■ Application Guidelines 應用指南

1 .電路設計中的注意事項

(1)要在確認使用環境及安裝環境的基礎上，在電容器的產品目錄或仕樣書、圖紙交貨申請書(以下簡稱交貨仕樣書)中規定的電容器額定性能的範圍內進行設計。

(2)工作溫度及負荷紋波電流值不可超出產品目錄或交貨仕樣書中規定的範圍。

①電容器不可在超出規定的上限溫度(最高使用溫度)的環境下使用。

②不可施加超過負荷的紋波電流下使用。

(3)進行電路設計時，請選擇與機器壽命相符適用的電容器。

(4)電容器為極性電容器。
請確認有無連接反向電壓或交流電壓。
在極性反轉電路中請選用雙極性電容器。
注意:雙極性電容器不可以用於交流電路。

(5)在進行重複快速充放電的電路中請選用適合工作條件相符的電容器。
作為進行重複快速充放電的電路，有電焊機、相機閃光燈等。此外，電路電壓變動較大的伺服馬達等旋轉機器的控制電路也會進行重複快速的充放電。關於選用進行重複快速充放電電路中使用的電容器，請與我們聯絡。

(6)請確認電容器上是否有過電壓現象(超過額定電壓的電壓)

①請注意紋波電流(交流部分)重疊到直流電壓上時的峰值不可超過額定電壓。

②將兩個以上電容器串聯使用時，要將通過各個電容器的電壓控制在額定電壓以下。並且同時要考慮並聯加入分壓電阻器分配於各個電容器有相同電壓。

1 .Circuit Design

(1) Please make sure the application and mounting conditions to which the capacitor will be exposed to are within the conditions specified in the catalog or alternate product specification (Referred to as specification here after).

(2) Operating temperature and applied ripple current shall be within the specification.

①The capacitor shall not be used in an ambient temperature which exceeds the operating temperature specified in the specification.

②Do not apply excessive current which exceeds the allowable ripple current.

(3) Appropriate capacitors which comply with the life requirement of the products should be selected when designing the circuit.

(4) Aluminum electrolytic capacitors are polarized.
Make sure that no reverse voltage or AC voltage is applied to the capacitors. Please use bi–polar capacitors for a circuit that can possibly see reversed polarity.
Note:Even bi–polar capacitors can not be used for AC voltage application.

(5) For a circuit that repeats rapid charging / discharging of electricity, an appropriate capacitor that is capable of enduring such a condition must be used. Welding machines and photo flash are a few examples of products that contain such a circuit. In addition, rapid charging / discharging may be repeated in control circuits for servomotors, in which the circuit voltage fluctuates substantially. For appropriate choice of capacitors for circuit that repeat rapid charging / discharging, please consult Taicon.

(6) Make sure that no excess voltage (that is, higher than the rated voltage) is applied to the capacitor.

①Please pay attention so that the peak voltage, which is DC voltage overlapped by ripple current, will not exceed the rated voltage.

②In the case where more than 2 aluminum electrolytic capacitors are used in series, please make sure that applied voltage will be lower than rated voltage and the voltage will be applied to each capacitor equally using a balancing resistor in parallel with the capacitors.

(7) 電容器的外裝套管並非有絕緣保證。請勿直接用於需要絕緣功能的地方。需要外裝套管具有絕緣功能時，請洽詢我們。

(7) Outer sleeve of the capacitor is not guaranteed as an electrical insulator. Do not use a standard sleeve on a capacitor in applications that require the electrical insulation. When the application requires special insulation, please contact our sales office for details.

(8) 電容器如果在以下環境中使用，可能有故障情形發生。

①周圍環境(耐氣候性)條件

(a) 直接濺水的環境、高溫高濕的環境或結露的環境

(b) 直接濺水的環境或充滿油霧的環境

(c) 直接濺鹽水的環境或充滿鹽分的環境

(d) 充滿有毒氣體(硫化氫、亞硫酸、氯氣、溴氣、溴甲烷、氨氣等)的環境

(e) 有直接日光、臭氧、紫外線或放射線照射的環境

(f) 有酸性或鹼性溶劑濺到的環境

②震動或衝擊條件超過交貨仕樣書規定範圍外的嚴苛環境

(8) Capacitors may fail if they are used under the following conditions:

①Environmental (climatic) conditions

(a) Being exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.

