



OIML Member State  
Japan



OIML Certificate N<sup>o</sup>  
R117/1995-JP1-11.01  
Revision 2

## OIML CERTIFICATE OF CONFORMITY

### Issuing Authority

Name: National Metrology Institute of Japan /National Institute of Advanced Industrial Science and Technology (NMIJ/AIST)  
Address: AIST Tsukuba Central 3-9  
Tsukuba Ibaraki 305-8563, Japan  
Person responsible: Dr. Ryoji Chubachi, President of AIST

### Applicant

Name: Tokico Technology Ltd.  
Address: 3-9-27 Tsurumi Chuo, Tsurumi-ku, Yokohama City, Kanagawa,  
Japan

### Manufacturer of the certified type

Name: Tokico Technology Ltd. Shizuoka Works  
Address: 13 Tanyou, Kakegawa City, Shizuoka, Japan

### Identification of the certified type:

Fuel dispenser for motor vehicles, A series  
Further characteristics see page 2 to 4

This certificate attests the conformity of the above identified type (represented by the sample or samples identified in the associated Test Report) with the requirements of the following Recommendation of the International Organization of Legal Metrology (OIML):

**R117**  
Edition 1995  
for accuracy class 0.5

**R118**  
Edition 1995

This certificate relates only to the metrological and technical characteristics of the type of instrument covered by the relevant OIML Recommendation identified above.

This certificate does not bestow any form of legal international approval.



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Revision 2

The conformity was established by the results of tests and examinations provided in the associated Test report(s):

N° R117/1995-JP1-2011-01;  
N° R117/1995-JP1-2011-03;  
N° R117/1995-JP1-2013-01.

The Issuing Authority

The CIML Member

NMIJ/AIST



Dr. R. Chubachi

Dr. Y. Miki

President of AIST

2013-04-15

2013-04-15

Characteristics: Fuel dispenser for motor vehicles, A series

| Accuracy class | Maximum flowrate (Qmax) | Minimum Flowrate (Qmin) | Minimum measured Quantity (litres) | Maximum volume Indication (number of digits) | Maximum unit price (number of digits) | Maximum price-to-pay (number of digits) |
|----------------|-------------------------|-------------------------|------------------------------------|--|---------------------------------------|---|
| Low flowrate   |                         |                         |                                    |  |                                       |   |
| 0.5            | 50 L/min                | 3 L/min                 | 5                                  | 6 / 7  | 6                                     | 6 / 7                                   |
| High flowrate  |                         |                         |                                    |  |                                       |   |
| 0.5            | 90 L/min                | 3 L/min                 | 5                                  | 6 / 7  | 6                                     | 6 / 7                                   |

Liquids: Gasoline, Diesel, Kerosene

Comprising of:

- Meter

Manufacturer: Tokico Technology ltd.

Pattern designation: type F-1, F-2, F-3, F-4



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- Gas elimination device (integral with pump)

Manufacturer: Tokico Technology ltd.  
Pattern designation: EP-1, GPU-1

- Measuring transducer

Manufacturer: Tokico Technology ltd.  
Pattern designation: SPG3

- Calculator

Manufacturer: Tokico Technology ltd.  
Pattern designation: LCD-YV, LCD-YV7

- Hose

Manufacturer: Tokico Technology ltd.  
Pattern designation: YC16D, YG19D, YG25D, TC16D, TC19D

Manufacturer: Good Year  
Pattern designation: Flexsteel futura vaporrecovery hose 3/4"  
Flexsteel futura hose 1"

Manufacturer: GATES  
Pattern designation: blacksnake 3/4"

- Nozzle

Manufacturer: Tokico Technology ltd.  
Pattern designation: type-FF, type-FL, type-FF-VR, type-FL-VR, type-G

Manufacturer: OPW  
Pattern designation: 11-A3/4, 12VWH, 7-H

Manufacturer: TDW  
Pattern designation: 11-A3/4



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- Break valve

Manufacturer: Tokico Technology Ltd.  
Pattern designation: TBAS-1, TBAW-1

Manufacturer: OPW  
Pattern designation: 66CAS

Important note: Apart from the mention of the Certificate's reference number and the name of the OIML Member State in which the Certificate is issued, partial quotation of the Certificate and of the associated Test Report is not permitted, although either may be reproduced in full.

# T e s t   r e p o r t

Test report number : R117/1995-JP1-2013-01

Specimen : Fuel dispenser for motor vehicles

Issued by : National Metrology Institute of Japan

Test address : National Metrology Institute of Japan  
1-1-1 Umezono, Tsukuba 305-8563, Japan

Test specifications : OIML R118 (edition 1995)

Application : Tokico Technology Ltd.  
3-9-27Tsurumi Chuo, Tsurumi-ku, Yokohama City,  
Kanagawa, Japan

Manufacturer : Tokico Technology Ltd. Shizuoka Works  
13 Tanyou, Kakegawa City, Shizuoka, Japan

Signature : Hiroaki Morinaka  
Hiroaki MORINAKA  
Chief of Legal Flow Metrology Section Fluid Flow Division

Date of issue : 2013. 3. 26

## GENERAL INFORMATION CONCERNING THE PATTERN

Applicant No. : 24-013  
Applicant : Tokico Technology Ltd.  
Manufacturer : Tokico Technology Ltd. Shizuoka Works

