Renewal “No.1 Recorder”

Power of Paper
Introduction

This document summarizes the essence of the uR10000 to help you understand the concept, features, and functions of the product. This is useful for sales activities as a sales tool. The structure of the document is sorted by functions (input, display, record, operation, communication); please read appropriate chapters if you want to know and make good use of this for customer sales presentation. In addition, the specifications and functional details are covered in the following documents. Read them as necessary.

GS 04P01B01-01 uR10000 General Specifications
TI 04P01B01-02 uR10000 Comparative table
Chart Recorder

Feature

- Carryover of µR1000
- Excellent operationality
  Large screen
  Ease-of-viewing
  Internal light (white LED)
- Versatile functions
  Powerful Math, printout, communication
- High reliability and high quality
  Fully contact-less technology
  High degree of integration using custom IC
Renewal No.1 Recorder

μR1000

Quality
Reliability
Functions
Naming

μR1000 Product line up

Pen type
Input: 1, 2, 3, 4 ch
Measurement: 125 msec

Dot type
Input: 6 ch
Measurement: 1 or 2.5 sec
Carryover of µR1000 Functions: Assured Compatibility

- Same as the µR1000
  - Measuring points/ Panel cut /Terminal placement /
  - Pen, Ribbon, Chart

<table>
<thead>
<tr>
<th>Measurement points</th>
<th>Pen model: 1, 2, 3, or 4 pens</th>
<th>Dot model: 6 dots (points)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Dim.</strong></td>
<td>External dimensions</td>
<td>Same (panel cut, case depth)</td>
</tr>
<tr>
<td>Front door</td>
<td>Splashproof and dustproof (IP-54)</td>
<td>Same (IP-54)</td>
</tr>
<tr>
<td>Terminal positions</td>
<td></td>
<td>Same (panel cut)</td>
</tr>
<tr>
<td>Terminal arrangement</td>
<td>4mm screw</td>
<td>Input terminal: dot model same, pen model unified with the dot model</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Option terminal: same</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power supply terminal: same</td>
</tr>
<tr>
<td>Mass (weight)</td>
<td>Approximately 30% less</td>
<td></td>
</tr>
<tr>
<td>Power Supply</td>
<td>Rated supply voltage</td>
<td>Same (rating)</td>
</tr>
<tr>
<td></td>
<td>Power consumption</td>
<td>Pen: Approximately 40% less.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dot: Approximately 20% less.</td>
</tr>
<tr>
<td></td>
<td>Fuse</td>
<td>No need for maintenance fuses</td>
</tr>
<tr>
<td>General Accessories</td>
<td>Same (pen, plotter pen, ribbon cassette, chart paper, shunt resistors, mounting brackets)</td>
<td></td>
</tr>
</tbody>
</table>

New Technology

- New Servo Unit
  - A servo with decreased size was made possible through a more compact stepping motor, and by using rack and pinion design.
  - Power consumption has been reduced through digital control methods.
  - Contact-free position detection is realized through a light encoder system.

- Mixed Analog/Digital IC (Input Circuit)
  - This and other ASICs increase integration while reducing power consumption, suppressing heat emissions, and increasing the lifespan of components.
Design for New μR10000

New Design and All Function Renewal

Network

Display

Setting

Alarm

Remote control

Operation

New Additional value

Measurement

Record

Input process

Computation

A/D

Analog Recording

Digital printout

Improved Basic Performance

Succession

Improved Operationality

Pen model

Number of input: 1, 2, 3, 4ch

Measurement interval: 125m sec

Dot model

Number of input: 6ch

Measurement interval: 1 or 2.5 sec

<table>
<thead>
<tr>
<th>Input type</th>
<th>Range</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>St’d DCV</td>
<td>20mV, 60mV, 200mV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2V, 6V, 20V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50V, 1-5V</td>
<td></td>
</tr>
<tr>
<td>RTD</td>
<td>Pt100/JPt100</td>
<td></td>
</tr>
<tr>
<td>DI</td>
<td>DCV input/ contact input</td>
<td></td>
</tr>
<tr>
<td>Option TC</td>
<td>PR40-20, PLATINEL, NiNiMo, W/WRe26, Type N(AWG14), Kp vs Au7Fe</td>
<td>/N3</td>
</tr>
<tr>
<td>Special inputs</td>
<td>Cu10, Cu25</td>
<td>/N1</td>
</tr>
<tr>
<td></td>
<td>Pt50, Pt25, Ni100SAMA, Ni100DIN, Ni120, J263*B, Cu53, Cu100</td>
<td>/N3</td>
</tr>
</tbody>
</table>
**Low Level cut off**

- **Low level cut off for square root**

  Input processing:
  - Input
  - Voltage (DCV)
  - $\sqrt{}$
  - Low level Cut off
  - Record display

  **Low level cut off for square root**

  Avoid negative value integration for flow meter.

