

## Overview

KEMET's PEH200 Series of capacitors has a polarized all-welded design, heavy duty screw terminals, extended cathode construction, safety vent, and plastic insulation. The sealing system is designed for electrolyte leakage-free operation and a very low gas-diffusion rate of electrolyte. Mechanical contact between the winding and aluminum case allows excellent heat transfer from the winding hot-spot to the ambient, which means cooler operation and very high current ratings.

## Applications

Typical applications for KEMET's PEH200 capacitor include uninterruptible power supplies (UPS), ground power units (GPU), welding equipment, and drives where high current ratings and compact size are important.

## Benefits

- High CV value
- Long life, up to 29,000 hours at +85°C ( $V_R$ ,  $I_R$  applied)
- Low ESR and ESL
- Compact size
- Optimized designs available upon request



## Part Number System

| PEH200                                     | H   |   | A                      | 515  | 0            | M                     | U2   |
|--|---|---|------------------------|--|--------------|-----------------------|--|
| Series                                     | Rated Voltage (VDC)   |   | Size Code              | Capacitance Code (µF)  | Version      | Capacitance Tolerance | Stud Option                                      |
| Screw Terminal<br>Aluminum<br>Electrolytic | H = 25<br>K = 40<br>M = 63<br>P = 100<br>S = 250<br>U = 350 | X = 385<br>V = 400<br>O = 420<br>Y = 450<br>Z = 500 | See Dimension<br>table | The last two<br>digits represent<br>significant<br>figures. The first<br>digit specifies the<br>total number of<br>digits. | 0 = Standard | M = ±20%              | U2 = Plain Can<br>B2 = Threaded<br>mounting stud |

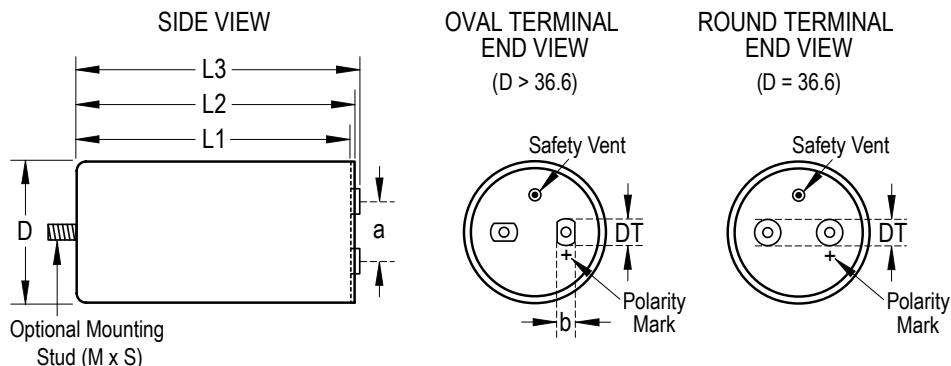
## Performance Characteristics

| Item                          | Performance Characteristics   |  |   |
|-------------------------------|---|--|---|
| Capacitance Range             | 100 – 330,000 $\mu$ F   |  |   |
| Rated Voltage                 | 25 – 500 VDC  |  |   |
| Operating Temperature         | -40 to +85°C  |  |   |
| Capacitance Tolerance         | $\pm$ 20% at 100 Hz / +20°C   |  |   |
| Operational Lifetime          | D (mm)  | Rated Voltage and Ripple Current at +85°C (hours)  | Rated Voltage at +85°C (hours)  |
|                               | 35  | 10,000   |   |
|                               | 50  | 12,000   |   |
|                               | 65  | 15,000   |   |
|                               | 75  | 19,000   |   |
|                               | 90  | 29,000   | 60,000  |
| Shelf Life                    | 2,000 hours at +85°C or 4 years at +40°C 0 VDC  |  |   |
| Leakage Current               | $I = 0.003 CV + 4000$ ( $\mu$ A) ( $V_R < 500$ VDC)   |  |   |
|                               | C = rated capacitance ( $\mu$ F), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C.  |  |   |
| Vibration Test Specifications |   | Procedure  | Requirements  |
|                               | D $\leq$ 50 mm  | 0.75 mm displacement amplitude or 10 g maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 500 Hz (Capacitor clamped by body). | No leakage of electrolyte or other visible damage. Deviations in capacitance and $\tan\delta$ from initial measurements must not exceed: $\Delta C/C < 5\%$ |
| D > 50 mm                     | 0.75 mm displacement amplitude or 10 g maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 55 Hz (Capacitor clamped by body). |  |   |
| Standards                     | IEC 60384–4 long life grade 40/85/56  |  |   |

## Test Method & Performance

| Endurance Life Test          |  |                                 |
|------------------------------|--|---------------------------------|
| Conditions                   | Performance  |                                 |
| Temperature                  | +85°C  |                                 |
| Test Duration                | 2,000 hours  |                                 |
| Ripple Current               | Maximum ripple current specified in table  |                                 |
| Voltage                      | The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor |                                 |
| <b>Performance</b>           | <b>The following specifications will be satisfied when the capacitor is tested at +20°C:</b>     |                                 |
| Capacitance Change           | $\leq 100$ V   | Within 15% of the initial value |
|                              | $> 100$ V  | Within 10% of the initial value |
| Equivalent Series Resistance | Does not exceed 200% of the initial value  |                                 |
| Leakage Current              | Does not exceed leakage current limit  |                                 |