### Measuring system

Pattern designation: A series  
Low flow rate: 50 litres/min  
High flow rate: 90 litres/min  
Maximum flow rate: 90 litres/min  
Minimum flow rate: 3 litres/min  
Minimum measured quantity: 5 litres  
Maximum pressure: 0.33 MPa  
Minimum pressure: 0.10 MPa  
Maximum unit price  
(number of digits): 6 digits  
Maximum price to pay  
(number of digits): Calculator Pattern designation :LCD-YV 6 digits  
Calculator Pattern designation :LCD-YV7 7 digits  
Maximum volume  
(number of digits): Calculator Pattern designation :LCD-YV 6 digits  
Calculator Pattern designation :LCD-YV7 7 digits  
Temperature range: -25 °C to + 55 °C  
Liquids (or viscosity range): Gasoline / Diesel / Kerosene  
Mains power:  
Voltage: AC100-120V/AC200-240V(Display)  
Frequency: 50/60Hz  
Type of display: LCD display

### Meter

Manufacturer : Tokico Technology Ltd.  
Pattern designation: type F-1  
type F-2  
type F-3  
type F-4  
Pattern approval mark: -  
Maximum flow rate: 90 litres/min  
Minimum flow rate: 3 litres/min  
Minimum measured quantity: 5 litres

### Gas elimination device (integral with pump)

Manufacturer : Tokico Technology Ltd.  
Pattern designation: EP-1  
Volume: 1700cc  
Maximum flow rate: 90 litres/min  
Minimum flow rate: 3 litres/min  
Maximum pressure: 0.33 MPa  
Minimum pressure: 0.10 MPa

Measuring transducer

Manufacturer: Tokico Technology ltd.  
Pattern designation: SPG3  
Number of pulses per revolution 50 pulses

Calculator

Manufacturer : Tokico Technology ltd.  
Pattern designation: LCD-YV  
LCD-YV7  
Mains power:  
Voltage: AC100-120V/AC200-240V  
Frequency: 50/60 Hz

Hose

Manufacturer: Tokico Technology ltd.  
Pattern designation: YC16D  
YG19D  
YG25D  
TC16D  
TC19D  
Manufacturer: Good Year  
Pattern designation: Flexsteel futura vaporrecovery hose 3/4"  
Flexsteel futura hose 1"  
Manufacturer: GATES  
Pattern designation: blacksake 3/4"

Nozzle

Manufacturer: Tokico Technology ltd.  
Pattern designation: type-FF  
type-FL  
type-FF-VR  
type-FL-VR  
type-G  
Manufacturer: OPW  
Pattern designation: 11-A3/4  
12VWH  
7-H  
Manufacturer: TDW  
Pattern designation: 11-A3/4

Break valve

Manufacturer: Tokico Technology ltd.  
Pattern designation: TBAS-1  
TBAW-1  
Manufacturer: OPW  
Pattern designation: 66CAS

## CHECK LIST

**Notes: 1** Item numbering refers to international Recommendation OIML R117 , Edition 1995(E) Measuringsystems for liquids other than water.

**2** For each test , the check list has been completed according to the example:

|                                       |   |   |
|---------------------------------------|---|---|
|                                       | + | - |
| if the instrument has passed the test | × |   |
| if the instrument has failed          |   | × |
| if the test is not applicable         | / | / |

| §(R117)   | Requirement  | + | - | Remarks                |
|---|--|---|---|------------------------|
| <b>GENERAL PROVISIONS</b>                                       |  |   |   |                        |
| <b>MARKINGS</b>   |  |   |   |                        |
| 2.19.1  | Markings applied legibly and indelibly on the dial of the indicating device or on a special data plate:  | × |   |                        |
|   | • Pattern approval sign  | × |   |                        |
|   | • Manufacturers identification mark or trade mark designation  | × |   |                        |
|   | • Serial number  | × |   |                        |
|   | • Year of manufacture  | × |   |                        |
|   | • Minimum measured quantity (MMQ)  | × |   |                        |
|   | • Maximum flowrate (Qmax)  | × |   |                        |
|   | • Minimum flowrate (Qmin)  | × |   |                        |
|   | • Maximum pressure   | × |   |                        |
|   | • Minimum pressure   | × |   |                        |
|   | • Liquids  | × |   |                        |
| • Temperature range   | /  | / |   |                        |
| <b>INDICATIONS</b>  |  |   |   |                        |
| 2.9.1   | Unit of volume: litre( l or L)   | × |   |                        |
| 2.9.5   | Difference between volume indications of more than one indicating device $\leq 1$ scale interval of indicating device with the greatest scale interval               | × |   |                        |
| <b>BRANCHES AND BY-PASSES</b>                                   |  |   |   |                        |
| 2.16.1  | Branches downstream of meter: diversion to any receiving receptacle(s) other than that intended is impossible  | × |   |                        |
| <b>SEALING DEVICES AND STAMPING PLATE</b>                       |  |   |   |                        |
| 2.20.1  | Seals easily accessible and preventing access to components which allow alteration of the measurement result without damaging the seals including the stamping plate | × |   |                        |
| <b>REQUIREMENTS FOR ANCILLARY DEVICES OF A MEASURING SYSTEM</b> |  |   |   |                        |
| <b>ADJUSTMENT DEVICE</b>  |  |   |   |                        |
| 3.1.4   | Difference between consecutive values of the ratio $\leq 0.001$  | × |   | Ratio:0.0008 or 0.0001 |
|   | Adjustment by means of a by-pass of the meter impossible   | × |   |                        |



