# ENVIRONMENTAL CHARACTERISTICS 環境特性
## TRIMMER POTENTIOMETERS

## 〈サーメットトリマ：CT-6 シリーズ〉 <Cermet trimmer: CT-6 series>

### 1. 抵抗温度特性 Resistance temperature characteristics

関連規格 Related standard: MIL-STD-202, method 304

抵抗器を 25 ℃、− 15 ℃、− 55 ℃、25 ℃、65 ℃、120 ℃の恒温槽中に 30 ～ 45 分間保ち、全抵抗値を測定し、それぞれ 25 ℃に対する温度係数 (TCR) を、次式より求める。

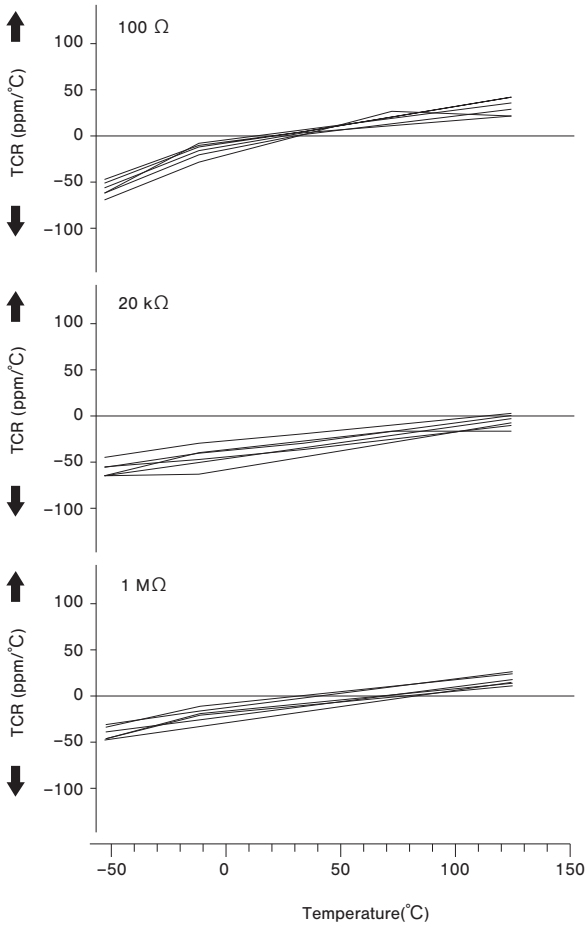
Samples are kept at the ambient temperature of 25℃, −15℃, −55 ℃, 25℃, 65℃ and 120℃ respectively for 30 to 45 minutes in a temperature chamber, and the total resistance measurement is made at each tempera-ture. Then, the temperature coefficient reffered to a refer-ence temperature of 25℃ is computed by the following formula.

$$TCR\ \left(10^{-6}/\,^{\circ}C\right) = \frac{R2-R1}{R1 \times (T2-T1)} \times 10^{6}$$

R1：基準温度 (25 ℃) での抵抗値
Resistance value at reference temperature of 25℃
R2：試験温度での抵抗値
Resistance value at test temperature
T1：基準温度
The reference temperature
T2：試験温度
The test temperature

但し、初めの 25 ℃は負側、後の 25 ℃は正側の温度に対する基準とする。

The computation of the T.C.R. at the temperatures below zero (−15℃ & −55℃ ) is to be made using the resistance value measured initially at 25℃ as a reference, and that for 65℃ and 120℃ is to be made using the resistance value measured in the middle at 25℃ as a reference.




〈仕様 Specifications〉

TCR: ±100 $10^{-6}$/°C maximum (50 Ω ～ 2 MΩ)
±250 $10^{-6}$/°C maximum (10 Ω , 20 Ω )

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### 2. 回転寿命試験 Rotational life