## Dimensions – Millimeters



| Reference Size (mm) | Size Code | Dimensions in mm |       |       |       |      | Mounting Stud (M x S) | Approximate Weight Grams |
|---------------------|-----------|------------------|-------|-------|-------|------|-----------------------|--------------------------|
|                     |           | D                | L1    | L2    | L3    | a    |                       |                          |
| 35 x 51             | A         | 36.6             | 51.5  | 54.5  | 58.9  | 13.0 | M8 x 12               | 70                       |
| 35 x 60             | B         | 36.6             | 59.5  | 62.5  | 66.9  | 13.0 | M8 x 12               | 85                       |
| 35 x 75             | C         | 36.6             | 73.5  | 76.5  | 80.9  | 13.0 | M8 x 12               | 105                      |
| 35 x 95             | D         | 36.6             | 94.5  | 97.5  | 101.9 | 13.0 | M8 x 12               | 130                      |
| 50 x 49             | G         | 51.6             | 48.5  | 51.5  | 56.4  | 22.0 | M12 x 16              | 150                      |
| 50 x 75             | H         | 51.6             | 74.5  | 77.5  | 82.4  | 22.0 | M12 x 16              | 180                      |
| 50 x 95             | J         | 51.6             | 95.5  | 98.5  | 103.4 | 22.0 | M12 x 16              | 240                      |
| 50 x 105            | K         | 51.6             | 103.5 | 106.5 | 111.4 | 22.0 | M12 x 16              | 265                      |
| 50 x 115            | I         | 51.6             | 115.5 | 118.5 | 123.4 | 22.0 | M12 x 16              | 300                      |
| 65 x 105            | O         | 66.6             | 106.0 | 109.2 | 113.0 | 28.5 | M12 x 16              | 415                      |
| 65 x 115            | Q         | 66.6             | 118.0 | 121.2 | 125.0 | 28.5 | M12 x 16              | 460                      |
| 65 x 130            | S         | 66.6             | 129.0 | 132.2 | 136.0 | 28.5 | M12 x 16              | 520                      |
| 65 x 140            | R         | 66.6             | 141.0 | 144.2 | 148.0 | 28.5 | M12 x 16              | 650                      |
| 75 x 78             | L         | 76.6             | 77.0  | 80.2  | 84.0  | 32.0 | M12 x 16              | 430                      |
| 75 x 98             | P         | 76.6             | 98.0  | 101.2 | 105.0 | 32.0 | M12 x 16              | 530                      |
| 75 x 105            | T         | 76.6             | 106.0 | 109.2 | 113.0 | 32.0 | M12 x 16              | 585                      |
| 75 x 115            | U         | 76.6             | 118.0 | 121.2 | 125.0 | 32.0 | M12 x 16              | 640                      |
| 75 x 145            | V         | 76.6             | 146.0 | 149.2 | 153.0 | 32.0 | M12 x 16              | 800                      |
| 75 x 220            | X         | 76.6             | 221.0 | 224.2 | 228.0 | 32.0 | M12 x 16              | 1400                     |
| 90 x 78             | M         | 91.6             | 76.5  | 79.7  | 83.4  | 32.0 | M12 x 16              | 750                      |
| 90 x 98             | N         | 91.6             | 97.5  | 100.7 | 104.4 | 32.0 | M12 x 16              | 950                      |
| 90 x 145            | Y         | 91.6             | 145.5 | 148.7 | 152.4 | 32.0 | M12 x 16              | 1400                     |
| 90 x 220            | Z         | 91.6             | 220.0 | 224.2 | 226.9 | 32.0 | M12 x 16              | 1500                     |

Note: Dimensions include sleeving. Additional case sizes available on request

## Termination Table

| Reference Diameter | Thread | Termination Style | Dimensions in mm |    |
|--------------------|--------|-------------------|------------------|----|
|                    |        |                   | DT               | b  |
| 35                 | M5     | Round             | 8                |    |
| 50                 | M5     | Oval              | 15               | 13 |
| 65                 | M5     | Oval              | 15               | 13 |
| 75                 | M5     | Oval              | 15               | 13 |
| 90                 | M5     | Oval              | 15               | 13 |

Note: M6 and other termination options available on request

## Shelf Life

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will very slowly increase. KEMET products are particularly stable and allow a shelf life in excess of three years at 40°C. See sectional specification under each product series for specific data.

## Re-age (Reforming) Procedure

Apply the rated voltage to the capacitor at room temperature for a period of one hour, or until the leakage current has fallen to a steady value below the specified limit. During re-aging a maximum charging current of twice the specified leakage current or 5 mA (whichever is greater) is suggested.

## Reliability

The reliability of a component can be defined as the probability that it will perform satisfactorily under a given set of conditions for a given length of time.

In practice, it is impossible to predict with absolute certainty how any individual component will perform; thus, we must utilize probability theory. It is also necessary to clearly define the level of stress involved (e.g. operating voltage, ripple current, temperature and time). Finally, the meaning of satisfactory performance must be defined by specifying a set of conditions which determine the end of life of the component.

Reliability as a function of time,  $R(t)$ , is normally expressed as:  $R(t)=e^{-\lambda t}$   
where  $R(t)$  is the probability that the component will perform satisfactorily for time  $t$ , and  $\lambda$  is the failure rate.

## Failure Rate

The failure rate is the number of components failing per unit time. The failure rate of most electronic components follows the characteristic pattern:

- Early failures are removed during the manufacturing process.
- The operational life is characterized by a constant failure rate.
- The wear out period is characterized by a rapidly increasing failure rate.

The failures in time (FIT) are given with a 60% confidence level for the various type codes. By convention, FIT is expressed as  $1 \times 10^{-9}$  failures per hour. Failure rate is also expressed as a percentage of failures per 1,000 hours.

e.g., 100 FIT =  $1 \times 10^{-7}$  failures per hour = 0.01%/1,000 hours

## End of Life Definition

Catastrophic Failure: short circuit, open circuit or safety vent operation

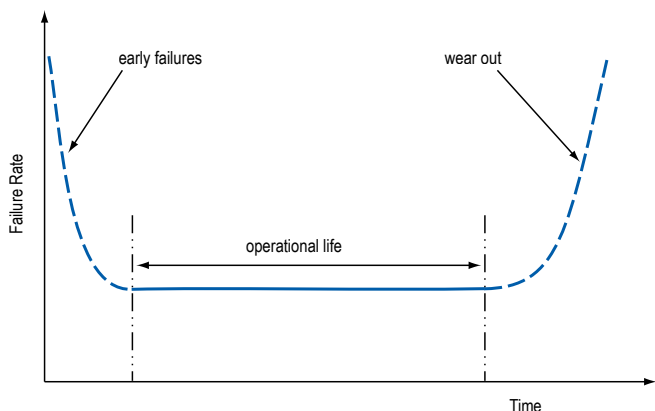
Parametric Failure:

- Change in capacitance >  $\pm 10\%$
- Leakage current > specified limit
- ESR > 2 x initial ESR value

## MTBF

The mean time between failures (MTBF) is simply the inverse of the failure rate.

$$MTBF = 1/\lambda$$



The failure rate is derived from our periodic test results. The failure rate ( $\lambda_p$ ) is, therefore, only given at test temperature for life tests. An estimation is also given at 60°C.

The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

### $T_a$ Failure Rate per Hour

85°C 1,000 FIT

60°C 100 FIT

Failure rate per hour includes both catastrophic and parametric failures.

## Environmental Compliance

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation world wide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Because of customer requirements, there may appear additional markings such as LF = Lead Free or LFW = Lead Free Wires on the label.