(b) Being exposed to oil or an atmosphere that is filled with particles of oil.

(c) Being exposed to salty water or an atmosphere that is filled with particles of salt.

(d) In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, ammonia, etc.).

(e) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.

(f) Being exposed to acidic or alkaline solutions.

②Under severe conditions where vibration and mechanical shock exceed the applicable ranges of the specifications.

(9) 將電容器安裝到印刷電路板上時，請事先確認以下內容後再進行設計。

①將印刷電路板的孔間隔與電容器的端子間隔對合。

②設計時不可將配線及電路板靠近到電容器的壓力閥部分。

③只要交貨仕樣書中沒有規定，電容器的壓力閥部分上面均應保留出如下述的間隔。

產品直徑	間隔
φ6.3~16	2mm以上
φ18~22	3mm以上

④印刷電路板一側裝有電容器壓力閥時，請對準壓力閥的位置，將壓力閥工作時的排氣孔打開。

⑤請將螺紋端子形的封口部朝上。另外，橫向放置時，請將壓力閥朝上或將陽極端子朝上。

(9) When designing a P.C. board, please pay attention to the following:

①Have the hole spacing on the P.C. board match the lead spacing of the capacitor.

②There should not be any circuit pattern or circuit wire above the capacitor pressure relief vent.

③Unless otherwise specified, following clearance should be made above the pressure relief vent.

Case Diameter	Clearance Required
φ6.3~16	2mm or more
φ18~22	3mm or more

④In case the vent side is placed toward P.C. board (such as end seal vented parts), make a corresponding hole on the P.C. board to release the gas when vent is operated. The hole should be made to match the capacitor vent position.

⑤Screw terminal capacitors must be installed with their end seal side facing up. When you install a screw terminal capacitor lying down, the upper side must be pressure relief vent or a positive terminal.

(10)一旦發生電解液洩漏時，電解液與電解紙皆為可燃物質且電解液為導電物質，若電解液洩漏時接觸PC板，可能造成電路板腐蝕與短路導致起火與冒煙。因此，請勿在電容器封口部的下面進行電路板配線。

(10)The main chemical solution of the electrolyte and the separator paper used in the capacitors are combustible. The electrolyte is conductive. When it comes in contact with the P.C. board, there is a possibility of pattern corrosion or short circuit between the circuit pattern which could result in smoking or catching fire. Do not locate any circuit pattern beneath the capacitor end seal.

(11)請勿在電容器的周圍及印刷電路板的背面(電容器下面)安裝發熱元件。

(11)Do not design a circuit board so that heat generating components are placed near an aluminum electrolytic capacitor or reverse side of P.C. board (under the capacitor).

(12)電容器的電器特性會根據溫度及頻率的不同而變化。請在確認該變化量的基礎上進行電路設計。

(12)Electrical characteristics may vary depending on changes in temperature and frequency. Please consider this variation when you design circuits.

(13)在雙面印刷電路板上安裝電容器時，在進行電路設計時，請將電路設計成電容器下面沒有多餘的印刷電路板孔及正反面連接用貫通孔的樣式。

(13)When you mount capacitors on the double-sided P.C. boards, do not place capacitors on circuit patterns or over on unused holes.

(14)並聯兩個以上電容器使用時，需要充分考慮電流平衡。

(14)When you install more than 2 capacitors in parallel, consider the balance of current flowing through the capacitors.

(15)串聯兩個以上電容器時，要考慮電壓平衡，並將分壓電阻器插入，使其與電容器並聯。

(15)If more than 2 aluminum electrolytic capacitors are used in series, make sure the applied voltage will be lower than the rated voltage and that voltage will be applied to each capacitor equally using a balancing resistor in parallel with each capacitor.

2 .安裝注意事項

(1) 對組裝設備上已經使用的電容器，請勿再次使用。除了定期檢修時為檢測電器性能而拆卸的電容器外，均不能再次使用。

(1) Once a capacitor has been assembled in the set and power applied. Even if a capacitor is discharged, an electric potential (restriking voltage) may exist between the terminals.

(2) 即使將電容器放電後，端子間仍有可能產生電壓(再生電壓)。此時，請通過1kΩ的電阻器進行放電。

(2) Electric potential between positive and negative terminal may exist as a result of returned electromotive force, so please discharge the capacitor using a 1kΩ resistor.

