Technical Information

µR10000
Overview

TI 04P01B01-01E

Renewal "No.1 Recorder" Power of Paper

<Notice>
The F1 option was discontinued on April 15, 2022.

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TI 04P01B01-01E

1st Edition Oct. 2004

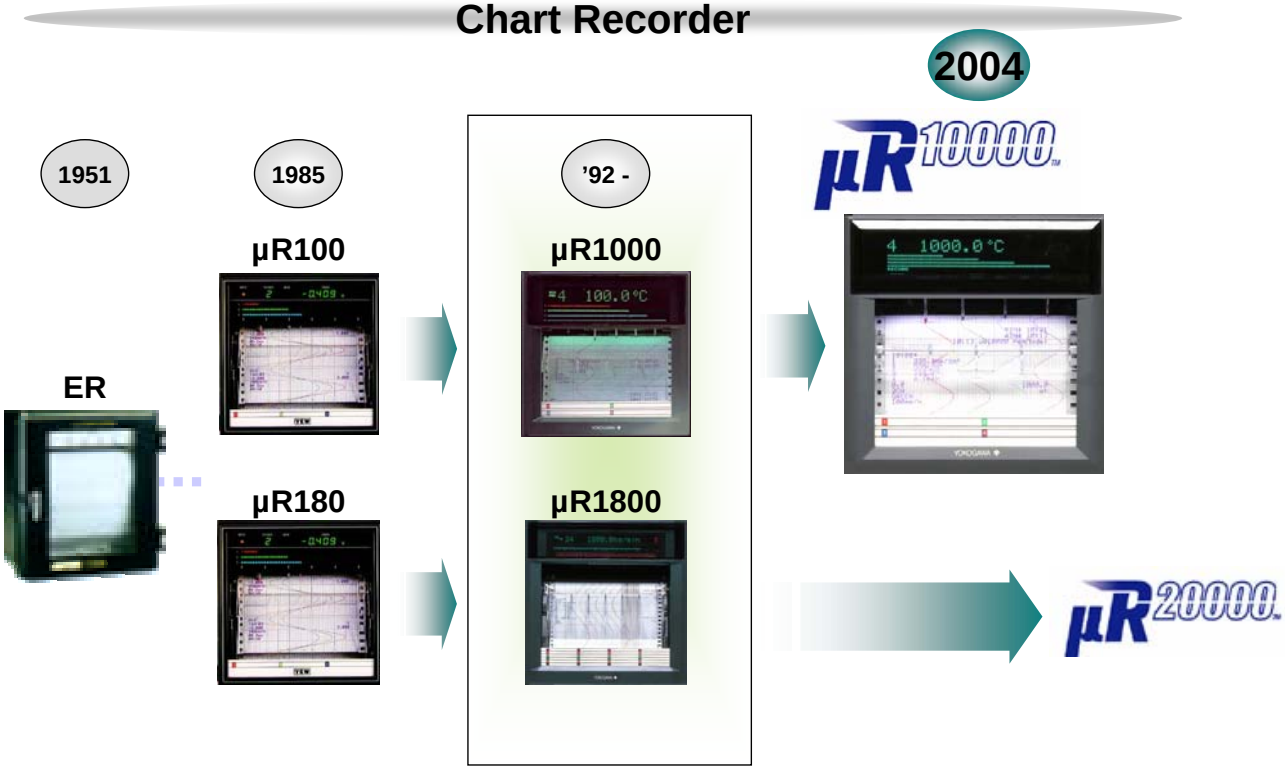
Introduction

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 sort by functions (input, display, record, operation, communication); please read appropriate chapter you want to know and make good use of this for customer sales presentation.
In addition, the specifications and the functional details are covered in the following documents.
Read them as necessary.

GS 04P01B01-01	µR10000 General Specifications
TI 04P01B01-02	µR10000 Comparative table

YOKOGAWA Industrial Recorder Always with Customer in any Ages.

Chart Recorder



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Feature

μR100000

- **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

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Renewal No.1 Recorder

Quality

Reliability

Functions

Naming

μR10000™

μR1000

μR10000 Product line up

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

- Dot type
- Input: 6ch
- 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

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

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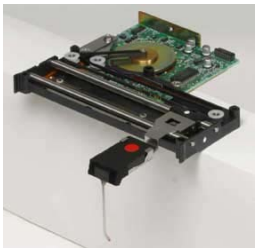
New Technology

New Technology

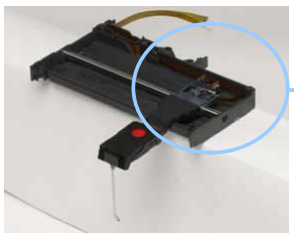
New Servo Unit

- 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.

Current µR Servo Unit

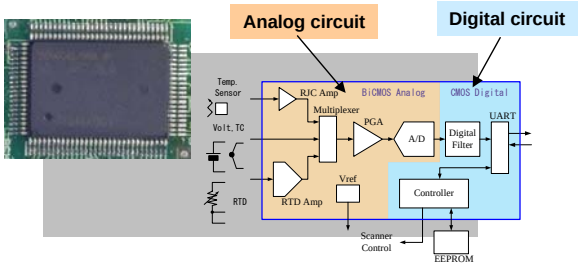


New µR Servo Unit



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.



