

FX3 · Screw-Terminal · 10 000 h/85 °C

Compact Design · Long Life

Optional design for permanent and deep charge-discharge application with high voltage hub and pulsed operation mode upon request.

Spezielles Design für häufige und tiefe Lade-, Entladeanwendungen mit hohem Spannungshub und Impulsbetrieb auf Anfrage erhältlich.

> Specifications · Spezifikationen

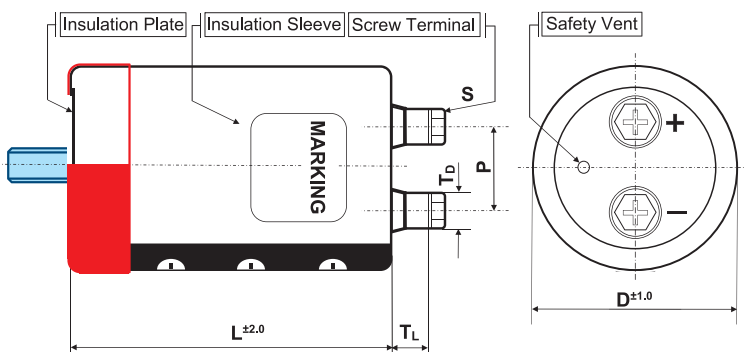
| Items | Characteristics |
|--|---|
| Temperature range | -40°C ~ +85°C |
| Capacitance tolerance (at 20°C) | Standard +/- 20%, -10/+30% on request |
| Surge voltage | Repetitive max. 30 sec per 6 Minutes |
| Leakage current max. I_L (20°C, 5 min) | 0.01 • C • V, [μ A] or 3 mA, which is smaller. |
| Useful life | 10 000 hours at 85°C |
| Field failure rate | 0.5 FIT = 0.5 • 10 ⁻⁹ Failures/hour |
| RoHS conform | Directive 2011/65/EU & (EU)2015/863 |
| Specification / Vibration | JIS C 5101-4/0.75mm, 10...55Hz, 10g, 3x2h |
| Outer materials | UL94-V0/UL224-VW1 certified (cap/sleeve) |
| Sleeve withstanding voltage | 4000 Vac/ 1min between terminals bundled and plate* |

* Typical value



> Shape designation · Formbezeichnung

- for details refer to p. 8–9 · technische Details siehe S. 8–9
- for mounting options refer to p. 149 ff · Montageoptionen siehe S. 149 ff



| | B | I/Y | N |
|----------------------|---|-----|---|
| outer sleeve | • | • | • |
| insulation plate | • | • | • |
| stud bolt | • | | |
| bottom double sleeve | | • | |

| ØD | available shape | P | S | T _L | T _D | Cap material |
|----|-----------------|------|-------|----------------|----------------|--------------|
| 51 | B, N, I, Y | 22.0 | M5x10 | 5.5 | 10 | PH |
| 64 | B, N, I, Y | 28.6 | M5x10 | 5.5 | 10 | PH |
| 77 | B, N, I, Y | 31.5 | M5x10 | 5.0 | 10 | PH |
| | | | M6x12 | 4.5 | 17.2 | PH |
| 90 | B, N, I, Y | 31.5 | M5x10 | 5.0 | 10 | PH |
| | | | M6x12 | 5.0 | 17.2 | PH |

Size in mm. First listed terminal is standard

> Product Code · Bestellbezeichnung

Example: Series FX3 · 8200 µF +/- 20 % · 400 V · D=77 mm · L=130 mm with Y-Bracket

FX3

Type of series

2G

Rated voltage code

Code Voltage

| | |
|----|-----|
| 2G | 400 |
| 2W | 450 |
| 2H | 500 |

822

Capacitance code

The first two digits are significant.
The last digit indicates the number of following zeros in µF.

Y

Fixing symbol code

B : Bolt
N : single outer sleeve
I : 2 Stoppers Bracket
Y : 3 Stoppers Bracket

Capacitance tolerance

Ø : ± 20 %
Q : -10 % ~ +30 %

E

Case code diameter

| ØD | Code |
|----|------|
| 51 | C |
| 64 | D |
| 77 | E |
| 90 | F |

130

Specific features (e.g. M6 ...)

