) | Rated Ripple Current<br>(mArms/105°C, 120Hz) |  |
| 3.3             | 8 × 11.5     | 33                                           |              |                                              |  |
| 4.7             | 8 × 15       | 42                                           | 10 × 16      | 70                                           |  |
| 6.8             | 8 × 20       | 59                                           | 10 × 20      | 90                                           |  |
| 10              | 10 × 20      | 110                                          | 12.5 × 20    | 120                                          |  |
| 22              | 12.5 × 20    | 208                                          | 8 × 50       | 230                                          |  |
|                 |              |                                              | 16 × 25      | 228                                          |  |
| 27              | 8 × 50       | 154                                          |              |                                              |  |
| 33              | 16 × 20      | 261                                          | 16 × 31.5    | 270                                          |  |
| 39              | 10 × 45      | 340                                          | 10 × 50      | 305                                          |  |
| 47              | 16 × 25      | 335                                          | 18 × 31.5    | 360                                          |  |
| 68              | 12.5 × 45    | 482                                          | 12.5 × 50    | 473                                          |  |
|                 | 16 × 31.5    | 460                                          | 18 × 35.5    | 500                                          |  |
| 82              | 12.5 × 50    | 527                                          | 18 × 35.5    | 549                                          |  |
|                 | 18 × 31.5    | 520                                          |              |                                              |  |
| 100             | 18 × 35.5    | 630                                          | 12.5 × 60    | 626                                          |  |
|                 |              |                                              | 18 × 35.5    | 660                                          |  |
|                 |              |                                              | 18 × 40      | 670                                          |  |
| 120             | 18 × 40      | 700                                          | 20 × 40      | 720                                          |  |

## RATINGS OF NFL Series

| V <sub>DC</sub> | 500          |                                                           |
|-----------------|--------------|-----------------------------------------------------------|
| Items<br>μF     | ø D × L (mm) | Rated Ripple Current<br>(mA <sub>rms</sub> /105°C, 120Hz) |
| 10              | 12.5 × 20    | 150                                                       |
| 22              | 16 × 25      | 228                                                       |
| 27              | 10 × 50      | 253                                                       |
| 33              | 16 × 31.5    | 270                                                       |
|                 | 18 × 25      | 260                                                       |
| 39              | 12.5 × 50    | 358                                                       |
| 47              | 18 × 31.5    | 360                                                       |
| 60              | 12.5 × 60    | 467                                                       |
| 68              | 18 × 35.5    | 500                                                       |
| 82              | 18 × 40      | 606                                                       |
| 100             | 20 × 40      | 657                                                       |

## RATED RIPPLE CURRENT MULTIPLIERS

Frequency Multipliers

| Freq. (Hz) | 120  | 1k   | 10k  | 50k  | 100k |
|------------|------|------|------|------|------|
| Factor     | 1.00 | 1.25 | 1.50 | 1.60 | 1.75 |