| <b>VOLUME INDICATING DEVICE</b> |  |   |                          |
|---------------------------------|--|---|--------------------------|
| 3.2.1.1                         | Reading precise, easy and unambiguous by simple juxtaposition  | × |                          |
|                                 | Decimal sign clear   | × |                          |
| 3.2.1.2                         | Scale interval: $1 \times 10^n$ , $2 \times 10^n$ or $5 \times 10^n$   | × | scale interval $0.01L$   |
| 3.2.1.4                         | Continuous indicating device:<br>MSVD $\geq$ volume corresponding to 2 mm on the scale, and $\geq 1/5$ of scale interval                       | / | /                        |
|                                 | Discontinuous indicating device:<br>MSVD $\geq 2$ scale intervals  | × | MSVD: $0.05L \geq 0.02L$ |
| 3.2.2.1                         | Element with graduation entirely visible (except element corresponding one revolution corresponds to 10n authorized units of volume)           | / | /                        |
| 3.2.2.2                         | Element with graduation entirely visible:<br>one revolution of the element corresponds to scale interval of the following element              | / | /                        |
| 3.2.2.3                         | Element with only part of graduation visible through a window (except first element) :<br>discontinuous movement                               | / | /                        |
| 3.2.2.4                         | Advance by one figure of following element when preceding element passes from 9 to 0   | / | /                        |
| 3.2.2.5                         | Dimension of the window for the first element $\geq 1.5 \times$ (distance between two graduated scale marks)                                   | / | /                        |
| 3.2.2.6                         | Width of scale mark $\leq 1/4$ of scale spacing  | / | /                        |
|                                 | Apparent scale spacing $\geq 2$ mm   | / | /                        |
| 3.2.3                           | Electronic indicating device<br>continuous display of volume during the period of measurement  | × |                          |
| 3.2.4.2                         | Zero setting device not permitting any alteration of the result  | × |                          |
| 3.2.4.3                         | No indication of any result during zeroing   | × |                          |
| 3.2.4.4                         | Continuous indicating device:<br>residual indication after zeroing $\leq 1/2$ of MSVD  | / | /                        |
| 3.2.4.5                         | Discontinuous indicating device: indicate zero without any   | × |                          |
| <b>PRICE INDICATING DEVICE</b>  |  |   |                          |
| 3.3.2                           | Unit price adjustable and indicated before measurement by a displaying device; valid for the whole transaction                                 | × |                          |
|                                 | Elapsed time between changing unit price and before next measurement starts: at least five seconds   | × | 5 seconds                |
| 3.3.3                           | (mutatis mutandis)   |   |                          |
| (3.2.1.1)                       | Reading precise, easy and unambiguous  | × |                          |
| (3.2.2.4)                       | Advance by figure of following element when preceding element passes from 9 to 0   | / | /                        |
| (3.2.4.2)                       | Zero setting device not permitting any alteration of the result  | × |                          |
| (3.2.4.3)                       | No indication of any result during zeroing   | × |                          |
| 3.3.4                           | Monetary unit or its symbol in the immediate vicinity of the indicating device.  | × |                          |
| 3.3.5                           | Zero setting devices of price indication and volume indication:<br>zeroing of either of them automatically involves zeroing the other          | × |                          |
| 3.3.6                           | Continuous indicating device:<br>MSPD $\geq$ price corresponding to 2 mm on the scale, and $\geq$ price corresponding to 1/5 of scale interval | / | /                        |
|                                 | Discontinuous indicating device:<br>MSPD $\geq$ price corresponding to 2 scale intervals   | × | MSPD: $0.05 \geq 0.02$   |
| 3.3.8                           | Continuous indicating device:<br>residual indication after zeroing $\leq 1/2$ of MSPD  | / | /                        |
| 3.3.9                           | Discontinuous indicating device:<br>indicate zero without any ambiguity  | × |                          |

| PRINTING DEVICE    |  |   |   |                                |
|--------------------|--|---|---|--------------------------------|
| 3.4.1              | Printed volume scale interval:<br>$1 \times 10^n$ , $2 \times 10^n$ or $5 \times 10^n$ and $\leq$ MSVD, and smallest scale interval of indicating device | / | / | no printer connected           |
| 3.4.2              | Unit of volume: litre (l or L)<br>Figures, unit or symbol, (and decimal sign) of volume printed on   | / | / |                                |
| 3.4.3              | If connected to more than one measuring system: print  | / | / |                                |
| 3.4.4              | If repetition of printing:<br>copies are marked clearly  | / | / |                                |
| 3.4.5              | If volume determination by difference between two printed values:<br>withdrawal of ticket during measurement impossible                                  | / | / |                                |
| 3.4.6              | Zeroing device of printer and volume indicator: zeroing of one of them involves zeroing the other  | / | / |                                |
| 3.4.7              | Figures monetary unit or symbol, (and decimal sign) of price printed on ticket   | / | / |                                |
| 3.4.8              | Printed price scale interval:<br>$1 \times 10^n$ , $2 \times 10^n$ or $5 \times 10^n$ monetary unit, and $\leq$ MSPD                                     | / | / |                                |
| PRE-SETTING DEVICE |  |   |   |                                |
| 3.6.2              | If several independent controls:<br>scale interval corresponding to one control equals range of control of the next lower order                          | / | / | only keypad                    |
| 3.6.4              | Figures of pre-setting display clearly distinguishable from those of volume indicator  | x |   |                                |
| 3.6.5              | Indication of the selected quantity during delivery remains unaltered or returns progressively to zero   | x |   |                                |
| 3.6.6              | Difference between pre-set volume and indicated volume $\leq$  | x |   |                                |
| 3.6.7              | Unit of pre-set volume same as that of volume indicator  | x |   |                                |
|                    | Marking of unit of volume or its symbol on pre-setting mechanism   | x |   |                                |
| 3.6.8              | Scale interval of pre-setting device $\geq$ scale interval of volume   | x |   | pre-set unit of 1L             |
| 3.6.10             | (mutatis mutandis for price pre-setting devices)   |   |   |                                |
| (3.6.2)            | If several independent controls:<br>scale interval corresponding to one control equals range of control of the next lower order                          | / | / | only keypad                    |
| (3.6.4)            | Figures of pre-setting display clearly distinguishable from those of price indicator   | x |   |                                |
| (3.6.5)            | Indication of the selected quantity during delivery remains unaltered or returns progressively to zero   | x |   |                                |
| (3.6.6)            | Difference between pre-set price and indicated price $\leq$ MSPD   | x |   |                                |
| (3.6.7)            | Unit of pre-set price same as that of price in dicator   | x |   |                                |
|                    | Marking of monetary unit or its symbol on pre-setting mechanism  | x |   |                                |
| (3.6.8)            | Scale interval of pre-setting device $\geq$ scale interval of price  | x |   | Example:<br>pre-set unit of ¥1 |