**Table 1 – Ratings & Part Number Reference**

| VDC | Rated Capacitance   | Size Code | Reference Size | Ripple Current Maximum |                                 |                    | ESR Maximum         |                      | L <sub>ESL</sub><br>Approximate (nH) | Part Number      |
|-----|---------------------|-----------|----------------|------------------------|---------------------------------|--------------------|---------------------|----------------------|--------------------------------------|------------------|
|     | 100 Hz<br>25°C (µF) |           | D x L (mm)     | 100 Hz 85°C<br>(A)     | 10 kHz 50°C<br>(A) <sup>2</sup> | 10 kHz 40°C<br>(A) | 100 Hz 20°C<br>(mΩ) | 100 kHz 20°C<br>(mΩ) |                                      |                  |
| 25  | 15000               | A         | 35 x 51        | 11.9                   | 28.7                            | 19.0               | 25                  | 21                   | 12                                   | PEH200HA5150M(1) |
| 25  | 22000               | C         | 35 x 75        | 15.2                   | 34.3                            | 24.4               | 17                  | 14                   | 12                                   | PEH200HC5220M(1) |
| 25  | 33000               | D         | 35 x 95        | 17.8                   | 38.0                            | 28.1               | 12                  | 10                   | 12                                   | PEH200HD5330M(1) |
| 25  | 47000               | H         | 50 x 75        | 20.2                   | 43.3                            | 30.1               | 11                  | 10                   | 16                                   | PEH200HH5470M(1) |
| 25  | 68000               | J         | 50 x 95        | 23.4                   | 47.4                            | 34.6               | 8                   | 7                    | 16                                   | PEH200HJ5680M(1) |
| 25  | 100000              | K         | 50 x 105       | 23.9                   | 46.1                            | 34.7               | 7                   | 7                    | 16                                   | PEH200HK6100M(1) |
| 25  | 150000              | O         | 65 x 105       | 26.3                   | 50.0                            | 37.2               | 7                   | 7                    | 16                                   | PEH200HO6150M(1) |
| 25  | 220000              | T         | 75 x 105       | 35.0                   | 63.6                            | 49.5               | 5                   | 5                    | 17                                   | PEH200HT6220M(1) |
| 25  | 330000              | V         | 75 x 145       | 40.0                   | 73.1                            | 56.9               | 4                   | 4                    | 17                                   | PEH200HV6330M(1) |
| 40  | 6800                | A         | 35 x 51        | 9.9                    | 27.2                            | 18.1               | 33                  | 25                   | 12                                   | PEH200KA4680M(1) |
| 40  | 10000               | B         | 35 x 60        | 12.0                   | 31.5                            | 21.4               | 23                  | 18                   | 12                                   | PEH200KB5100M(1) |
| 40  | 15000               | C         | 35 x 75        | 14.6                   | 36.1                            | 25.5               | 16                  | 12                   | 12                                   | PEH200KC5150M(1) |
| 40  | 22000               | D         | 35 x 95        | 17.1                   | 39.8                            | 29.2               | 12                  | 9                    | 12                                   | PEH200KD5220M(1) |
| 40  | 33000               | H         | 50 x 75        | 18.9                   | 41.1                            | 28.8               | 11                  | 9                    | 16                                   | PEH200KH5330M(1) |
| 40  | 47000               | J         | 50 x 95        | 22.1                   | 46.3                            | 33.6               | 8                   | 7                    | 16                                   | PEH200KJ5470M(1) |
| 40  | 68000               | O         | 65 x 105       | 25.2                   | 49.9                            | 35.6               | 7                   | 7                    | 16                                   | PEH200KO5680M(1) |
| 40  | 100000              | O         | 65 x 105       | 24.9                   | 46.3                            | 36.9               | 8                   | 8                    | 16                                   | PEH200KO6100M(1) |
| 40  | 150000              | U         | 75 x 115       | 35.7                   | 67.7                            | 51.2               | 5                   | 4                    | 17                                   | PEH200KU6150M(1) |
| 40  | 220000              | V         | 75 x 145       | 34.4                   | 62.3                            | 48.9               | 5                   | 5                    | 17                                   | PEH200KV6220M(1) |
| 63  | 4700                | A         | 35 x 51        | 9.0                    | 26.8                            | 18.0               | 32                  | 21                   | 12                                   | PEH200MA4470M(1) |
| 63  | 6800                | C         | 35 x 75        | 11.5                   | 32.7                            | 23.5               | 21                  | 14                   | 12                                   | PEH200MC4680M(1) |
| 63  | 10000               | D         | 35 x 95        | 13.6                   | 36.0                            | 27.0               | 15                  | 10                   | 12                                   | PEH200MD5100M(1) |
| 63  | 15000               | H         | 50 x 75        | 16.1                   | 37.3                            | 26.5               | 14                  | 11                   | 16                                   | PEH200MH5150M(1) |
| 63  | 22000               | J         | 50 x 95        | 19.0                   | 42.0                            | 30.9               | 10                  | 8                    | 16                                   | PEH200MJ5220M(1) |
| 63  | 33000               | O         | 65 x 105       | 22.8                   | 45.9                            | 34.8               | 10                  | 8                    | 16                                   | PEH200MO5330M(1) |
| 63  | 47000               | O         | 65 x 105       | 21.8                   | 42.7                            | 32.0               | 10                  | 9                    | 16                                   | PEH200MO5470M(1) |
| 63  | 68000               | U         | 75 x 115       | 31.5                   | 61.3                            | 46.8               | 6                   | 5                    | 17                                   | PEH200MU5680M(1) |
| 63  | 100000              | V         | 75 x 145       | 34.3                   | 62.2                            | 50.3               | 5                   | 5                    | 17                                   | PEH200MV6100M(1) |
| 100 | 1500                | A         | 35 x 51        | 5.7                    | 18.0                            | 12.1               | 92                  | 63                   | 12                                   | PEH200PA4150M(1) |
| 100 | 2200                | B         | 35 x 60        | 7.0                    | 21.3                            | 14.7               | 63                  | 44                   | 12                                   | PEH200PB4220M(1) |
| 100 | 3300                | C         | 35 x 75        | 8.7                    | 25.0                            | 17.8               | 43                  | 30                   | 12                                   | PEH200PC4330M(1) |
| 100 | 4700                | D         | 35 x 95        | 10.3                   | 28.9                            | 21.1               | 31                  | 21                   | 12                                   | PEH200PD4470M(1) |
| 100 | 6800                | H         | 50 x 75        | 12.7                   | 30.4                            | 21.5               | 33                  | 27                   | 16                                   | PEH200PH4680M(1) |
| 100 | 10000               | J         | 50 x 95        | 15.3                   | 34.7                            | 25.6               | 23                  | 19                   | 16                                   | PEH200PJ5100M(1) |
| 100 | 15000               | K         | 50 x 105       | 17.3                   | 37.6                            | 27.9               | 17                  | 14                   | 16                                   | PEH200PK5150M(1) |
| 100 | 22000               | O         | 65 x 105       | 19.3                   | 38.7                            | 30.1               | 15                  | 13                   | 16                                   | PEH200PO5220M(1) |
| 100 | 33000               | T         | 75 x 105       | 26.3                   | 53.0                            | 39.8               | 10                  | 8                    | 17                                   | PEH200PT5330M(1) |
| 100 | 47000               | V         | 75 x 145       | 30.8                   | 60.5                            | 47.3               | 7                   | 6                    | 17                                   | PEH200PV5470M(1) |
| 250 | 330                 | A         | 35 x 51        | 2.2                    | 13.5                            | 8.7                | 330                 | 170                  | 12                                   | PEH200SA3330M(1) |
| 250 | 470                 | B         | 35 x 60        | 2.7                    | 15.9                            | 10.6               | 240                 | 120                  | 12                                   | PEH200SB3470M(1) |
| 250 | 680                 | C         | 35 x 75        | 3.4                    | 18.7                            | 13.0               | 160                 | 84                   | 12                                   | PEH200SC3680M(1) |
| 250 | 1000                | D         | 35 x 95        | 4.1                    | 21.2                            | 15.6               | 110                 | 58                   | 12                                   | PEH200SD4100M(1) |
| 250 | 1000                | G         | 50 x 49        | 4.3                    | 20.7                            | 12.6               | 120                 | 69                   | 16                                   | PEH200SG4100M(1) |
| 250 | 1500                | H         | 50 x 75        | 5.9                    | 28.7                            | 19.5               | 78                  | 42                   | 16                                   | PEH200SH4150M(1) |
| 250 | 2200                | J         | 50 x 95        | 7.3                    | 32.5                            | 23.2               | 54                  | 29                   | 16                                   | PEH200SJ4220M(1) |
| 250 | 3300                | O         | 65 x 105       | 10.0                   | 39.8                            | 29.4               | 38                  | 22                   | 16                                   | PEH200SO4330M(1) |
| 250 | 3300                | L         | 75 x 78        | 10.5                   | 43.8                            | 29.6               | 38                  | 22                   | 17                                   | PEH200SL4330M(1) |
| 250 | 4700                | O         | 65 x 105       | 11.3                   | 38.2                            | 27.2               | 29                  | 18                   | 16                                   | PEH200SO4470M(1) |
| 250 | 4700                | M         | 90 x 78        | 12.7                   | 44.2                            | 30.4               | 30                  | 18                   | 16                                   | PEH200SM4470M(1) |
| 250 | 6800                | T         | 75 x 105       | 14.7                   | 51.5                            | 36.5               | 20                  | 12                   | 17                                   | PEH200ST4680M(1) |
| 250 | 6800                | N         | 90 x 98        | 15.8                   | 52.1                            | 37.3               | 21                  | 13                   | 16                                   | PEH200SN4680M(1) |
| 250 | 10000               | V         | 75 x 145       | 18.0                   | 59.0                            | 44.0               | 14                  | 9                    | 17                                   | PEH200SV5100M(1) |
| 250 | 12000               | V         | 75 x 145       | 18.8                   | 58.6                            | 43.6               | 14                  | 9                    | 17                                   | PEH200SV512AM(1) |
| 250 | 15000               | X         | 75 x 220       | 20.6                   | 61.6                            | 49.2               | 10                  | 6                    | 17                                   | PEH200SX5150M(1) |
| 250 | 15000               | Y         | 90 x 145       | 21.8                   | 60.1                            | 45.5               | 12                  | 8                    | 16                                   | PEH200SY5150M(1) |
| 350 | 220                 | A         | 35 x 51        | 2.0                    | 13.7                            | 8.8                | 360                 | 170                  | 12                                   | PEH200UA3220M(1) |
| 350 | 330                 | B         | 35 x 60        | 2.6                    | 16.6                            | 11.0               | 240                 | 110                  | 12                                   | PEH200UB3330M(1) |
| 350 | 470                 | C         | 35 x 75        | 3.2                    | 19.3                            | 13.4               | 170                 | 79                   | 12                                   | PEH200UC3470M(1) |
| VDC | Rated Capacitance   | Size Code | Reference Size | Ripple Current         |                                 |                    | ESR                 |                      | L <sub>ESL</sub>                     | Part Number      |