  0.0 to 5.0% of recording span

**Input Bias**

- **Input Bias**

  Adding appropriate value to measurement value in order to compensate sensor.

  Input processing:
  - Input
  - Voltage (DCV)
  - Temperature (TC)
  - Bias
  - Record Display

  **Input bias**

  10.0% to 10.0%

  Measured value after compensation
**Burnout Detection**

- Burnout of TC or **1-5V range** can be detected.

**Burnout detection setting**

- Detection: can be set for each channel
- Recording position in detection:
  - selectable (plus or minus)
  - definable for per channel

**Display and printout in burnout detection**

- Display: B.out

- Burnout detection for 0.2 V or less

---

**Improve accuracy of voltage range**

- Measurement accuracy at 6V range (guaranteed value)*: ±0.017V -> ±0.007V

Example of Measuring span (1.000 to 5.000V)

* : This is for all range.

<table>
<thead>
<tr>
<th>Range</th>
<th>µR100000 Measuring accuracy</th>
<th>µR1000 Measuring accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>20mV</td>
<td>±(0.1% of rdg +2digits)</td>
<td>±(0.2% of rdg +3digits)</td>
</tr>
<tr>
<td>60mV</td>
<td>±(0.1% of rdg +2digits)</td>
<td>±(0.2% of rdg +2digits)</td>
</tr>
<tr>
<td>200mV</td>
<td>±(0.1% of rdg +2digits)</td>
<td>±(0.2% of rdg +2digits)</td>
</tr>
<tr>
<td>2V</td>
<td>±(0.1% of rdg +2digits)</td>
<td>±(0.3% of rdg +2digits)</td>
</tr>
<tr>
<td>6V</td>
<td>±(0.1% of rdg +2digits)</td>
<td>±(0.3% of rdg +2digits)</td>
</tr>
<tr>
<td>20V</td>
<td>±(0.1% of rdg +2digits)</td>
<td>±(0.3% of rdg +2digits)</td>
</tr>
<tr>
<td>50V</td>
<td>±(0.1% of rdg +3digits)</td>
<td>--------------------------</td>
</tr>
<tr>
<td>1-5V</td>
<td>±(0.1% of rdg +2digits)</td>
<td>--------------------------</td>
</tr>
</tbody>
</table>

- Standard in GS:
  - µR100000 6 V range: ±(0.1% of rdg +2digits)
    ±(0.1% × 5V + 2digits) = ±(0.005V(5digits)+2digits) = ±7digits = ±0.007V
  - µR1000 6 V range: ±(0.3% of rdg +2digits)
    ±(0.3% × 5V + 2digits) = ±(0.015V(15digits)+2digits) = ±17digits = ±0.017V

Updated AD + input circuit, ASIC (for analog/digital data)
### Alarm Function

**Alarm function**
- 4 level /channel
- high/low limit, high/low rate-of-change limit, differential high/low limit, delay high/low.
- 0.0 to 1.0% of hysteresis (0.1% step) can be set.

### Alarm display

1ch digital + 4ch bar graph display

- **Alarm type**
- **Occurring alarm channel (status)**
- **Alarm set point**
- Channel number of occurring alarm is displayed

### New chart cassette

- With an integrated display and keyboard design, the front panel is uncluttered and usability is markedly improved.
- You can pull out the chart and easily review previously recorded data, even during recording.
Internal Illumination

- Improves visibility of the chart.
- Brightness selectable. (4-level brightness)
- Comes standard with all dot and pen models.
- Uses a compact high intensity white LED. No heat is released.

Easy-to-Use Operation Panel

- Retains the operability that the customer expects from previous µR models, yet offers improved ease of use by assigning keys to each function.

ON (power)

Operation mode

Set mode

Setup mode

No need Power ON/OFF to enter setup mode

Edit keys

Used when in Set mode and Setup mode.

CHARACTER key: Select English, numerical, or symbol characters.

keys: When used with the SHIFT key, changes the direction of cursor movement.

Starts/stops recording

Selects a display screen

For setting parameters

Starts functions

Feeds chart paper

For setting display screen

Increments channel during MAN display

Alarm ACK

Start/stop computation
Message print
Buffer clear
Start/stop printing
Key lock...

Hold down the MENU key for three seconds to switch the mode.

Press DISP+FUNC key to switch the mode.