| SPECIFIC REQUIREMENTS FOR MEASURING SYSTEMS EQUIPPED WITH ELECTRONIC DEVICE |  |   |   |
|---|--|---|---|
| <b>CHECKING FACILITIES FOR MEASUREMENT TRANSDUCER</b>                       |  |   |   |
| 4.3.2.1   | When each pulse represents elementary volume, at least security level B defined by ISO 6551  | × |   |
|   | Checking facilities of type P  | × |   |
|   | Checking interval not exceeding the duration of measurement of amount of liquid equal to MSVD  | × | every 1 pulse                               |
|   | Possibility of testing the operation of checking facilities during pattern approval and verification   | × | by removing pulser wire                     |
| <b>CHECKING FACILITIES FOR CALCULATION</b>                                  |  |   |   |
| 4.3.3.1   | Checking facilities for operation of type P or I   | × |   |
|   | Checking interval for type I at each delivery  | × |   |
| 4.3.3.2   | Checking facilities for validity of calculation of type P  | × |   |
|   | Existence of a means for controlling continuity  | × |   |
| <b>CHECKING FACILITIES FOR INDICATING DEVICE</b>                            |  |   |   |
| 4.3.4.1   | Checking facilities for operation of type P or I if indication can be reconstituted  | × |   |
| 4.3.4.2   | Tests "all displaying" - "all blanking" - "all zeros" test with duration of each sequence $\geq 0.75s$   | × | 0.75s                                       |
| 4.3.4.3   | Possibility of testing the operation of checking facilities during verification  | × | A communication line is removed and checked |
| <b>CHECKING FACILITIES FOR PRINTING DEVICE</b>                              |  |   |   |
| 4.3.5   | Checking facilities of type I or P<br>Checking includes presence of paper and of electronic control<br>Possibility of testing the operation of checking facilities during pattern approval and verification<br>Where action is a warning: given on or by the printing device | / | / no printer connected                      |
| <b>OTHER SPECIFIC REQUIREMENTS</b>  |  |   |   |
| 5.1.1   | Ratio between maximum flowrate and minimum flowrate: at least ten  | × | 50L/min:3L/min                              |
| 5.1.2   | If integral pump: gas elimination device placed immediately upstream of the meter inlet  | × |   |
| 5.1.3   | If no integral pump: check that the installation schemes provide for necessary securities  | × |   |
| 5.1.4   | Device for resetting the volume indicator to zero present  | × |   |
|   | Height of figures of volume indicator with zero setting device $\geq 10$ mm  | × | 33mm  |
|   | If price indicator, presence of zero setting device  | × |   |
| 5.1.5   | Next delivery inhibited until nozzle(s) replaced and indicator reset   | × |   |
| 5.1.6   | When maximum flowrate ( $Q_{max}$ ) $\leq 3.6$ m <sup>3</sup> /h, MMQ $\leq 5$ L   | × | MMQ=5L                                      |
| 5.1.8   | Fuel dispenser interruptible   | × |   |
| 5.1.9   | Minimum duration of operation of display after power failure $\geq 15$ min continuously and automatically, or $\geq 5$ min in one or several periods controlled manually during 1 h  | × | continuation during 15 minutes              |
|   | Delivery interrupted by power failure:<br>impossible to continue delivery if power failure has lasted more   |   |   |
| 5.1.10  | Delay time between measurement value and indicated values $\leq$   | × | every 30ms                                  |
| 5.1.12  | Hidden volume at the beginning of the delivery $\leq 2 \times MSVD$  | × | hides=0.07L                                 |
|   | Hidden price at the beginning of the delivery $\leq 2 \times MSPD$   | × |   |

## CONCLUSION OF TESTS

Application No. :24-013

Date : 28-Feb-13

| No. | Test description                         | + | - | Remark |
|-----|--|---|---|--------|
| 1   | Accuracy                                 | / | / |        |
| 2   | Minimum mesured quantity                 | / | / |        |
| 3   | Flow interruption                        | / | / |        |
| 4   | Gas elimination device                   | / | / |        |
| 5   | Variation in the internal volume of hose | / | / |        |
| 6   | Endurance test                           | / | / |        |
| 7   | Dry heat (non-condensing)                | × |   |        |
| 8   | Cold                                     | × |   |        |
| 9   | Damp heat, cyclic (condensing)           | × |   |        |
| 10  | Power voltage variations                 | × |   |        |
| 11  | Short-time power reductions              | × |   |        |
| 12  | Electrical bursts                        | × |   |        |
| 13  | Electrostatic discharges                 | × |   |        |
| 14  | Electromagnetic susceptibility           | × |   |        |

Notes :

|   |   |                                       |
|---|---|---------------------------------------|
| + | - |                                       |
| × |   | if the instrument has passed the test |
|   | × | if the instrument has failed          |
| / | / | if the test is not applicable         |