(1) Mounting Code: U2 = plain can, B2 = threaded mounting stud  
<sup>2</sup> 2 m/s forced air, studmounted on 3°C/W aluminum chassis.

**Table 1 – Ratings & Part Number Reference cont'd**

| VDC | Rated Capacitance   | Size Code | Reference Size | Ripple Current Maximum |                                 |                    | ESR Maximum         |                      | L <sub>ESL</sub><br>Approximate (nH) | Part Number      |
|-----|---------------------|-----------|----------------|------------------------|---------------------------------|--------------------|---------------------|----------------------|--------------------------------------|------------------|
|     | 100 Hz<br>25°C (µF) |           | D x L (mm)     | 100 Hz 85°C<br>(A)     | 10 kHz 50°C<br>(A) <sup>2</sup> | 10 kHz 40°C<br>(A) | 100 Hz 20°C<br>(mΩ) | 100 kHz 20°C<br>(mΩ) |                                      |                  |
| 350 | 680                 | D         | 35 x 95        | 3.8                    | 21.9                            | 16.0               | 120                 | 55                   | 12                                   | PEH200UD3680M(1) |
| 350 | 680                 | G         | 50 x 49        | 4.0                    | 20.7                            | 12.6               | 130                 | 66                   | 16                                   | PEH200UG3680M(1) |
| 350 | 1000                | H         | 50 x 75        | 5.5                    | 28.8                            | 19.5               | 85                  | 41                   | 16                                   | PEH200UH4100M(1) |
| 350 | 1500                | J         | 50 x 95        | 6.8                    | 32.9                            | 23.4               | 57                  | 28                   | 16                                   | PEH200UJ4150M(1) |
| 350 | 2200                | O         | 65 x 105       | 9.4                    | 39.8                            | 29.2               | 41                  | 21                   | 16                                   | PEH200UO4220M(1) |
| 350 | 2200                | L         | 75 x 78        | 9.8                    | 43.5                            | 29.4               | 41                  | 21                   | 17                                   | PEH200UL4220M(1) |
| 350 | 3300                | O         | 65 x 105       | 10.9                   | 38.6                            | 27.5               | 31                  | 17                   | 16                                   | PEH200UO4330M(1) |
| 350 | 3300                | M         | 90 x 78        | 13.1                   | 54.0                            | 37.0               | 28                  | 15                   | 16                                   | PEH200UM4330M(1) |
| 350 | 4700                | U         | 75 x 115       | 14.5                   | 54.7                            | 39.5               | 20                  | 11                   | 17                                   | PEH200UU4470M(1) |
| 350 | 4700                | N         | 90 x 98        | 15.0                   | 51.3                            | 36.7               | 22                  | 13                   | 16                                   | PEH200UN4470M(1) |
| 350 | 6800                | V         | 75 x 145       | 16.8                   | 57.0                            | 42.3               | 15                  | 8                    | 17                                   | PEH200UV4680M(1) |
| 350 | 10000               | X         | 75 x 220       | 19.4                   | 60.8                            | 48.5               | 11                  | 7                    | 17                                   | PEH200UX5100M(1) |
| 350 | 10000               | Y         | 90 x 145       | 23.3                   | 75.2                            | 56.9               | 11                  | 6                    | 16                                   | PEH200UY5100M(1) |
| 350 | 15000               | Z         | 90 x 220       | 27.3                   | 79.8                            | 64.4               | 8                   | 5                    | 16                                   | PEH200UZ515AM(1) |
| 385 | 220                 | A         | 35 x 51        | 2.1                    | 14.6                            | 9.3                | 330                 | 150                  | 12                                   | PEH200XA3220M(1) |
| 385 | 330                 | C         | 35 x 75        | 2.7                    | 17.0                            | 12.0               | 220                 | 97                   | 12                                   | PEH200XC3330M(1) |
| 385 | 470                 | D         | 35 x 95        | 3.3                    | 19.1                            | 14.2               | 150                 | 69                   | 12                                   | PEH200XD3470M(1) |
| 385 | 470                 | G         | 50 x 49        | 3.6                    | 20.9                            | 12.8               | 160                 | 78                   | 16                                   | PEH200XG3470M(1) |
| 385 | 680                 | H         | 50 x 75        | 4.7                    | 26.8                            | 18.4               | 110                 | 51                   | 16                                   | PEH200XH3680M(1) |
| 385 | 1000                | J         | 50 x 95        | 5.9                    | 31.7                            | 22.8               | 76                  | 35                   | 16                                   | PEH200XJ4100M(1) |
| 385 | 1500                | K         | 50 x 105       | 7.1                    | 34.1                            | 24.7               | 52                  | 25                   | 16                                   | PEH200XK4150M(1) |
| 385 | 2200                | O         | 65 x 105       | 9.6                    | 36.7                            | 26.1               | 38                  | 20                   | 16                                   | PEH200XO4220M(1) |
| 385 | 2200                | L         | 75 x 78        | 10.0                   | 42.7                            | 28.8               | 38                  | 20                   | 17                                   | PEH200XL4220M(1) |
| 385 | 3300                | T         | 75 x 105       | 12.8                   | 52.5                            | 37.4               | 25                  | 13                   | 17                                   | PEH200XT4330M(1) |
| 385 | 3300                | M         | 90 x 78        | 13.3                   | 52.6                            | 36.0               | 26                  | 14                   | 16                                   | PEH200XM4330M(1) |
| 385 | 4700                | V         | 75 x 145       | 15.2                   | 57.6                            | 43.9               | 19                  | 11                   | 17                                   | PEH200XV4470M(1) |
| 385 | 4700                | N         | 90 x 98        | 16.6                   | 62.4                            | 44.4               | 19                  | 10                   | 16                                   | PEH200XN4470M(1) |
| 385 | 6800                | Y         | 90 x 145       | 20.9                   | 74.8                            | 57.2               | 14                  | 8                    | 16                                   | PEH200XY4680M(1) |