Case Code length

Length in mm (3 digits)

FX3 · Screw-Terminal · 10 000 h/85 °C

| Rated VoltageCode (Surge Voltage) V_r [V DC] | Capacitance C_r [μ F] | Ripple Current at 85°C/120Hz I_r [A RMS] | Ripple Current at 40°C/120Hz [A RMS] | ESR (typ) at 20°C/100Hz [m Ω] | Zmax at 20°C/10kHz [m Ω] | ESL (typ) [nH] | Dissipation Factor at 20°C/120Hz Tan δ | DxL [mm] | Product Code # = variable value, see fixing code in the product code |
|--|------------------------------------|--|---|--|---|----------------------|---|---------------|---|
| 400 VDC Code: 2G Surge Voltage 450 VDC | 2 200 | 9.7 | 20.3 | 46 | 48 | 17 | 0.20 | 51x96 | FX32G222#C096 |
| | 2 700 | 11.5 | 24.2 | 38 | 40 | 17 | 0.20 | 51x115 | FX32G272#C115 |
| | 3 000 | 12.1 | 25.4 | 34 | 36 | 17 | 0.20 | 51x115 | FX32G302#C115 |
| | 3 300 | 13.3 | 28.0 | 30 | 32 | 17 | 0.20 | 51x130 | FX32G332#C130 |
| | 3 900 | 14.1 | 29.7 | 26 | 28 | 18 | 0.20 | 64x96 | FX32G392#D096 |
| | 4 700 | 16.7 | 35.0 | 21 | 22 | 18 | 0.20 | 64x115 | FX32G472#D115 |
| | 5 600 | 19.1 | 40.1 | 18 | 19 | 18 | 0.20 | 64x130 | FX32G562#D130 |
| | 6 800 | 22.7 | 47.6 | 15 | 15 | 18 | 0.20 | 64x155 | FX32G682#D155 |
| | | 21.3 | 44.7 | 15 | 15 | 20 | 0.20 | 77x115 | FX32G682#E115 |
| | 8 200 | 24.4 | 51.2 | 12 | 15 | 20 | 0.20 | 77x130 | FX32G822#E130 |
| | 8 400 | 25.6 | 53.9 | 12 | 14 | 20 | 0.20 | 77x143 | FX32G842#E143 |
| | 10 000 | 28.9 | 60.6 | 10 | 15 | 20 | 0.20 | 77x155 | FX32G103#E155 |
| | 12 000 | 34.8 | 73.2 | 8 | 13 | 20 | 0.20 | 77x195 | FX32G123#E195 |
| | 15 000 | 39.1 | 82.1 | 8 | 10 | 20 | 0.20 | 90x171 | FX32G153#F171 |
| | 18 000 | 45.3 | 95.2 | 6 | 9 | 20 | 0.20 | 90x196 | FX32G183#F196 |
| 22 000 | 54.1 | 113.5* | 6 | 8 | 20 | 0.20 | 90x236 | FX32G223#F236 | |
| 450 VDC Code: 2W Surge Voltage 500 VDC | 1 800 | 8.3 | 17.4 | 71 | 73 | 17 | 0.20 | 51x96 | FX32W182#C096 |
| | 2 200 | 9.9 | 20.8 | 58 | 60 | 17 | 0.20 | 51x115 | FX32W222#C115 |
| | 2 700 | 11.6 | 24.4 | 47 | 49 | 17 | 0.20 | 51x130 | FX32W272#C130 |