Remarks :

Observer :

## TEST REPORT

Symbols, units and equations:

|           |  |
|-----------|--|
| $P_u$     | Unit price (¥/L)   |
| $t$       | Time (s)   |
| $Q$       | Flowrate of liquid (L/min)   |
| $V_i$     | Volume indication of dispenser (L)   |
| $P_i$     | Price indication (or printed if not fitted with a price indicator) of dispenser (¥)                    |
| $P_c$     | Calculated price (¥)   |
| $V_n$     | Volume indication of test measure or computed volume from simulated pulses (L)                         |
| $T$       | Temperature of liquid in the test measure ( $^{\circ}\text{C}$ )                                       |
| $T_r$     | Reference temperature of test measure ( $^{\circ}\text{C}$ )   |
| $T_m$     | Temperature of liquid passing through the meter ( $^{\circ}\text{C}$ )                                 |
| $E_v$     | Error of volume indication (%)   |
| $E_p$     | Error of price indication (¥)  |
| $Q_a$     | Flowrate of air (L/min)  |
| $V_a$     | Volume of air (L)  |
| $\alpha$  | Cubic expansion coefficient of test liquid due to temperature ( $^{\circ}\text{C}^{-1}$ )              |
| $\beta$   | Cubic expansion coefficient of test measure due to temperature ( $^{\circ}\text{C}^{-1}$ )             |
| $V_{nc}$  | Volume of test measure, compensated for deviation from reference temperature (L)                       |
| $V_{mc}$  | Volume passing through the meter compensated for deviation from reference temperature and pressure (L) |
| $\bar{E}$ | Mean value of error of indication (% or ¥)   |
| $n$       | Number of tests at the same condition  |
| $P_c$     | $= V_i \times P_u$   |
| $E_v$     | $= (V_i - V_n) / V_n \times 100$ $V_n$ may be replaced by $V_{nc}$ , if appropriate                    |
| $E_p$     | $= P_i \times P_c$   |
| $Q$       | $= (V_i \times 60) / t$  |
| $V_{nc}$  | $= V_n \times [1 + \beta(T - T_r)]$  |
| $\bar{E}$ | $= [E(1) + E(2) + \dots + E(n)] / n$   |
| Range     | = Maximum error — minimum error (% or Yen)   |

Note: If significant differences are recorded between the temperature of the liquid in the meter and the test measure, a correction on the liquid volume passing through the meter is computed as follows:

$$V_{mc} = V_{nc} \times [1 + \alpha(T_m - T)]$$

and in this case  $V_{nc}$  is to be replaced by  $V_{mc}$  in the whole text.

If  $\beta$  is not known, the following values can be used.

| Material         | $\beta(^{\circ}\text{C}^{-1})$<br>(uncertainty: $5 \times 10^{-6} \text{ }^{\circ}\text{C}^{-1}$ ) |
|------------------|--|
| Borosilica glass | $10 \times 10^{-6}$  |
| Glass            | $27 \times 10^{-6}$  |
| Mild steel       | $33 \times 10^{-6}$  |
| Stainless steel  | $51 \times 10^{-6}$  |
| Copper, Brass    | $53 \times 10^{-6}$  |
| Aluminium        | $69 \times 10^{-6}$  |

## 7 Dry heat (non condensing)

Application No: 24-013

Date: 2013/1/16-17

Signature: Ito

| Test condition | Q<br>L/min | $P_u$<br>¥/L | $V_i$<br>L | $P_i$<br>¥ | $V_n$<br>L | $P_c$<br>¥ | $E_v$<br>% | mpe<br>% | $E_p$<br>¥ | MSPD<br>¥ |
|----------------|------------|--------------|------------|------------|------------|------------|------------|----------|------------|-----------|
| 20°C           | 30.0       | 123          | 100.410    | 12350      | 100.41     | 12350.0    | 0.00       | 0.5      | 0.00       | 6.15      |
| 55°C           | 30.0       | 123          | 101.380    | 12470      | 101.38     | 12470.0    | 0.00       | 0.5      | 0.00       | 6.15      |
| 20°C           | 30.0       | 123          | 100.560    | 12369      | 100.56     | 12369.0    | 0.00       | 0.5      | 0.00       | 6.15      |

Ambient conditions (20°C):

Temperature: 23.7 °C

Humidity: 23.0 %RH

Pressure: 1012.3 hPa

Ambient conditions (55°C):

Temperature: 22.3 °C

Humidity: 23.0 %RH

Pressure: 1011.2 hPa

Ambient conditions (20°C):

Temperature: 22.2 °C

Humidity: 23.0 %RH

Pressure: 1008.3 hPa

Remarks: Simulator used in this test

Simulator manufacturer: TOKIKO

mechanical type(0.01L/P)

## 8 Cold

Application No: 24-013

Date: 2013/1/17-18

Signature: Ito,Fujimoto

| Test condition | Q<br>L/min | $P_u$<br>¥/L | $V_i$<br>L | $P_i$<br>¥ | $V_n$<br>L | $P_c$<br>¥ | $E_v$<br>% | mpe<br>% | $E_p$<br>¥ | MSPD<br>¥ |
|----------------|------------|--------------|------------|------------|------------|------------|------------|----------|------------|-----------|
| 20°C           | 30.0       | 123          | 100.560    | 12369      | 100.56     | 12369      | 0.00       | 0.5      | 0.00       | 6.15      |
| -25°C          | 30.0       | 123          | 100.620    | 12376      | 100.62     | 12376      | 0.00       | 0.5      | 0.00       | 6.15      |
| 20°C           | 30.0       | 123          | 100.240    | 12330      | 100.24     | 12330      | 0.00       | 0.5      | 0.00       | 6.15      |