| 385 | 6800                | X         | 75 x 220       | 17.4                   | 58.9                            | 47.0               | 14                  | 8                    | 17                                   | PEH200XX4680M(1) |
| 400 | 220                 | A         | 35 x 51        | 2.2                    | 11.4                            | 9.6                | 310                 | 130                  | 12                                   | PEH200VA3220M(1) |
| 400 | 330                 | C         | 35 x 75        | 2.8                    | 14.3                            | 12.6               | 210                 | 90                   | 12                                   | PEH200VC3330M(1) |
| 400 | 470                 | D         | 35 x 95        | 3.4                    | 16.5                            | 14.8               | 140                 | 63                   | 12                                   | PEH200VD3470M(1) |
| 400 | 470                 | G         | 50 x 49        | 3.7                    | 15.0                            | 12.7               | 150                 | 73                   | 16                                   | PEH200VG3470M(1) |
| 400 | 680                 | H         | 50 x 75        | 4.9                    | 21.2                            | 18.3               | 110                 | 55                   | 16                                   | PEH200VH3680M(1) |
| 400 | 1000                | J         | 50 x 95        | 5.9                    | 24.2                            | 21.3               | 76                  | 38                   | 16                                   | PEH200VJ4100M(1) |
| 400 | 1500                | O         | 65 x 105       | 9.1                    | 49.1                            | 35.1               | 53                  | 27                   | 16                                   | PEH200VO415AQ(1) |
| 400 | 1500                | L         | 75 x 78        | 8.8                    | 34.0                            | 29.0               | 52                  | 27                   | 17                                   | PEH200VL4150M(1) |
| 400 | 2200                | O         | 65 x 105       | 9.6                    | 29.1                            | 25.6               | 39                  | 21                   | 16                                   | PEH200VO4220M(1) |
| 400 | 2200                | M         | 90 x 78        | 11.8                   | 44.1                            | 37.1               | 36                  | 19                   | 16                                   | PEH200VM4220M(1) |
| 400 | 3300                | O         | 65 x 105       | 11.0                   | 30.5                            | 26.7               | 29                  | 16                   | 16                                   | PEH200VO433AM(1) |
| 400 | 3300                | U         | 75 x 115       | 13.8                   | 52.0                            | 45.7               | 22                  | 10                   | 17                                   | PEH200VU433AQ(1) |
| 400 | 3300                | N         | 90 x 98        | 14.9                   | 52.8                            | 45.2               | 25                  | 13                   | 16                                   | PEH200VN4330M(1) |
| 400 | 3300                | T         | 75 x 105       | 13.0                   | 41.5                            | 36.3               | 26                  | 14                   | 17                                   | PEH200VT4330M(1) |
| 400 | 4700                | V         | 75 x 145       | 15.6                   | 57.0                            | 42.5               | 18                  | 10                   | 17                                   | PEH200VV447AM(1) |
| 400 | 6800                | X         | 75 x 220       | 17.6                   | 51.2                            | 47.7               | 13                  | 8                    | 17                                   | PEH200VX4680M(1) |
| 400 | 6800                | Y         | 90 x 145       | 21.4                   | 64.1                            | 56.8               | 13                  | 7                    | 16                                   | PEH200VY4680M(1) |
| 400 | 10000               | Z         | 90 x 220       | 24.7                   | 69.2                            | 64.0               | 9                   | 5                    | 16                                   | PEH200VZ5100M(1) |
| 420 | 150                 | A         | 35 x 51        | 1.8                    | 12.1                            | 7.8                | 400                 | 170                  | 12                                   | PEH200OA3150M(1) |
| 420 | 220                 | C         | 35 x 75        | 2.3                    | 14.3                            | 10.3               | 270                 | 110                  | 12                                   | PEH200OC3220M(1) |
| 420 | 330                 | D         | 35 x 95        | 2.9                    | 16.3                            | 12.3               | 180                 | 76                   | 12                                   | PEH200OD3330M(1) |
| 420 | 330                 | G         | 50 x 49        | 3.2                    | 20.4                            | 12.6               | 190                 | 80                   | 16                                   | PEH200OG3330M(1) |
| 420 | 470                 | H         | 50 x 75        | 4.2                    | 24.8                            | 17.0               | 140                 | 62                   | 16                                   | PEH200OH3470M(1) |
| 420 | 680                 | J         | 50 x 95        | 5.1                    | 28.1                            | 20.4               | 96                  | 44                   | 16                                   | PEH200OJ3680M(1) |
| 420 | 1000                | K         | 50 x 105       | 6.3                    | 32.0                            | 23.2               | 67                  | 31                   | 16                                   | PEH200OK4100M(1) |
| 420 | 1500                | O         | 65 x 105       | 8.8                    | 38.9                            | 28.4               | 47                  | 23                   | 16                                   | PEH200OO4150M(1) |
| 420 | 1500                | L         | 75 x 78        | 9.1                    | 42.3                            | 28.5               | 47                  | 23                   | 17                                   | PEH200OL4150M(1) |
| 420 | 2200                | T         | 75 x 105       | 11.5                   | 51.6                            | 37.0               | 32                  | 16                   | 17                                   | PEH200OT4220M(1) |
| 420 | 2200                | M         | 90 x 78        | 12.2                   | 52.7                            | 36.0               | 33                  | 17                   | 16                                   | PEH200OM4220M(1) |
| VDC | Rated Capacitance   | Size Code | Reference Size | Ripple Current         |                                 |                    | ESR                 |                      | L <sub>ESL</sub>                     | Part Number      |

(1) Mounting Code: U2 = plain can, B2 = threaded mounting stud

<sup>2</sup> 2 m/s forced air, studmounted on 3°C/W aluminum chassis.