| | 3 300 | 12.4 | 26.1 | 39 | 41 | 18 | 0.20 | 64x96 | FX32W332#D096 |
| | 3 900 | 14.5 | 30.4 | 33 | 35 | 18 | 0.20 | 64x115 | FX32W392#D115 |
| | 4 700 | 16.8 | 35.3 | 27 | 29 | 18 | 0.20 | 64x130 | FX32W472#D130 |
| | 5 600 | 19.7 | 41.3 | 23 | 25 | 18 | 0.20 | 64x155 | FX32W562#D155 |
| | | 18.4 | 38.6 | 23 | 25 | 20 | 0.20 | 77x115 | FX32W562#E115 |
| | 6 800 | 21.3 | 44.7 | 19 | 21 | 20 | 0.20 | 77x130 | FX32W682#E130 |
| | 8 200 | 25.1 | 52.6 | 16 | 18 | 20 | 0.20 | 77x155 | FX32W822#E155 |
| | | 26.1 | 54.8 | 16 | 18 | 20 | 0.20 | 77x170 | FX32W822#E170 |
| | 10 000 | 29.6 | 62.1 | 13 | 15 | 20 | 0.20 | 90x157 | FX32W103#F157 |
| | 12 000 | 33.5 | 70.3 | 11 | 13 | 20 | 0.20 | 90x171 | FX32W123#F171 |
| | 15 000 | 39.6 | 83.1 | 9 | 11 | 20 | 0.20 | 90x196 | FX32W153#F196 |
| | 18 000 | 46.8 | 98.3 | 8 | 10 | 20 | 0.20 | 90x236 | FX32W183#F236 |
| 500 VDC Code: 2H Surge Voltage 550 VDC | 1 200 | 7.2 | 15.2 | 92 | 100 | 17 | 0.20 | 51x96 | FX32H122#C096 |
| | 1 500 | 8.7 | 18.4 | 74 | 80 | 17 | 0.20 | 51x115 | FX32H152#C115 |
| | 1 800 | 10.0 | 21.0 | 53 | 50 | 17 | 0.20 | 51x130 | FX32H182#C130 |
| | 2 200 | 10.8 | 22.7 | 40 | 35 | 18 | 0.20 | 64x96 | FX32H222#D096 |
| | 2 700 | 13.5 | 28.3 | 37 | 33 | 18 | 0.20 | 64x130 | FX32H272#D130 |
| | 3 300 | 16.0 | 33.6 | 36 | 32 | 18 | 0.20 | 64x155 | FX32H332#D155 |
| | | 15.1 | 31.6 | 36 | 32 | 20 | 0.20 | 77x115 | FX32H332#E115 |
| | 3 900 | 17.1 | 36.0 | 27 | 29 | 20 | 0.20 | 77x130 | FX32H392#E130 |
| | 4 700 | 19.6 | 41.2 | 25 | 27 | 20 | 0.20 | 77x144 | FX32H472#E144 |
| | 5 600 | 22.9 | 48.1 | 23 | 21 | 20 | 0.20 | 77x171 | FX32H562#E171 |
| | | 22.0 | 46.1 | 23 | 21 | 20 | 0.20 | 90x131 | FX32H562#F131 |
| | 6 800 | 26.7 | 56.0 | 20 | 18 | 20 | 0.20 | 77x195 | FX32H682#E195 |
| | | 25.9 | 54.3 | 20 | 18 | 20 | 0.20 | 90x157 | FX32H682#F157 |
| | 8 200 | 29.4 | 61.8 | 17 | 16 | 20 | 0.20 | 90x171 | FX32H822#F171 |
| | 10 000 | 34.4 | 72.2 | 15 | 14 | 20 | 0.20 | 90x196 | FX32H103#F196 |
| 12 000 | 40.6 | 85.2 | 13 | 12 | 20 | 0.20 | 90x236 | FX32H123#F236 | |