(3) 放置達2年以上的電容器的漏電流有可能會增大。此時，請通過1kΩ的電阻器進行電壓處理。

(3) Leakage current of the parts that have been stored for more than 2 years may increase. If leakage current has increased, please perform a voltage treatment using 1kΩ resistor.

(4) 請確認電容器的額定值(靜電容量及電壓)後，再進行安裝。

(4) Please confirm ratings before installing capacitors on the P.C. board.

(5) 請確認電容器的極性後，再進行安裝。

(5) Please confirm polarity before installing capacitors on the P.C. board.

(6) 請勿將電容器摔落到地上，摔落後的電容器請勿使用。

(6) Do not drop capacitors on the floor, nor use a capacitor that was dropped.

2 .Mounting

(7) 安裝時請勿使電容器主體變形。

(7) Do not damage the capacitor while installing.

(8) 請確認電容器的端子間隔和印刷電路板間隔一致後，再進行安裝

(8) Please confirm that the lead spacing of the capacitor matches the hole spacing of the P.C. board prior to installation.

(9) 電容器要緊密安裝在PC板上(非浮起狀態)。

(9) Type capacitor should be installed tightly to the P.C. board (allow no gap between the P.C. board and bottom of the capacitor).

(10) 利用自動插入機放置和固定電容器時，強度不可過大。

(10) Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.

(11) 請注意由自動插入機及裝配機的吸附器、產品檢驗器及對中操作所引起的衝擊力。

(11) Please pay attention to the mechanical shock to the capacitor by suction nozzle of the automatic insertion machine or automatic mounter, or by product checker, or by centering mechanism.

(12) 利用焊鐵進行的焊接

①焊接條件(溫度、時間)不可超出交貨仕樣書中規定的範圍。

②因端子間隔和印刷電路板孔間隔不一致而需要加工引線端子時，在進行焊接之前，加工時不可使用電容器主體承受壓力。

③利用烙鐵進行修整時，如果需要先將焊接的電容器卸下，請將焊錫充分融化後再拆卸，以免使用電容器的端子承受壓力。

④請勿讓烙鐵接觸到電容器的主體。

(12) Hand soldering.

① Soldering condition must be confirmed to be within the specification.

② If it is necessary that the leads must be formed due to a mismatch of the lead space to hole space on the board, bend the lead prior to soldering without applying too much stress to the capacitor.

③ If you need to remove parts which were soldered, please melt the solder enough so that stress is not applied to lead.

④ Please pay attention so that solder iron does not touch any portion of capacitor body.

(13) 流動焊

①進行焊接時，請勿將電容器主體浸入焊料中。插入印刷電路板，只有對電容器一側的相反側背面進行焊接。

②焊接條件(預熱、焊接溫度、端子浸漬時間)不可超出交貨仕樣書中規定的範圍。

③除端子部以外，其餘部分不可附著有焊劑。

④進行焊接時，要注意避免其他部件接觸到電容器。

(13) Flow soldering (Wave solder)

① Aluminum capacitor body must not be submerged into the solder bath. Aluminum capacitors must be mounted on the "top side" of the P.C. board and only allow the bottom side of the P.C. board to come in contact with the solder.

②Soldering condition must be confirmed to be within specification.

Solder temperature: 260 ± 5°C
Immersing lead time: 10 ± 1second
Thickness of P.C. board: 1.6mm

③ Please avoid having flux adhere to any portion except the terminal.

④ Please avoid contact between other components and the aluminum capacitor.

(14) 回流焊

①焊接條件(預熱、焊接溫度、時間、回流次數)不可超出交貨仕樣書中定的範圍。

②使用紅外線加熱器時，由於紅外線吸收率根據電容器的顏色及材料的不同而不同，因此需要注意加熱的程度。

(15) 焊接時以及固定電容器用的樹脂的硬化等而使電容器在150°C以上的環境大氣中放置2分鐘以上，或者讓高溫氣體、熱射線直接接觸電容器時，外裝套管有時會發生收縮、膨脹、龜裂。