**Table 1 – Ratings & Part Number Reference cont'd**

| VDC | Rated Capacitance   | Size Code | Reference Size | Ripple Current Maximum |                                 |                    | ESR Maximum         |                      | L <sub>ESL</sub><br>Approximate (nH) | Part Number      |
|-----|---------------------|-----------|----------------|------------------------|---------------------------------|--------------------|---------------------|----------------------|--------------------------------------|------------------|
|     | 100 Hz<br>25°C (µF) |           | D x L (mm)     | 100 Hz 85°C<br>(A)     | 10 kHz 50°C<br>(A) <sup>2</sup> | 10 kHz 40°C<br>(A) | 100 Hz 20°C<br>(mΩ) | 100 kHz 20°C<br>(mΩ) |                                      |                  |
| 420 | 2700                | O         | 65 x 105       | 12.4                   | 57.3                            | 40.1               | 24                  | 10                   | 16                                   | PEH200OO427AM(1) |
| 420 | 3300                | V         | 75 x 145       | 14.0                   | 57.5                            | 43.7               | 22                  | 11                   | 17                                   | PEH200OV4330M(1) |
| 420 | 3300                | N         | 90 x 98        | 15.4                   | 61.9                            | 44.0               | 22                  | 12                   | 16                                   | PEH200ON4330M(1) |
| 420 | 4700                | X         | 75 x 220       | 15.7                   | 57.6                            | 46.8               | 16                  | 8                    | 17                                   | PEH200OX4470M(1) |
| 420 | 4700                | Y         | 90 x 145       | 18.2                   | 62.2                            | 47.5               | 17                  | 9                    | 16                                   | PEH200OY4470M(1) |
| 420 | 8200                | Z         | 90 x 220       | 23.8                   | 77.3                            | 63.1               | 10                  | 5                    | 16                                   | PEH200OZ4820M(1) |
| 450 | 150                 | A         | 35 x 51        | 2.0                    | 14.6                            | 9.3                | 350                 | 150                  | 12                                   | PEH200YA3150M(1) |
| 450 | 220                 | C         | 35 x 75        | 2.5                    | 16.8                            | 11.9               | 240                 | 99                   | 12                                   | PEH200YC3220M(1) |
| 450 | 330                 | D         | 35 x 95        | 3.1                    | 19.4                            | 14.5               | 160                 | 66                   | 12                                   | PEH200YD3330M(1) |
| 450 | 330                 | G         | 50 x 49        | 3.5                    | 20.8                            | 12.7               | 170                 | 75                   | 16                                   | PEH200YG3330M(1) |
| 450 | 470                 | H         | 50 x 75        | 4.5                    | 25.5                            | 17.5               | 120                 | 58                   | 16                                   | PEH200YH3470M(1) |
| 450 | 680                 | J         | 50 x 95        | 5.5                    | 28.8                            | 20.8               | 86                  | 41                   | 16                                   | PEH200YJ3680M(1) |
| 450 | 1000                | K         | 50 x 105       | 6.7                    | 32.7                            | 23.6               | 60                  | 29                   | 16                                   | PEH200YK4100M(1) |
| 450 | 1500                | O         | 65 x 105       | 9.3                    | 39.2                            | 28.2               | 43                  | 22                   | 16                                   | PEH200YO4150M(1) |
| 450 | 1500                | L         | 75 x 78        | 9.6                    | 42.3                            | 28.5               | 43                  | 22                   | 17                                   | PEH200YL4150M(1) |
| 450 | 1800                | O         | 65 x 105       | 10.6                   | 47.8                            | 34.0               | 43                  | 22                   | 17                                   | PEH200YO418AM(1) |
| 450 | 2200                | T         | 75 x 105       | 12.1                   | 50.1                            | 35.6               | 29                  | 15                   | 17                                   | PEH200YT4220M(1) |
| 450 | 2200                | M         | 90 x 78        | 12.7                   | 52.4                            | 35.8               | 30                  | 16                   | 16                                   | PEH200YM4220M(1) |
| 450 | 3300                | V         | 75 x 145       | 14.7                   | 57.3                            | 43.7               | 20                  | 10                   | 17                                   | PEH200YV4330M(1) |
| 450 | 3300                | N         | 90 x 98        | 16.1                   | 61.9                            | 43.9               | 21                  | 11                   | 16                                   | PEH200YN4330M(1) |
| 450 | 4700                | X         | 75 x 220       | 16.8                   | 59.3                            | 47.6               | 14                  | 8                    | 17                                   | PEH200YX4470M(1) |
| 450 | 4700                | Y         | 90 x 145       | 18.9                   | 61.4                            | 46.9               | 16                  | 9                    | 16                                   | PEH200YY4470M(1) |
| 450 | 8200                | Z         | 90 x 220       | 24.9                   | 77.7                            | 63.4               | 10                  | 5                    | 16                                   | PEH200YZ4820M(1) |
| 500 | 100                 | A         | 35 x 51        | 1.5                    | 6.1                             | 3.9                | 1290                | 760                  | 12                                   | PEH200ZA3100M(1) |
| 500 | 150                 | B         | 35 x 60        | 1.9                    | 7.5                             | 4.9                | 670                 | 390                  | 12                                   | PEH200ZB3150M(1) |
| 500 | 220                 | C         | 35 x 75        | 2.3                    | 8.4                             | 5.8                | 570                 | 345                  | 12                                   | PEH200ZC3220M(1) |
| 500 | 220                 | G         | 50 x 49        | 2.5                    | 10.1                            | 6.1                | 595                 | 365                  | 12                                   | PEH200ZG3220M(1) |
| 500 | 330                 | D         | 35 x 95        | 2.9                    | 10.7                            | 7.7                | 390                 | 234                  | 12                                   | PEH200ZD3330M(1) |
| 500 | 470                 | H         | 50 x 75        | 4.2                    | 15.8                            | 10.5               | 280                 | 165                  | 16                                   | PEH200ZH3470M(1) |
| 500 | 680                 | J         | 50 x 95        | 5.1                    | 18.4                            | 12.8               | 195                 | 115                  | 16                                   | PEH200ZJ3680M(1) |
| 500 | 1000                | O         | 65 x 105       | 6.8                    | 21.4                            | 15.5               | 130                 | 79                   | 16                                   | PEH200ZO4100M(1) |
| 500 | 1500                | T         | 75 x 105       | 9.2                    | 29.8                            | 21.0               | 90                  | 57                   | 17                                   | PEH200ZT4150M(1) |
| 500 | 1800                | O         | 65 x 105       | 10.6                   | 40.9                            | 28.2               | 71                  | 45                   | 16                                   | PEH200ZO418HM(1) |
| 500 | 2200                | V         | 75 x 145       | 11.1                   | 33.7                            | 25.1               | 62                  | 40                   | 17                                   | PEH200ZV4220M(1) |
| 500 | 3300                | X         | 75 x 220       | 12.8                   | 36.5                            | 29.0               | 43                  | 28                   | 17                                   | PEH200ZX4330M(1) |
| 500 | 3300                | Y         | 90 x 145       | 15.7                   | 46.9                            | 35.4               | 38                  | 24                   | 16                                   | PEH200ZY4330M(1) |
| 500 | 5600                | Z         | 90 x 220       | 19.6                   | 53.4                            | 42.6               | 31                  | 21                   | 16                                   | PEH200ZZ4560M(1) |
| VDC | Rated Capacitance   | Size Code | Reference Size | Ripple Current         |                                 |                    | ESR                 |                      | L <sub>ESL</sub>                     | Part Number      |