*Please contact us if load condition exceeds terminals related $I_{r,max}$ referred on page 9

Additional designs on request · Weitere Designs auf Anfrage

> Ripple Current Multiplier · Wechselstrommultiplikator

| Frequency [Hz] | 50/60 | 120 | 300 | 1k | ≥ 10k | Forced cooling [m/sec] | v < 1.0 | v ≥ 1.0 |
|----------------|-------|------|------|------|-------|------------------------|---------|---------|
| Multiplier | 0.80 | 1.00 | 1.18 | 1.34 | 1.45 | Multiplier | 1.0 | 1.1 |

| Temperature (°C) | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Multiplier | 2.1 | 2.0 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.1 | 1.0 |

> Life Time Table · Brauchbarkeitsdauer – Tabelle

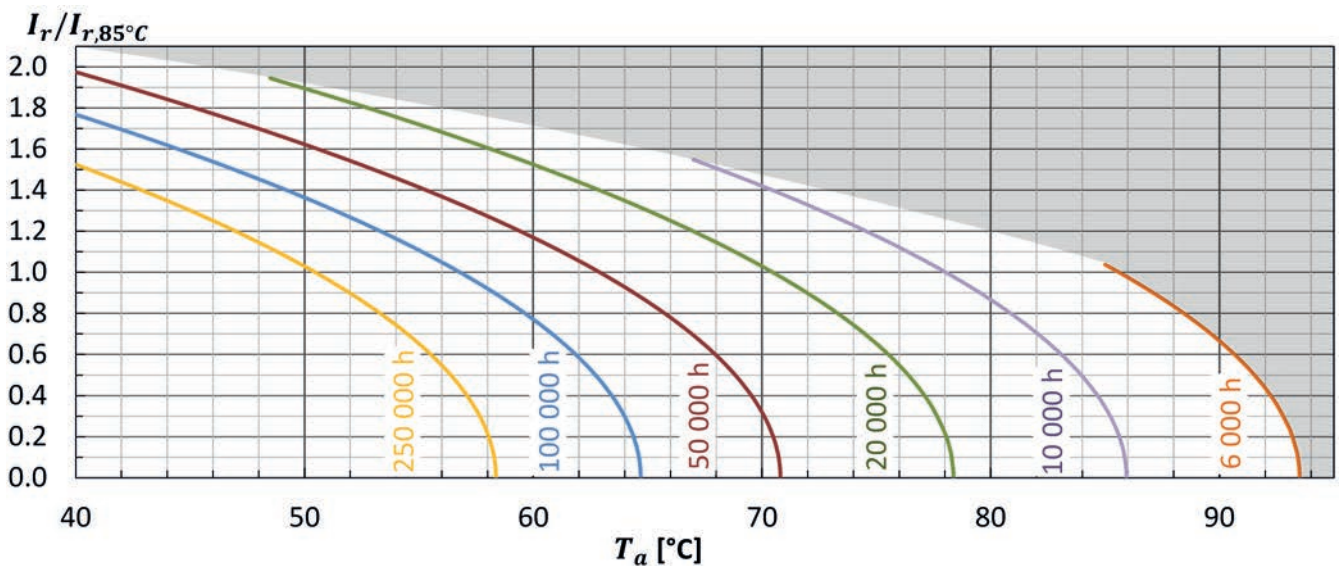
| FX3 | Useful life as function of ambient temperature and ripple current | | | | | | | | | | | |
|---------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| I_r at 85°C | x 1.0 | x 1.1 | x 1.2 | x 1.3 | x 1.4 | x 1.5 | x 1.6 | x 1.7 | x 1.8 | x 1.9 | x 2.0 | x 2.1 |
| $T_a = 40°C$ | 250 | 250 | 250 | 250 | 250 | 250 | 210 | 166 | 128 | 98 | 74 | 55 |
| $T_a = 45°C$ | 250 | 250 | 250 | 250 | 205 | 166 | 133 | 105 | 81 | 62 | 47 | |
| $T_a = 50°C$ | 250 | 224 | 189 | 158 | 130 | 105 | 84 | 66 | 51 | 39 | | |
| $T_a = 55°C$ | 165 | 141 | 120 | 100 | 82 | 66 | 53 | 42 | 32 | | | |
| $T_a = 60°C$ | 104 | 89 | 75 | 63 | 52 | 42 | 33 | 26 | | | | |
| $T_a = 65°C$ | 66 | 56 | 48 | 40 | 32 | 26 | | | | | | |
| $T_a = 70°C$ | 41 | 35 | 30 | 25 | 20 | | | | | | | |
| $T_a = 75°C$ | 26 | 22 | 19 | 16 | | | | | | | | |
| $T_a = 80°C$ | 16 | 14 | | | | | | | | | | |
| $T_a = 85°C$ | 10 | | | | | | | | | | | |

Max. value limited to 250 000 hours.

> Life Time Graph · Brauchbarkeitsdauer – Diagramm

Useful life depending on ambient temperature T_a and ripple current operating conditions I_r versus rated ripple current at the upper category temperature $I_{r, 85°C, 120Hz}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur T_a und Wechselstrombelastung I_r im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorie-temperatur $I_{r, 85°C, 120Hz}$



> Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

| Life time test | Test procedure | Life time criteria |
|----------------|--|---|
| Endurance test | $T_a = 85^\circ\text{C}$; V_r , I_r applied 8000 hours | $\Delta C/C \leq 10\%$ (of initial value) $\text{Tan}\delta \leq 175\%$ (of specified value) $I_L \leq$ specified value |
| Useful life | $T_a = 85^\circ\text{C}$; V_r , I_r applied 10000 hours | $\Delta C/C \leq 15\%$ (of initial value) $\text{Tan}\delta < 200\%$ (of specified value) $I_L \leq$ specified value |

Reference Specification: JIS C 5101-4, JIS C 5102, IEC 60384-4