Exit and save to switch from Setup mode to Operation mode.
Improved Setting Entry Operation

The setting operation for Math equations, messages, and units has been improved.
- Added function for inserting, deleting, copying, and pasting characters
- Easy cursor movement with Up/Down and Left/Right keys

Eliminates troubles during entry of settings.

Using the Insert Function: Example

Editing a message (Start ecording ==> Start Recording)

(1) Message: Start ecording
(2) Message: Start ecording
(3) Message: Start R

You can insert a space at the insertion point using the INS Disp key.

Enter a "R" (previously you had to retype "Recording" from the beginning).

Easier Entry of Settings

All settings are interactive, and supported by the navigational display, offering superior ease of use.

Navigation Display (Example of Range Setting)

Upper (setting parameter): The setting channel, range, span (left), or span (right) is displayed.
Lower (setting navigation): An explanation and setting range for the parameter is displayed.

Setting the Range
(1) Hold down the MENU key for three seconds to change from Operation mode to Set mode.
   In Set mode, the upper row shows the setting parameter, and the lower row shows the navigation.
(2) Select a parameter using the UP/DOWN key, and press ENT to advance to the next setting.
(3) Follow on-screen prompts using the UP/DOWN and LEFT/RIGHT keys to enter settings.
(4) When finished entering settings, hold down MENU for three seconds to return to Operation mode.
Large, VFD101 x 16 Full Dot Matrix Display

Uses a large, easy-to-view VFD101 x 16 full dot matrix display (an industry first).
- Displays the channel number, TAG number, units, flags, and alarm information as desired.

μR10000 Display (multiple display) variation (1)

Basic displays: 19 types for pen model

Basic display: 18 types for dot model
μR10000 Display (Multiple display) Variation (2)

7 types of displays for upper of split display

7 types of displays for lower of split display

μR10000 Screen Structure

Can be Selected up to 15 screens for operation.
The displays can be switched during operation using ‘Disp’ key.

Basic Displays
(Pen models: 19; Dot models: 18)

Operation Screens
(up to 15 screens)

Upper Displays
(7)

Split Displays

Lower Displays
(7)

Combine upper and lower displays as desired.

Up to 15 screens can be set using the basic displays and the split displays.
Example of screen for operation

→ Provides optimal monitoring by allowing you to select screens and display intervals matching your on-site processes.

**Example of Two Channel Digital Display + AUTO display Switching**

Displays data from each channel on the upper and lower rows.
Display contents: Channel or TAG number, alarm type, measured value, and units (six digits, or three digits for TAG number display).

**Powerful Math. Functions (/M1 option)**

- Analog recording of computed results
- Increased computation channels
- Additional operations (power function, relational operators: ≤, ≥)
- Support for communication digital input and remote input (used in equations)
- Expanded length of equations (120 characters)

**Dot model:**
Allows recording on all computation channels (12 ch). Recording can be turned ON/OFF on each channel.

**Pen model:**
You can assign measured or computed results to an arbitrary pen for recording.
### Powerful Math. Functions

<table>
<thead>
<tr>
<th>Computation ch</th>
<th>Uses measurement channels, communication digital input, and remote input.</th>
</tr>
</thead>
</table>
| No. of computation channels | Pen models: 8  
 Dot models: 12 |
| Computations | The four arithmetic operations (+, -, ×, ÷), square root, absolute value, common logarithm (y=\log_{10}x), exponents (e^x), and powers.  
 Relational operators (<, >, ≤, ≥, =, ≠)  
 Logical operations (AND, OR, NOT, XOR) |
| Constants | 30 |
| Communication digital input | Pen: 8 points, Dot: 12 points |
| Remote input | - Up to 5 remote inputs allowed.  
 - Remote status (0/1) can be used in equations. |
| Equations | Up to 120 characters can be used |
| Statistical computations | MAX, MIN, AVE, SUM, MAX-MIN |

---

### Enables Computation and Recording of Relative Humidity

- Actual input: Dry bulb temperature, wet bulb temperature  
- Computation: Convert actual input to relative humidity (using arithmetical and power calculations)  
- Computed results: Recorded in analog

#### Example of Relative Humidity Computation and Recording

**Meas. channel:** 01 ch (dry bulb temperature)  
02 ch (wet bulb temperature)  
**Computation channel:**  
A ch: saturated vapor pressure (dry bulb temp.)  
B ch: saturated vapor pressure (wet bulb temp.)  
C ch: relative humidity  
**Analog recording:** 01 ch, 02 ch and the computed results Cch.