関連規格 Related standard: MIL-R-22097 4.6.18

無負荷状態で電気的有効角の 90 % 以上の区間を 200 回、回転させ、全抵抗値変化及び、機械的損傷の有無を調べる。

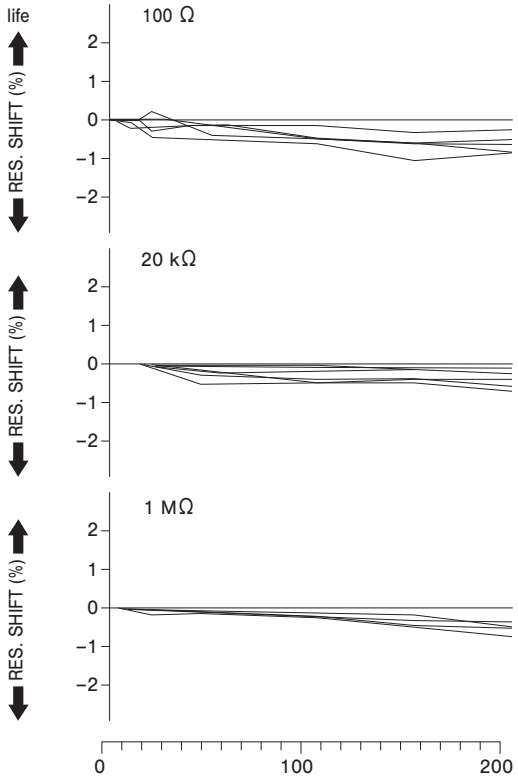
The rotor shaft continuously cycled through not less than 90 % of the actual effective electrical travel under no load, for a total of 200 cycles. After this, the samples are checked for a change in the total resistance value and evidence for mechanical damage.

〈仕様 Specifications〉

Δ R/R：全抵抗値変化
Change in total resistance

ΔR/R ≦ ±(2 Ω+3 %)

機械的損傷無し。
There shall be no mechanical damage.




### 3. 高温放置試験 High temperature exposure

関連規格 Related standard: MIL-R-22097 4.6.17

抵抗器を 120 ℃恒温槽中に 250 時間放置した後、室温に戻し全抵抗値及び設定安定度の変化を調べる。

Samples are exposed to an ambient temperature of 120 ℃ in a temperature chamber for a period of 250 hours. Then, the samples are checked for a change in the total resistance value and setting stability.

〈仕様 Specifications〉

Δ R/R：全抵抗値変化
Change in total resistance
ΔR/R ≦ ±3 %

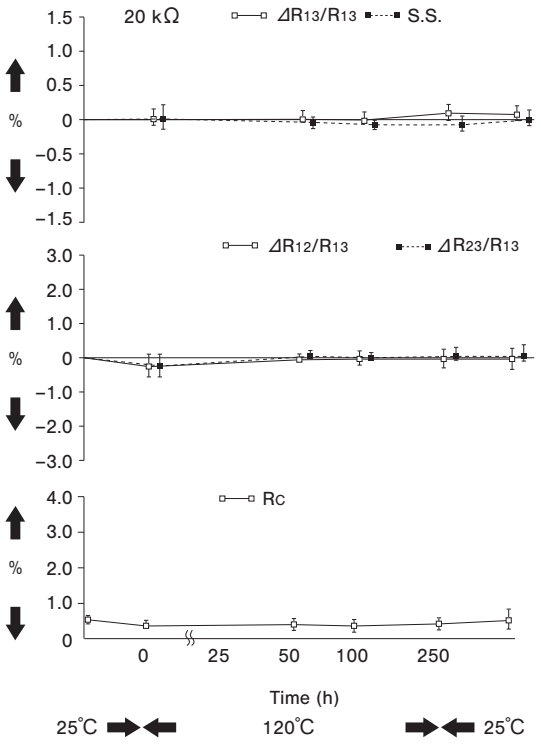
S.S.：電圧設定安定度
Setting stability
S.S. ≦ ±2 %

$R_{13}$：1 番端子と 3 番端子間の抵抗値
The resistance between terminal 1 and terminal 3

$R_{12}$：1 番端子と 2 番端子間の抵抗値
The resistance between terminal 1 and terminal 2

$R_{23}$：2 番端子と 3 番端子間の抵抗値
The resistance between terminal 2 and terminal 3

$R_C$：集中接触抵抗
Contact resistance



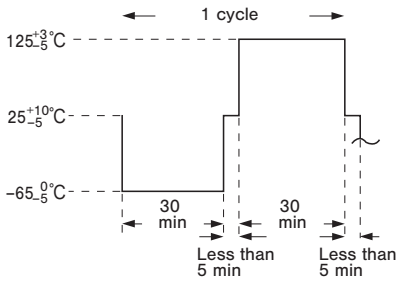
## 〈サーメットトリマ：ST-4 シリーズ〉 <Cermet trimmer: ST-4 series>