(1) Mounting Code: U2 = plain can, B2 = threaded mounting stud

<sup>2</sup> 2 m/s forced air, studmounted on 3°C/W aluminum chassis.



## Mechanical Data

### Polarity and Reversed Voltage

Aluminium Electrolytic capacitors manufactured for use in DC applications contain an anode foil and a cathode foil. As such, they are polarized devices and must be connected with the +ve to the anode foil and the -ve to the cathode foil. If this were to be reversed then the electrolytic process that took place in forming the oxide layer on the anode would be recreated in trying to form an oxide layer on the cathode. In forming the cathode foil in this way, heat would be generated and gas given off within the capacitor, usually leading to catastrophic failure.

The cathode foil already possesses a thin stabilized oxide layer. This thin oxide layer is equivalent to a forming voltage of approximately 2 V. As a result, the capacitor can withstand a voltage reversal of up to 2 V for short periods. Above this voltage, the formation process will commence. Aluminium Electrolytic capacitors can also be manufactured for use in intermittent AC applications by using two anode foils in place of one anode and one cathode.

### Mounting Position

The capacitor can be mounted upright or inclined to a horizontal position.

### Clamp Fixing

Clips must be ordered separately.

### Stud Fixing

Nylon cap nut must be ordered separately. For the stud fixing insulated version, the outer insulation serves as lock washer.

Maximum tightening torque:

M8 = 3 Nm

M12= 8 Nm

Maximum chassis thickness 5 mm.

### Screw Terminals

M5 x 10 according to DIN 41.248.

Maximum tightening torque = 2.5 Nm.

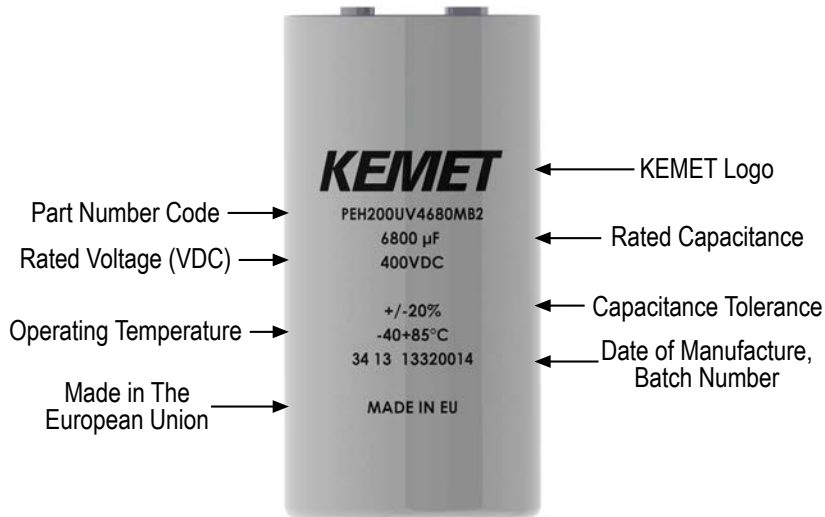
Must be ordered separately.

Recommended maximum connector thickness with delivered screw = 4 mm. M6 thread upon request.

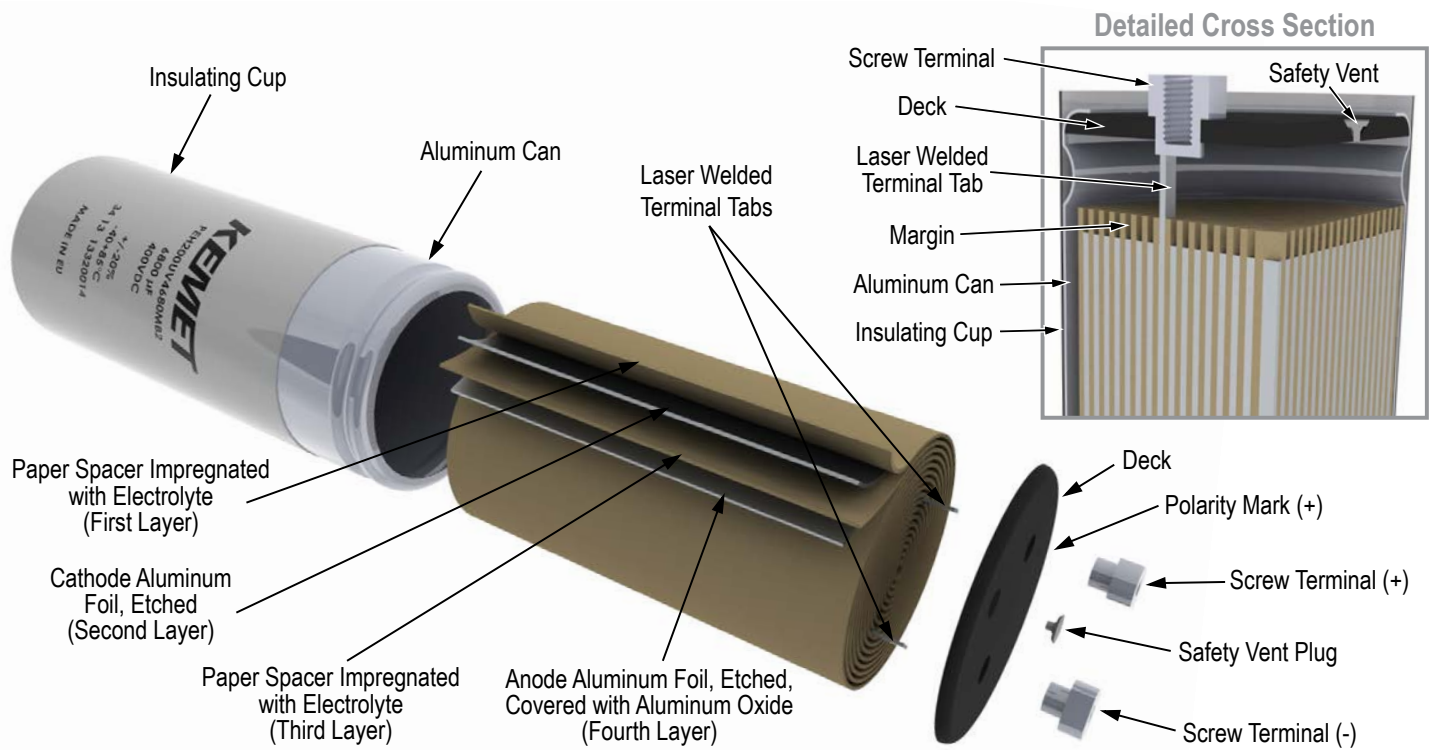
### Insulating Cup

PEH200 is supplied with a 0.8 mm thick polypropylene insulating cup. Voltage proof of the insulating cup:  $\geq 4,000$  VDC