**Analog Recording (Image)**

- 01 ch (Dry bulb temp.)  
- 02 ch (Wet bulb temp.)  
- Cch (Relative humidity)

**Setting Equations**

Relative humidity is displayed on Cch, and recorded.  
01 ch: Dry bulb temperature (°C)  
02 ch: Wet bulb temperature (°C)  
Ach: \( K01^*K02^*[(K03^*01)/(01+K04)] \)  
Bch: \( K01^*K02^*[(K03^*02)/(02+K04)] \)  
Cch: \( (K05*A^*B-K06)/(01-02) \)  
K01: 6.11  
K02: 10  
K03: 7.5  
K04: 237.3  
K05: 100  
K06: 0.87077  
K06: 0.000662 (wind speed 2.5 m or more) * 1013.25 (atmospheric pressure hPa)

**Equation for Relative Humidity**

Relative humidity \( \%Rh = \left(100\% \right) \left(ew-A^*P/(Td-Tw)\right) \)  
\( ed: \) Saturated vapor pressure of dry bulb temp (hPa) = 6.11 \( \times \) 10^x \( \left(Td/Td+237.3\right) \)  
\( ew: \) Saturated vapor pressure of wet bulb temp (hPa) = 6.11 \( \times \) 10^x \( \left(Tw/Tw+237.3\right) \)
Enables Computation of the F Value for Sterilization Process Control

- Actual input: Food temperature
- Computation: Compute the F value from actual input (using relational operations, and arithmetical and power calculations).
- Computed results: Recorded in analog

Example of Computation and Recording of the F Value

Measurement channel: 01 ch (food temperature)
Computation channel: Bch (F value computation)
The F value computation is reset when the food temperature is 100°C or lower.
Analog recording: Records measured results from 01 ch, and the computed results of the F value from Bch.

Setting Equations
Relative humidity is displayed on Cch, and recorded.
01 ch: Food temperature (°C)
Ach: \(K01^{((1-K3)/K2)}\)
Bch: \((B + A \cdot 4) \cdot (01.GT.K5)\)
K01: 10  K02: 10.000  K03: 121.1  K04: 0.01667  K05: 100

K04: 1/unit time (when the unit time is 60 seconds)
K05: When the integration value is reset (when 01ch is 100°C or less)
Note: Depending on conditions, it can change from the K01 to K05 constant.

Variety of Digital Printing Functions (1)

- Allows time printouts down to the second (excluding periodic and report printouts)
- Allows printouts of character strings (messages)
- Allows printout of unit power
- Ch No. printout can be turned OFF
- Report printout available even without the /M1 option

Example of Printing on Dot Models

(1) Periodic printout*
(2) Alarm printout (occurring)
(3) Alarm printout (cleared)
(4) Message printout
Can printout character strings.
(5) Chart speed change printout
(6) Manual printout
(7) Recording start time printout

* In Set mode you can select from three types: Periodic printout, report printout, or “None.”

CH No. printout can be turned ON/OFF
Variety of Digital Printing Functions (2)

- Allows time printouts down to the second (excluding periodic and report printouts)
- Printouts of character strings (messages)
- Allows printout of unit power
- Recording color printout can be turned OFF
- Report printout available even without the /M1 option

Ex: Printout from Pen Models

1. Periodic printout
2. Alarm printout (occurring)
3. Alarm printout (cleared)
4. Message printout
   Can printout character strings.
5. Chart speed change printout
6. Manual printout
7. Recording start time printout
   *In Set mode you can select from three types: Periodic printout, report printout, or “None.”

Variety of Digital Printout Function (3)

Report printout available without /M1

Example of report printout

Report printout*

Selectable from the followings
- AVE (average)
- MIN (minimum)
- MAX (maximum)
- MIN/MAX/AVE
- SUM (summation)
- INST (instantaneous value)

* Selectable from report printout, periodic printout, OFF in set mode
**Variety of Analog Record Function**

- "Partial Expanded" and "Zone Recording" Available to Monitor Target Data

**Example of zone recording**

Zone 1 | Zone 2 | Zone 3 | Zone 4
---|---|---|---
0% | 50% | 100% | 0%
-6V | 0V | 6V | -6V
---|---|---|---

**Zone recording**

Each channel data can be recorded in each channel zone separately.

**Example of partial expanded**

Partial expanded recording

The detail of trend part can be expanded and record.