### 1. 熱衝撃試験 Thermal shock

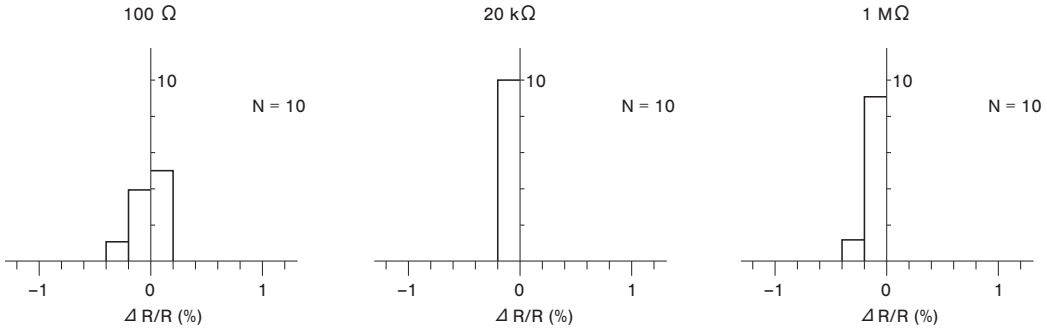
関連規格 Related standards: MIL-R-22097 4.6.8
MIL-STD-202, method 107, condition B

抵抗器を右記の温度条件で 5 サイクル試験した後の全抵抗値変化及び設定安定度、電気的不連続、機械的損傷の有無を調べる。

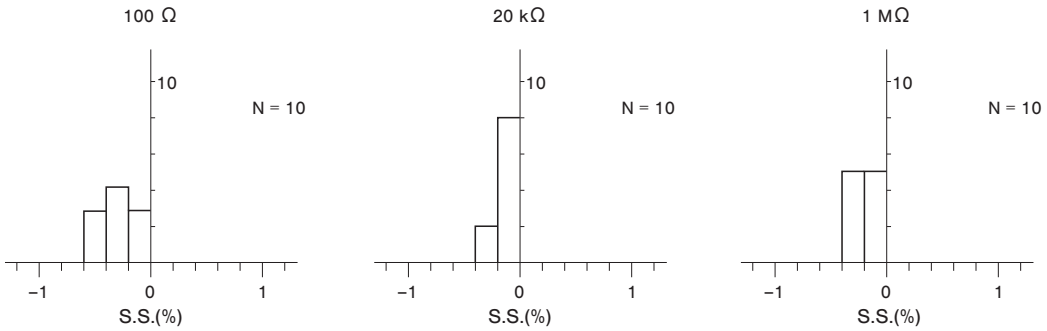
Samples are subjected to the following temperature cycle for 5 times and checked for a change in the total resistance value, setting stability, electrical discontinuity and mechanical damage.




［全抵抗値変化 Change in total resistance value］仕様 Specification: ΔR/R ≦ ±2 %




［電圧設定安定度 Setting stability］仕様 Specification: S.S. ≦ ±1 %




ΔR/R (%) ＝全抵抗値変化 Change in total resistance value

S.S. (%) ＝電圧設定安定度 Setting stability

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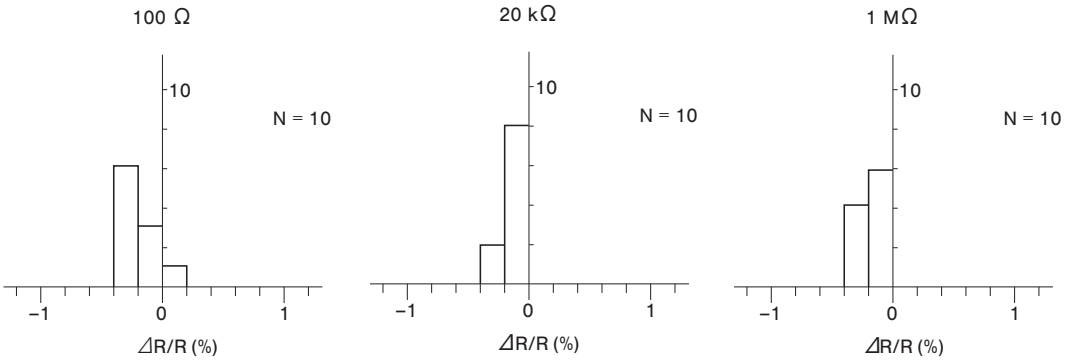
## 〈サーメットトリマ：ST-4 シリーズ〉 <Cermet trimmer: ST-4 series>