## Marking



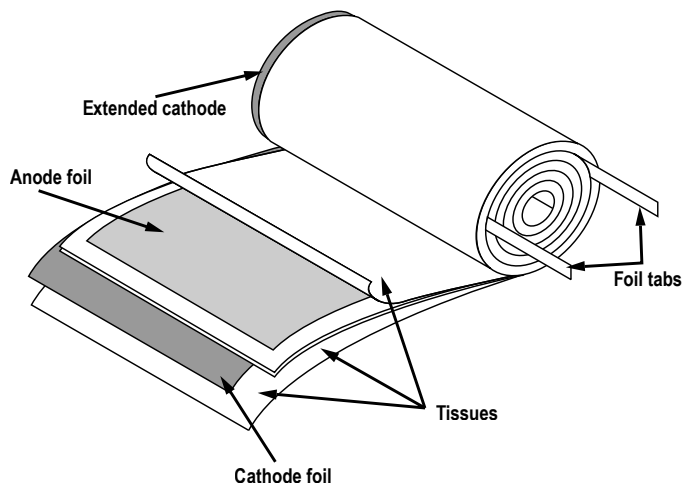
## Construction



## Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then “formed” to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.



Each capacitor is aged and tested before being sleeved and packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete.

Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A sample from each batch is taken by the quality department after completion of the production process. This sample size is controlled by the use of recognized sampling tables defined in BS 6001.

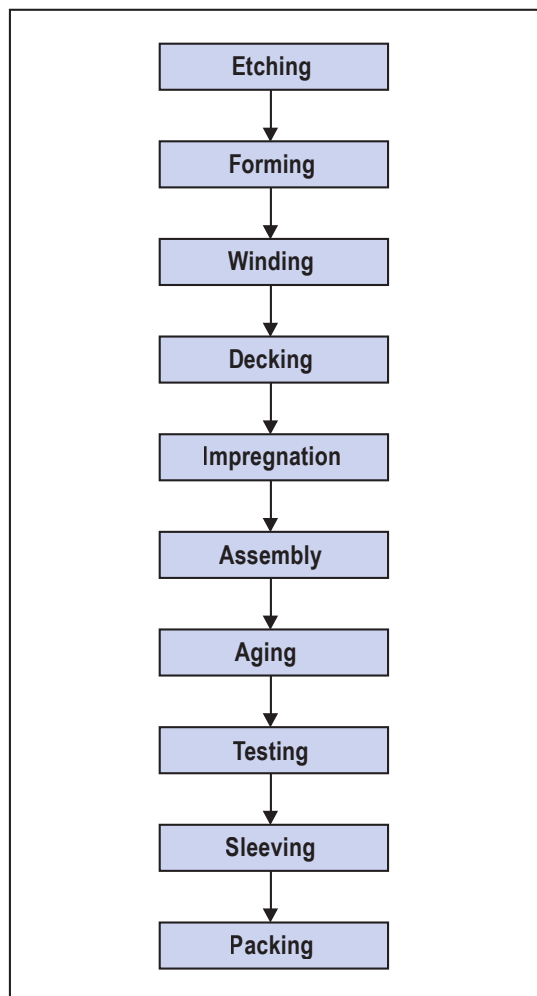
The following tests are applied and may be varied at the request of the customer. In this case the batch, or special procedure, will determine the course of action.

### Electrical:

- Leakage current
- Capacitance
- ESR
- Impedance
- Tan Delta

### Mechanical/Visual:

- Overall dimensions
- Torque test of mounting stud
- Print detail
- Box labels
- Packaging, including packed quantity



## KEMET Corporation World Headquarters

2835 KEMET Way  
Simpsonville, SC 29681

Mailing Address:  
P.O. Box 5928  
Greenville, SC 29606

www.kemet.com  
Tel: 864-963-6300  
Fax: 864-963-6521

**Corporate Offices**  
Fort Lauderdale, FL  
Tel: 954-766-2800

## North America

**Northeast**  
Wilmington, MA  
Tel: 978-658-1663

**Southeast**  
Lake Mary, FL  
Tel: 407-855-8886

**Central**  
Novi, MI  
Tel: 248-994-1030

Irving, TX  
Tel: 972-915-6041

**West**  
Milpitas, CA  
Tel: 408-433-9950

**Mexico**  
Guadalajara, Jalisco  
Tel: 52-33-3123-2141

## Europe

**Southern Europe**  
Sasso Marconi, Italy  
Tel: 39-051-939111

Skopje, Macedonia  
Tel: 389-2-55-14-623

**Central Europe**  
Landsberg, Germany  
Tel: 49-8191-3350800

Kamen, Germany  
Tel: 49-2307-438110

**Northern Europe**  
Wyboston, United Kingdom  
Tel: 44-1480-273082

Espoo, Finland  
Tel: 358-9-5406-5000

## Asia

**Northeast Asia**  
Hong Kong  
Tel: 852-2305-1168

Shenzhen, China  
Tel: 86-755-2518-1306

Beijing, China  
Tel: 86-10-5877-1075

Shanghai, China  
Tel: 86-21-6447-0707

Seoul, South Korea  
Tel: 82-2-6294-0550

Taipei, Taiwan  
Tel: 886-2-27528585

**Southeast Asia**  
Singapore  
Tel: 65-6701-8033

Penang, Malaysia  
Tel: 60-4-6430200

Bangalore, India  
Tel: 91-806-53-76817

*Note: KEMET reserves the right to modify minor details of internal and external construction at any time in the interest of product improvement. KEMET does not assume any responsibility for infringement that might result from the use of KEMET Capacitors in potential circuit designs. KEMET is a registered trademark of KEMET Electronics Corporation.*

## Disclaimer

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed.

All Information given herein is believed to be accurate and reliable, but it is presented without guarantee, warranty, or responsibility of any kind, expressed or implied.

Statements of suitability for certain applications are based on KEMET Electronics Corporation's ("KEMET") knowledge of typical operating conditions for such applications, but are not intended to constitute – and KEMET specifically disclaims – any warranty concerning suitability for a specific customer application or use. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by KEMET with reference to the use of KEMET's products is given gratis, and KEMET assumes no obligation or liability for the advice given or results obtained.

Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.