---

**Remote Control**

- /R1: Remote control

**Number of available setting**

- Record start/stop 1 edge
- Chart speed switching 1 level
- Message printout start 5 trigger
- Manual printout 1 trigger
- Alarm ACK 1 trigger
- Time adjustment 1 trigger
  (Adjusting time to a preset time)
- Computation start/stop 1 edge
- Computation reset 1 trigger
  (Effective during computation stop)

DI

Voltage-free contact or open collector
Up to 5 points (common)

The above actions can be selected up to 5 items.
Ethernet Interface

/C7 (Ethernet Interface) Option

The following functions are available through the command interface.
- Setting/output of parameters
- Output of measured and computed values
- Setting of communication input data (/M1: requires computation function)
- Control input such as start/stop of recording

Phases of Product Release

→ DAQWORX (DAQLOGGER) connection
- Connect using GateMR (tentatively named).
- Viewer software, event processor, e-mail transmission, and setting of parameters are available.

μR10000 Model Code

<table>
<thead>
<tr>
<th>Model code</th>
<th>Suffix</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>436101</td>
<td></td>
<td>1</td>
<td>1 pen recorder</td>
</tr>
<tr>
<td>436102</td>
<td></td>
<td>2</td>
<td>2 pen recorder</td>
</tr>
<tr>
<td>436103</td>
<td></td>
<td>3</td>
<td>3 pen recorder</td>
</tr>
<tr>
<td>436104</td>
<td></td>
<td>4</td>
<td>4 pen recorder</td>
</tr>
<tr>
<td>436105</td>
<td></td>
<td></td>
<td>6 dot recorder</td>
</tr>
<tr>
<td>Language</td>
<td>-1</td>
<td>Japanese</td>
<td>English (deg F,DST) *</td>
</tr>
<tr>
<td></td>
<td>-2</td>
<td></td>
<td>English</td>
</tr>
</tbody>
</table>

Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/A1</td>
<td>Alarm output (2 contacts)*1</td>
</tr>
<tr>
<td>/A2</td>
<td>Alarm output (4 contacts)*1</td>
</tr>
<tr>
<td>/A3</td>
<td>Alarm output (6 contacts)*1,2</td>
</tr>
<tr>
<td>/C3</td>
<td>RS-422A/485 communication interface *3</td>
</tr>
<tr>
<td>/C7</td>
<td>Ethernet communication interface *3</td>
</tr>
<tr>
<td>/F1</td>
<td>FAIL/chart end detection and output*2</td>
</tr>
<tr>
<td>/H2</td>
<td>Clumped input terminal *4</td>
</tr>
<tr>
<td>/H3</td>
<td>Non glare glass</td>
</tr>
<tr>
<td>/M1</td>
<td>Computation function</td>
</tr>
<tr>
<td>/N1</td>
<td>Cu10, Cu25 input</td>
</tr>
<tr>
<td>/N2</td>
<td>3 legs isolated RTD *4,5</td>
</tr>
<tr>
<td>/N3</td>
<td>Expansion inputs</td>
</tr>
<tr>
<td>/R1</td>
<td>Remote control</td>
</tr>
</tbody>
</table>

* Same functions as -1 (Japanese model) without deg F, DST (Daylight Saving Time), and language.
*1 /A1, /A2, /A3 cannot be specified together. *2 /A3 and /F1 cannot be specified together. *3 /C3 and /C7 cannot be specified together. *4 /H2 and /N2 cannot be specified together. *5 /N2 can be specified only for dot model (Pen model RTD inputs are all isolated.)
Specifications Differing from Those of the µR1000

Remote Control Functions
- Starting/Stopping of recording (level → edge)
- Starting/Stopping of statistical computation (level → edge)
- Periodic printout start via external trigger → function removed
  (Function removed since the µR1000 comes with a special menu for turning periodic printing OFF.)

Communication
- Command interface
  Redesign based on DX protocol

Functions Not Included

IC Memory Card
- Configuration software to be sold separately
  - Configuration software
  - Configuration software (with Interface unit)
  Also, support is planned for DAQLOGGER.

Roll Chart Cassette
- Not available as an optional function of standard mode

RRJC
- Please use 1 to 5 V input range with JUXTA signal conditioners and other converters.

PC Configuration Software

- Measurement channel, computation channel, and other settings can be easily set.
  Configuration software (standard) and configuration software (with interface unit) is available.
- Lets you organize settings.
- Settings can be entered via communications interface.

Configuration Software

<table>
<thead>
<tr>
<th>Ethernet or RS-422/485</th>
<th>Two models available</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC Software</td>
<td>Purchase this one if the main unit has communications</td>
</tr>
<tr>
<td>Configuration Software (with Interface unit)</td>
<td></td>
</tr>
<tr>
<td>PC Software</td>
<td>Note: The interface unit and RS422A/485 communication interface cannot work together.</td>
</tr>
<tr>
<td>Interface unit</td>
<td>- Interface unit required when using USB on the PC side.</td>
</tr>
<tr>
<td>- Please purchase cable separately.</td>
<td></td>
</tr>
</tbody>
</table>