(16) 將電容器焊接到印刷電路板上之後，不可將電容器主體傾斜、橫躺或扭曲使用。

(17) 將電容器焊接到印刷電路板上之後，不可將電容器當作把手來移動印刷電路板。

(18) 將電容器焊接到印刷電路板上之後，不可讓其他物體碰撞到電容器。此外，重疊放置印刷電路板時，不可使印刷電路板或其他部件等碰到電容器。

(19) 鹵素的影響

鋁電解電容器對鹵素元素非常敏感(特別是氯元素和溴元素)，鹵素對電容器影響程度和電解液、封口材料有關。

如果使用含有鹵素的助焊劑、溶劑(清洗劑、固定劑、塗層劑)或煙燻劑，鹵化物可能會透過封口材料侵入電容器內部，引起下方的化學反應。這些化學反應會導致漏電流增加、內壓升高防爆閥打開、電容器開路。這些化學反應也會隨著電壓和溫度升高而加快。

(14) Reflow soldering (SMD only)

①Soldering condition must be confirmed to be within specification.

②When an infrared heater is used, please pay attention to the extent of heating since the absorption rate of infrared, will vary due to difference in the color of the capacitor body, material of the sleeve and capacitor size.

(15) Shrinkage, bulging and cracking could be seen on the outer sleeve of the capacitor when capacitors are kept in for more than 2 minutes at 150°C ambient temperature during soldering at reflow process or resin curing process. Applying high temperature gas or heat ray to capacitor can cause the same phenomenon.

(16) Do not tilt lay down or twist the capacitor body after the capacitor are soldered to the P.C. board.

(17) Do not carry the P.C board by grasping the soldered capacitor.

(18) Please do not allow anything to touch the capacitor after soldering. If P.C. board are stored in a stack, please make sure P.C. board or the other components do not touch the capacitor.The capacitors shall not be effected by any radiated heat from the soldered P.C. board or other components after soldering.

(19) Aluminum electrolytic capacitors are sensitive to contamination of halogen ions(especially to chlorine and bromine ions)though the degree of the effect depends on the properties of the electrolyte and/or sealing materials used in the capacitors. For using the halide–containing flux, solvent (cleaning agent, adhesive or coating materials) or fumigant, the halide may pen–etrate into the capacitor through the rubber seal materials and cause the following corrosion reactions to occur. These reac–tions can lead to an increase in leakage current, opening of the pressure relief vent, and/or open–circuit failure in the capacitor.

The reactions are accelerated as the voltage and/or tempera–ture rises.

【腐蝕反應】

鹵化物分解

$RX + H_2O \rightarrow ROH + H^+ + X^-$ .....(1)

腐蝕反應

$Al_2O_3 + 6H^+ + 6X^- \rightarrow 2AlX_3 + 3H_2O$ .....(2)

$Al + 3X^- \rightarrow AlX_3 + 3e^-$ .....(3)

↓

$2AlX_3 + 6H_2O \rightarrow 2Al(OH)_3 + 6H^+ + 6X^-$ .....(4)

RX:鹵化合物

X^- :鹵離子(Cl^-、F^-、Br^-等)

鹵化物滲透素子害電解液接觸後發生如式(1)所示的水解反應且釋放出鹵離子。鹵離子隨後和鋁及氧化鋁發生反應，生成AlX_3(式 2、3)，而AlX_3更進一步發生水解反應產生氫氧化物和鹵離子(如式4)。在式4中產生的鹵離子將反覆式2–4的化學反應,如腐蝕作用一直進行下去。下面是使用助焊劑,清洗劑,固定劑,塗層劑和燻蒸劑的鹵素預防措施。

Corrosion reactions

Decomposition of halides

$RX + H_2O \rightarrow ROH + H^+ + X^-$ .....(1)

Corrosion reactions

$Al_2O_3 + 6H^+ + 6X^- \rightarrow 2AlX_3 + 3H_2O$ .....(2)

$Al + 3X^- \rightarrow AlX_3 + 3e^-$ .....(3)

↓

$2AlX_3 + 6H_2O \rightarrow 2Al(OH)_3 + 6H^+ + 6X^-$ .....(4)

Halides that penetrated the element inside a capacitor make contact with the electrolyte, by which the halides are hydrolyzed and release halogen ions as shown on Reaction (1)The halogen ions then attack aluminum by anodic half–cell reaction, producing AlX_3 (Reaction 2 and 3).AlX_3 is then hydrolyzed, which is decomposed to aluminum hydroxide and the halogen ions (Reaction (4). The halogen ions reproduced are repeatedly used and reproduced by the reactions of (2) ~(4), and then the corrosion develops endlessly. Shown below are precautions for use of flux, cleaning agents, adhesive, coating materials and fumigant.