Ambient conditions (20°C):

Temperature: 22.2 °C

Humidity: 23.0 %RH

Pressure: 1008.3 hPa

Ambient conditions (-25°C):

Temperature: 23.0 °C

Humidity: 20.0 %RH

Pressure: 1011.7 hPa

Ambient conditions (20°C):

Temperature: 22.7 °C

Humidity: 19.0 %RH

Pressure: 1010.9 hPa

Remarks: Simulator used in this test  
 Simulator manufacturer:TOKIKO  
 mechanical type(0.01L/P)

## 9 Damp heat, cyclic (condensing)

Application No: 24-013

Date:

2013/1/28-21

Signature: Fujimoto

| Test condition                          | Q(6)<br>L/min | $P_u$<br>¥ | $V_i$<br>L | $H_i$<br>% | $P_i$<br>¥ | $V_n$<br>L | $P_c$<br>¥ | $E_v$<br>% | mpe<br>% | $E_p$<br>¥ | MSPD<br>¥ |
|---|---------------|------------|------------|------------|------------|------------|------------|------------|----------|------------|-----------|
| 20°C<br>50%RH                           | 30            | 123        | 100.240    | 47.0       | 12330      | 100.24     | 12330      | 0.00       | 0.5      | 0.00       | 6.15      |
| Damp heat, cyclic (24 hours x 2 cycles) |               |            |            |            |            |            |            |            |          |            |           |
| 20°C<br>50%RH                           | 30            | 123        | 100.290    | 48.5       | 12336      | 100.29     | 12336      | 0.00       | 0.5      | 0.00       | 6.15      |

$H_i$ :Relative humidity indication

Ambient conditions

Temperature: 22.7 °C

Humidity: 18.8 %RH

Pressure: 1010.9 hPa

Remarks: Simulator used in this test  
 Simulator manufacturer:TOKIKO  
 mechanical type(0.01L/P)



## 10 Power voltage variation

Application No: 24-013

Date: 2013/1/21

Signature: Fujimoto

| Test condition | $U_i$<br>V | Q<br>L/min | $P_u$<br>¥/L | $V_i$<br>L | $P_i$<br>¥ | $V_n$<br>L | $P_c$<br>¥ | $E_v$<br>% | mpe<br>% | $E_p$<br>¥ | MSPD<br>¥ |
|----------------|------------|------------|--------------|------------|------------|------------|------------|------------|----------|------------|-----------|
| $U$            | 170.0      | 90.0       | 123          | 30.170     | 3711       | 30.17      | 3711       | 0.00       | 0.5      | 0.00       | 6.15      |
| 1.1 $U$        | 264.0      | 90.0       | 123          | 30.180     | 3712       | 30.18      | 3712       | 0.00       | 0.5      | 0.00       | 6.15      |
| 0.85 $U$       | 85.0       | 90.0       | 123          | 30.170     | 3711       | 30.17      | 3711       | 0.00       | 0.5      | 0.00       | 6.15      |

$U$  : Mains voltage

$U_i$ : Indicated mains voltage

Ambient conditions

Temperature: 13.7 °C

Humidity: 46.8 %RH

Pressure: 1023.7 hPa

Remarks: Simulator used in this test

Simulator manufacturer: TOKIKO

mechanical type(0.01L/P)

Power circuit: No. ZWS\*\*.\*\*

Voltage: 100V - 240V

## 11 Short-time power reductions

Application No: 24-013

Date: 2013/1/21

Signature: Fujimoto

| Test condition                        | Q<br>L/min | $P_u$<br>¥/L | $V_i$<br>L | $P_i$<br>¥ | $V_n$<br>L | $P_c$<br>¥ | $E_v$<br>% | S.F.<br>% | $E_p$<br>¥ | MSPD<br>¥ | Checking<br>facility |
|---------------------------------------|------------|--------------|------------|------------|------------|------------|------------|-----------|------------|-----------|----------------------|
| No reduction                          | 30.0       | 123          | 30.220     | 3717       | 30.22      | 3717.0     | 0.00       | 0.1       | 0.00       | 6.15      | -                    |
| 100% reduction<br>1/2 cycle, 10 yimes | 30.0       | 123          | 44.530     | 5477       | 44.53      | 5477.0     | 0.00       | 0.1       | 0.00       | 6.15      | yes                  |
| 50% reduction<br>1 cycle, 10 yimes    | 30.0       | 123          | 46.390     | 5706       | 46.39      | 5706.0     | 0.00       | 0.1       | 0.00       | 6.15      | yes                  |

Ambient conditions

Temperature: 14.0 °C

Humidity: 45.4 %RH

Pressure: 1023.3 hPa

Remarks:

Simurator used in this test  
 Simurator manufacturer: TOKIKO  
 mechanical type(0.01L/P)  
 Power circuit: No. ZWS\*\*-\*\*  
 Voltage: 100V - 240V