### 2. はんだ耐熱性試験　Soldering heat resistance

抵抗器を 260 $^{0}_{-5}$ ℃のはんだ槽中に 10 秒間浸漬し、全抵抗値変化、機械的損傷の有無を調べる。

The trimmer is immersed in a pot of molten solder at a temperature of 260 $^{0}_{-5}$°C for period of 10 seconds, and checked for a change in the total resistance value and evidence of mechanical damage.

［全抵抗値変化　Change in total resistance value］仕様　Specification: ΔR/R ≦ ±1 %




機械的損傷無し
There shall be no mechanical damage.

### 3. 負荷寿命試験　Load life

関連規格　Related standard: MIL-R-22097 4.6.15
MIL-STD-202, method 108, condition D

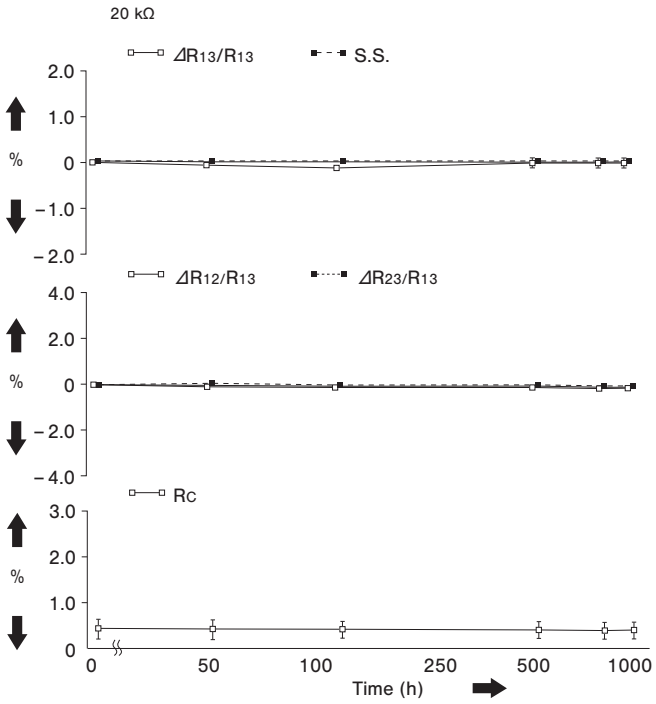
抵抗器を70℃の恒温槽中に保ち端子1-3間に定格電圧を1.5時間ON、0.5時間OFFと断続的に加え1000時間経過後に於て全抵抗値、設定安定度の変化を調べる。
また、試験中抵抗器が恒温槽内にある状態で、50、100、250、500、750、1000時間の抵抗値変化を調べる。

DC rated working voltage is applied intermittently to the end terminals (1 and 3) of the trimmers, 1.5 hours ON and 0.5 hour OFF, for a total of 1000 hours at a test temperature of 70°C in the temperature chamber. Then, the samples are checked for a change in the total resistance value and setting stability. While the samples are in the temperature chamber, a change in the resistance value is checked at 50, 100, 250, 500, 750 and 1000 hours respectively.

〈仕様　Specificaitons〉

△ R/R：全抵抗値変化
Change in total resistance
ΔR/R ≦ ±3 %

S.S.：電圧設定安定度
Setting stability
S.S. ≦ ±1 %




R13：1 番端子と 3 番端子間の抵抗値
The resistance between terminal 1 and terminal 3

R12：1 番端子と 2 番端子間の抵抗値
The resistance between terminal 1 and terminal 2

R23：2 番端子と 3 番端子間の抵抗値
The resistance between terminal 2 and terminal 3

Rc：集中接触抵抗
Contact resistance