(19–1) 助焊劑的影響

雖然一般助焊劑中含有會腐蝕電容器的鹵離子活性劑,但現在市場上已經有銷售不含鹵化合物的助焊劑。市場上有一些助焊劑雖然是使用"無鹵"的名稱,但有一部分這樣的"無鹵"助焊劑中含有大量的非離子性鹵化物也會對電容器造成腐蝕。下列為鹵素含量較低且不會對電容器造成腐蝕的助焊劑: AHQ3100K(Asahi 化學研究所) POZ6 (Senjyu金屬)

(19–1) Usually flux products contain an activator of ionic halide system, which has been associated with the corrosion issues of capacitors, and nowadays non–ionic halide system type flux products have been increasingly available on the market. Some of the latter flux type have been classified into the so called “non–halogen flux” or “halogen–free flux”, and parts of the “non–halogen” or “halogen–free” flux products may contain a large amount of non–ionic halides, which can also adversely affect the capacitors.Flux types whose halogen ion concentrations are so low that the capacitor may not be adversely affected include: · AHQ3100K (Asahi) · POZ6 (Senjyu)

(19–2) 清洗劑

(19–2–1) 酒精清洗劑

①高級乙醇類清洗劑(新型溶劑)

派因阿爾法(Pine Alpha)ST–100S(荒州化學工業) 庫林斯魯(Clean Through)750H, 750K, 750L, and 710M (花王)德克諾克阿Techno care FRW–14,15,16,17

(19–2) Cleaning Agents

(19–2–1) Alcohol Cleaning Agents

①Fatty–alcohol cleaning agents (New type of solvent) Pine Alpha ST–100S (Arakawa Chemical) Clean Through 750H, 750K, 750L, and 710M (Kao)Techno care FRW–14 through 17 (GE Toshiba Silicones)

②IPA異丙醇

（清洗條件）

60°C,10分鐘內之浸泡或超聲波清洗。

注意事項

(a)清洗時不可擦拭電容器標識部分或其他組件以及PC板，因使用清洗液進行清洗時可能將電容器標識洗掉。

(b)清洗或漂洗過後乾燥過程可能引起電容器外部套管膨脹或收縮。

(c)如果使用鹼性清潔劑(例:庫林斯魯 750H)，清洗後請用水漂洗以確保電容器表面沒有殘留。

(d)請控制清洗劑內中助焊劑濃度在2wt%以內。

(e)IPS(異丙醇)中如果包含二甲苯或其它改善清潔性能的溶劑，可能會使橡膠材料的膨脹。

(f)由於清潔劑的類型和使用條件不同，電容器的塑膠套管可能會失去光澤或外觀變白等現象。

②IPA (Isopropyl alcohol)

Cleaning conditions

Either of Immersion or ultrasonic cleaning, for a maximum of 10 minutes at a maximum liquid temperature of 60°C.

Precautions

(a)Make sure that the markings on a capacitor are not rubbed against any other component or the PC board during cleaning.Note that shower cleaning can cause the markings on the capacitor to be washed off.

(b)A drying process following a water cleaning or rinsing process may cause the outer sleeve materials of a capacitor to swell or shrink.

(c)After using a weak–alkaline cleaning agent (e.g. Clean Through 750H), rinse with water to make sure that no alkaline residue is left on the capacitor.

(d)Control a flux concentration in a cleaning agent within 2wt%.

(e)IPS (Isopropyl Alcohol), if containing xylene or other solvent to improve its cleanability, may swell the rubber seal materials.

(f)Depending on the type of cleaning agent or conditions, note that the outer sleeve of a capacitor may lose a gloss or whiten in appearance.

(19–2–2)其他溶劑類:

為了避免電容器失效，請勿使用下列溶劑:

- 鹵化類溶劑:因為鹵素的腐蝕作用會使電容器故障失效。
- 強鹼類溶劑:會腐蝕(溶解)電容器外殼。
- 萜烯和石油類溶劑:會使橡膠材料惡化。
- 二甲苯類溶劑:會使橡膠材料惡化。
- 丙酮類溶劑:會使電容器標示變模糊。

(19–2–2)Other Solvents

To avoid capacitor failures, do not use the following cleaning agents:

- Halogenated system: causes capacitor failures due to corrosion.
- Alkali system: corrodes (dissolves) the aluminum can case.
- Terpene and petroleum system: deteriorates the rubber seal materials.
- Xylene: deteriorates the rubber seal materials as well.
- Acetone: erases the markings printed on a capacitor.