## 12 Electrical bursts

Application No: 24-013

Date: 2013/1/21

Signature: Fujimoto

| Test condition     | Q<br>L/min | P <sub>u</sub><br>¥/L | V <sub>i</sub><br>L | P <sub>i</sub><br>¥ | V <sub>n</sub><br>L | P <sub>c</sub><br>¥ | E <sub>v</sub><br>% | S.F.<br>% | E <sub>p</sub><br>¥ | MSPD<br>¥ | Checking<br>facility |
|--------------------|------------|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-----------|---------------------|-----------|----------------------|
| Noiseless          | 30.0       | 123                   | 30.270              | 3723                | 30.27               | 3723                | 0.00                | 0.1       | 0.00                | 6.15      | yes                  |
| L1, Positive       | 30.0       | 123                   | 31.680              | 3897                | 31.68               | 3897                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L1, Negative       | 30.0       | 123                   | 32.090              | 3947                | 32.09               | 3947                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L2, Positive       | 30.0       | 123                   | 31.740              | 3904                | 31.74               | 3904                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L2, Negative       | 30.0       | 123                   | 31.590              | 3886                | 31.59               | 3886                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| PE, Positive       | 30.0       | 123                   | 31.660              | 3894                | 31.66               | 3894                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| PE, Negative       | 30.0       | 123                   | 32.300              | 3973                | 32.30               | 3973                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L1+L2, Positive    | 30.0       | 123                   | 31.660              | 3894                | 31.66               | 3894                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L1+L2, Negative    | 30.0       | 123                   | 31.610              | 3888                | 31.61               | 3888                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L1+PE, Positive    | 30.0       | 123                   | 31.490              | 3873                | 31.49               | 3873                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L1+PE, Negative    | 30.0       | 123                   | 31.690              | 3898                | 31.69               | 3898                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L2+PE, Positive    | 30.0       | 123                   | 31.650              | 3893                | 31.65               | 3893                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L2+PE, Negative    | 30.0       | 123                   | 32.340              | 3978                | 32.34               | 3978                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L1+L2+PE, Positive | 30.0       | 123                   | 31.990              | 3935                | 31.99               | 3935                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |
| L1+L2+PE, Negative | 30.0       | 123                   | 32.340              | 3978                | 32.34               | 3978                | 0.00                | 0.1       | 0.00                | 6.15      | Yes                  |

Line 1: Phase/Neutral

Line 2: Phase/Neutral

Ambient conditions

Temperature: 14.1 °C

Humidity: 43.8 %RH

Pressure: 1023.0 hPa

Remarks:

Simulator used in this test  
 Simulator manufacturer: TOKIKO  
 Power circuit: No. ZWS\*\*-\*\*  
 Voltage: 100V - 240V

### 13 Electrostatic discharge(Page 1)

Application No: 24-013

Date: 2013/1/22

Signature: Fujimoto

| Test Condition     |   | Q     | P <sub>u</sub> | V <sub>i</sub> | P <sub>i</sub> | V <sub>n</sub> | P <sub>c</sub> | E <sub>v</sub> | S.F. | E <sub>p</sub> | MSPD     | Checking facility |
|--------------------|---|-------|----------------|----------------|----------------|----------------|----------------|----------------|------|----------------|----------|-------------------|
|                    |   | L/min | ¥/L            | L              | ¥              | L              | ¥              | %              | %    | ¥              | ¥        | yes / No          |
| Non-discharge      |   | 30    | 123            | 30.700         | 3776           | 30.70          | 3776           | 0.00           | 0.1  | 0.00           | 6.15     | yes / No          |
| Front              | + | 30    | 123            | 45.910         | 5647           | 45.91          | 5647           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Back               | - | 30    | 123            | 46.050         | 5664           | 46.05          | 5664           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Right              | + | 30    | 123            | 45.890         | 5644           | 45.89          | 5644           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Left               | - | 30    | 123            | 45.970         | 5654           | 45.97          | 5654           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Top                | + | 30    | 123            | 46.730         | 5748           | 46.73          | 5748           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Contact discharge  |   | 30    | 123            | 45.750         | 5627           | 45.75          | 5627           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Front              | + | 30    | 123            | 45.950         | 5652           | 45.95          | 5652           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Back               | - | 30    | 123            | 46.850         | 5763           | 46.85          | 5763           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Right              | + | 30    | 123            | 45.960         | 5653           | 45.96          | 5653           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Left               | - | 30    | 123            | 46.040         | 5663           | 46.04          | 5663           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Air discharge      |   | 30    | 123            | 46.970         | 5777           | 46.97          | 5777           | 0.00           |      | 0.1            | 6.15     | yes / No          |
| Front              | - | 30    | 123            | 46.790         | 5755           | 46.79          | 5755           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Back               | + | 30    | 123            | 46.050         | 5664           | 46.05          | 5664           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Indirect discharge |   | 30    | 123            | 45.910         | 5647           | 45.91          | 5647           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Front(1)           | - | 30    | 123            | 45.750         | 5627           | 45.75          | 5627           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Right(2)           | + | 30    | 123            | 46.220         | 5685           | 46.22          | 5685           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Back(3)            | - | 30    | 123            | 47.720         | 5870           | 47.72          | 5870           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Left(4)            | + | 30    | 123            | 46.630         | 5735           | 46.63          | 5735           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Discharged point   |   | 30    | 123            | 46.240         | 5688           | 46.24          | 5688           | 0.00           |      | 0.00           | 6.15     | yes / No          |
| Ambient conditions |   | 30    | 123            | 46.090         | 5669           | 46.09          | 5669           | 0.00           | 0.00 | 6.15           | yes / No |                   |