(19–3)固定劑和塗層劑

使用的固定劑和塗層劑時，請注意以下幾點:

(a)請勿使用任何含有鹵化物的固定劑或塗層劑。

(b)請注意封口橡膠和PC板之間不應該有助焊劑或其他污漬殘留。

(c)在添加固定劑和塗層劑之前，請確保清洗劑已經被清除乾淨。

請不要將封口橡膠周圍全部用固定劑或塗層劑封住。

(d)使用不當的固定劑和塗層劑加熱或固定方法，會使電容器外套管膨脹或收縮。對於固定劑和塗層劑

(19–3)Adhesive and Coating Material

To use adhesives and/or coating materials for aluminum electrolytic capacitors, make sure of the following conditions:

(a)Do not use any of adhesive or coating materials containing halogenated solvents.

(b)No flux residue nor stain is left between the rubber seal of a capacitor and PC board.

(c)Dry the capacitor to remove residual cleaning agents before applying adhesive and coating materials. Do not cover up the entire surface of the rubber seal of the capacitor with adhesive and coating materials.

(d)Improper heating and/or curing conditions for adhesives and coating materials may cause the sleeve to swell or shrink. Please consult us for proper conditions.

(e)鋁電解電容器的封口完全被樹酯封住的話，會使電容器內部的壓力無法適當排放，有可能會帶來危險的狀況。樹酯中含有過量的鹵素離子的話，其成分會通過封口橡膠侵入到電容器內部，會導致不良的發生，使用上請注意。

(f)請注意在使用中固定劑、塗層劑所使用的溶劑種類，有可能會使套管表面發生光澤度的影響或漂白的可能。

(g)請注意在使用中固定劑、塗層劑中含有二甲苯的時候，有可能會使封口橡膠劣化，使助焊劑成分更容易侵入電容器內部。

(e) For a non-solid aluminum electrolytic capacitor, covering up the entire surface of the rubber seal with resin mold materials will obstruct the normal diffusion of internal hydrogen gas from the capacitor and result in serious failures. Also, where the adhesive and coating materials contain a large amount of halogen ions, the halogen ions will contaminate the inside of the capacitor through the rubber seal materials, which cause the capacitor to become a failure.

(f) The outer sleeve of a capacitor may lose a gloss or whiten in appearance depending on solvent materials that the adhesive or coating materials contains.

(g) Some adhesives or coating materials contain organic solvent such as Xylene. Xylene can deteriorate the rubber seal materials, which cause the flux ingredients to penetrate into the capacitor.

(19-4) 熏蒸的影響

在電子設備類進出口時，有時需用溴化甲烷等鹵素化合物進行熏蒸處理。此時，如果鋁電解電容器接觸到溴化甲烷等鹵素化合物，會有產生鹵素離子而發生腐蝕反應的危險。

在進出口的時候，敝司會考慮使用不需熏蒸處理的捆包方法。而對於客戶，鋁電解電容器單品或是包含鋁電解電容器的電子元件成品、半成品，請注意在進出口時的熏蒸處理與最終的包裝形態。(即使使用瓦楞紙或是塑料進行包裝，熏蒸氣體也有侵入內部的危險)

(19-4) Effect of Fumigation

In exporting or importing electronic devices, they may be exposed to fumigation with halide such as methyl bromide. Where aluminum electrolytic capacitors exposed to halide such as methyl bromide, the capacitors will be damaged with the corrosion reaction with the halogen ions.

For the export and import, Taicon considers using some packaging method and so forth that the fumigation is not required to. For customers to export or import electronic devices, semi-assembly products or capacitor components, confirm if they will be exposed to fumigation and also consider final condition of packaging. (Note that either cardboard or vinyl package has a risk of fumigation gas penetration.)