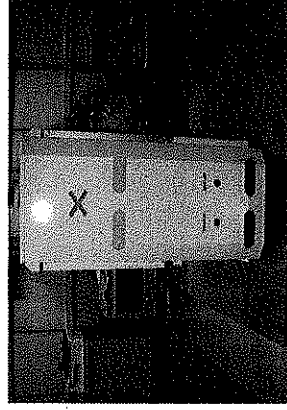
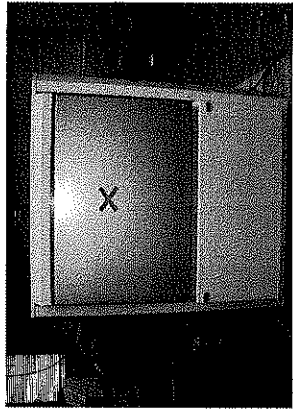
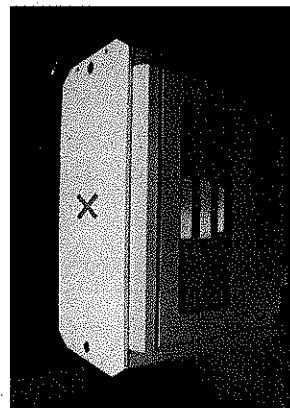
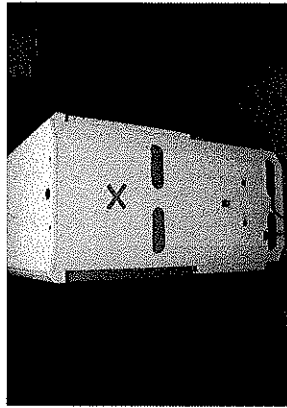
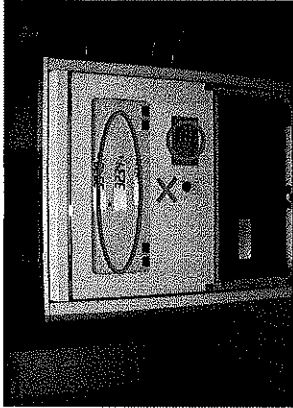
Temperature: 13.5 °C

Humidity: 55.3 %RH

Pressure: 1005.4 hPa

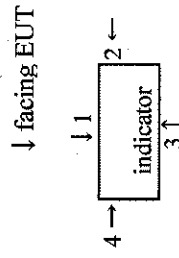
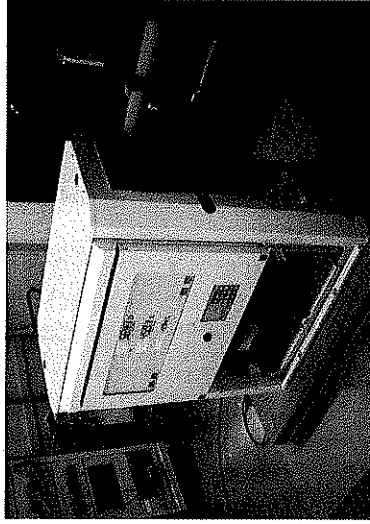
### 13 Electostatic discharge(Page 2)

Direct discharge



- :Contact discharges
- :Air discharges

Indirect discharge



# 14 Electromagnetic susceptibility (Page 1)

Application No: 24-013

Date: 2013/1/22,24

Signature: Sugaya Fujimoto

| Test condition | S.V.<br>decade/s | Q<br>L/min             | P <sub>u</sub><br>¥/L | V <sub>i</sub><br>L | P <sub>i</sub><br>¥ | V <sub>n</sub><br>L | P <sub>c</sub><br>¥ | E <sub>v</sub><br>% | S.F.<br>% | E <sub>p</sub><br>¥ | MSPD<br>¥ | Checking facility |    |
|----------------|------------------|------------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-----------|---------------------|-----------|-------------------|----|
|                |                  |                        |                       |                     |                     |                     |                     |                     |           |                     |           | yes               | no |
| Noiseless      | -                | 30                     | 123                   | 30.08               | 3700                | 30.08               | 3700                | 0.00                |           | 0.00                | 6.15      | yes               | no |
| Front          | V                | 1.5 × 10 <sup>-3</sup> | 123                   | 2112.500            | 259838              | 2112.50             | 259838              | 0.00                |           | 0.00                | 6.15      | yes               | no |
|                | H                | 1.5 × 10 <sup>-3</sup> | 123                   | 1686.880            | 207486              | 1686.88             | 207486              | 0.00                |           | 0.00                | 6.15      | yes               | no |
| Right          | V                | 1.5 × 10 <sup>-3</sup> | 123                   | 1657.000            | 203811              | 1657.00             | 203811              | 0.00                |           | 0.00                | 6.15      | yes               | no |
|                | H                | 1.5 × 10 <sup>-3</sup> | 123                   | 1672.820            | 205757              | 1672.82             | 205757              | 0.00                | 0.1       | 0.00                | 6.15      | yes               | no |
| Left           | V                | 1.5 × 10 <sup>-3</sup> | 123                   | 1690.030            | 207874              | 1690.03             | 207874              | 0.00                |           | 0.00                | 6.15      | yes               | no |
|                | H                | 1.5 × 10 <sup>-3</sup> | 123                   | 1667.010            | 205042              | 1667.01             | 205042              | 0.00                |           | 0.00                | 6.15      | yes               | no |
| Back           | V                | 1.5 × 10 <sup>-3</sup> | 123                   | 1739.150            | 213915              | 1739.15             | 213915              | 0.00                |           | 0.00                | 6.15      | yes               | no |
|                | H                | 1.5 × 10 <sup>-3</sup> | 123                   | 1637.800            | 201449              | 1637.80             | 201449              | 0.00                |           | 0.00                | 6.15      | yes               | no |

Ambient conditions

Temperature: 21.5 Humidity: 41.1 Pressure: 1000.4

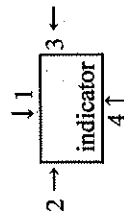
S.V.: Sweep Velocity

F.S.: Field Strength

V: Vertical

H: Horizontal

↓ facing EUT



**14 Electromagnetic susceptibility (Page 2)**