(19-5) 其他含有鹵化物之化學品

在安裝鋁電解電容器的過程中，或是任何情況時，將鋁電解電容器暴露在含有鹵化物 (或其蒸氣/揮發性氣體) 的環境下，都有可能造成鹵化物從封口侵入電容器內部，進而發生腐蝕反應的危險。

(19-5) Other chemicals containing halides

During aluminum electrolytic capacitors installation, or any exposure to halides (or its vapor / volatile gas) environments. Halides will penetrate rubber seal and capacitors with risking corrosion reaction with the halogen ions.

3.設備使用注意事項

(1)請勿直接接觸電容器的端子，有觸電的危險。

(2)不可以使導電體與電容器之間距離過近會短路。此外，不可使用電容器接觸酸或鹼性的水溶液等導電性溶液。

(3)請確保安裝設備的環境條件不會有溢出的水或油。陽光直射。 紫外線。 輻射，有毒氣體，振動或機械衝擊。

3 .In the Equipment

(1) Do not directly touch terminal by hand.

(2) Do not short between terminals by conductor, nor spill conductible liquid such as alkaline or acidic solution on or near the capacitor.

(3) Please make sure that the ambient conditions where the set is installed will be free from spilling water or oil. direct sunlight. ultraviolet rays. radiation, poisonous gases, vibration or mechanical shock.

4.保養檢修

(1) 對於工業機器中使用的電容器要進行定期檢修。檢修項目包括如下內容。

①外觀: 有無壓力閥的動作、液體洩漏等明顯異常。

②電器性能: 漏損電流、靜電容量、損失角的正切值及產品目錄或交貨仕樣書中規定的項目。

4.Maintenance and Inspection

(1) Please periodically inspect the aluminum capacitors that are installed in industrial equipment.
The following items should be checked:

①Appearance: Remarkable abnormality such as vent operation, leaking electrolyte etc.

②Electrical characteristic: Capacitance, dielectric loss tangent, leakage current, and items specified in the specification.

5.緊急狀況

(1) 在使用裝置的過程中，電容器的壓力閥動作，出現蒸氣時，請切斷裝置的主電源或者電源線的插頭從插座中拔出。

(2) 電容器的壓力閥工作時，將噴出超過+100°C的高溫氣體，此時不可將臉部靠近。一旦噴出的氣體進入眼睛或吸入時，應立即用水清洗眼部或漱口。不可舔食電容器的電解液。如果電解液濺到皮膚上，應使用肥皂進行沖洗。

5.In an Emergency

(1) If you see smoke due to operation of safety vent, turn off the main switch or pull out the plug from the outlet.

(2) Do not bring your face near the capacitor when the pressure relief vent operates, The gasses emitted from that are over 100°C. If the gas gets into your eyes, please flush your eyes immediately in pure water. If you breathe the gas, immediately wash out your mouth and throat with water. Do not ingest electrolyte, if your skin is exposed to electrolyte, please wash it away using soap and water.

6.保管條件

(1) 關於電容器的保管，建議在室溫5~35°C，相對溼度75%的條件下進行保管。

(2) 請不要在能夠直接接觸到水、鹽水以及油的環境中保管電容器。

(3) 請不要在充滿有害氣體(硫化氫、亞硫酸、亞硝酸、氯氣、氨氣、溴、溴化甲烷等)的環境中保管電容器

(4) 請不要在有臭氧、紫外線及放射線照射的環境中保管電容器

6.Storage

(1) It is recommended to keep capacitors between the ambient temperatures of 5°C to 35°C and a relative humidity of 75% or below.

(2) Do not keep Aluminum Electrolytic Capacitors in a condition where spray of water, saltwater or oil is expected.

(3) Do not store Aluminum Electrolytic Capacitors in an environment full of hazardous gas (e.g. hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas, ammonia, bromine gas, methyl bromide).

(4) Do not keep Aluminum Electrolytic Capacitors under exposure to ozone, ultraviolet rays or radiation.

7.廢棄處理

(1) 在廢棄電容器時，可採取以下任意一種方法。

①在電容器上開孔或充分破碎後焚燒。

②不焚燒電容器時，應交與專業的工業廢棄物處理廠，由其進行掩埋等處理。

7.Disposal

(1) Take either of the following methods in disposing of capacitors.

①Make a hole in the capacitor body or crush capacitors and incinerate them.

②If incineration is not applicable, hand them over to a waste disposal agent and have them buried in a landfill.