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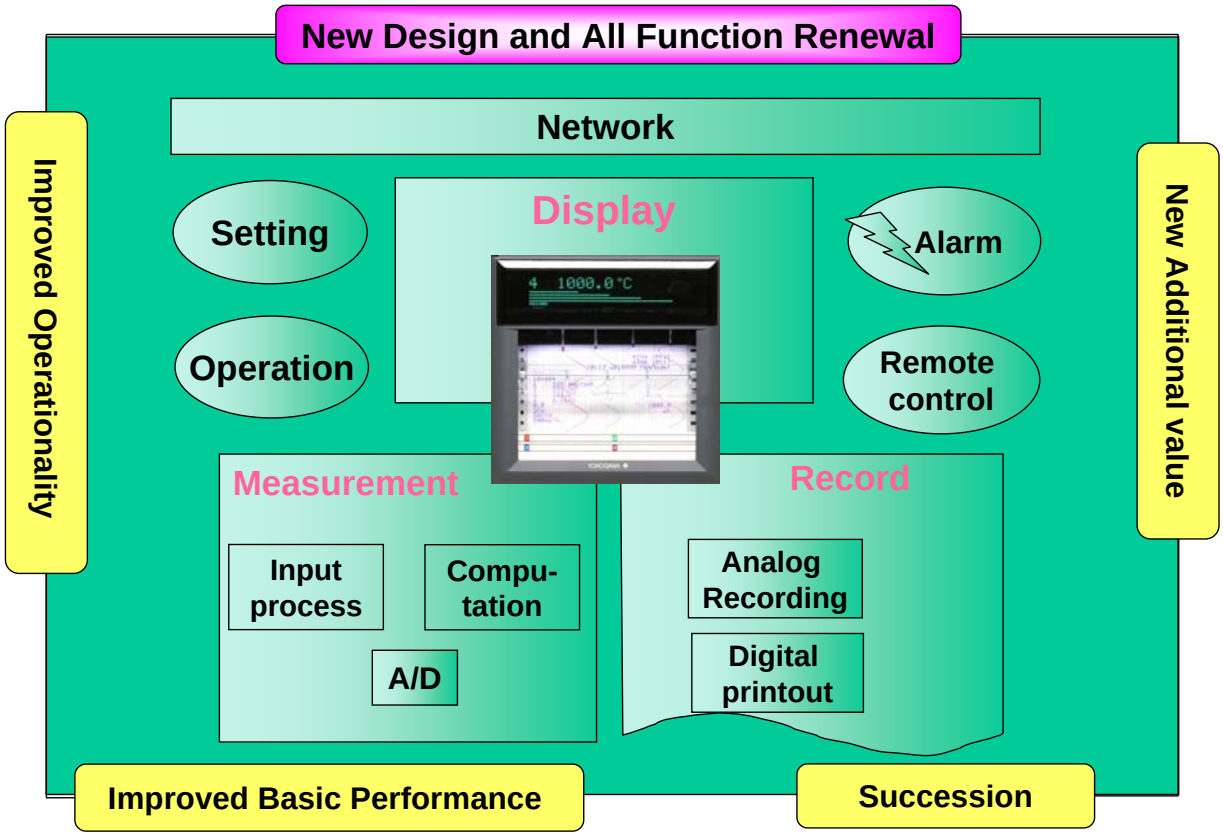
Design for New µR10000



Input

Input

Pen model
- Number of input: 1, 2, 3, 4ch
- Measurement interval: 125m sec

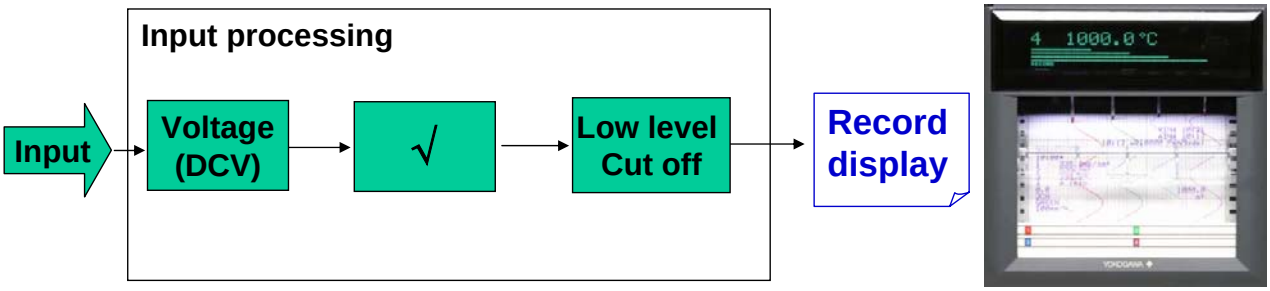
Dot model
- Number of input: 6ch
- Measurement interval: 1 or 2.5 sec

	Input type	Range	Remark
St'd	DCV	20mV,60mV, 200mV 2V, 6V, 20V **50V, 1-5V**	
	TC	R, S, B, K, E, J, T, N,W, L, U, **WRe**	
	RTD	Pt100/JPt100	
	DI	DCV input/ contact input	
Option	TC	PR40-20,PLATINEL, **NiNiMo, W/WRe26, Type N(AWG14), Kp vs Au7Fe**	/N3
	Special inputs	Cu10,Cu25	/N1
		Pt50, **Pt25, Ni100SAMA, Ni100DIN, Ni120, J263*B, Cu53, Cu100**	/N3

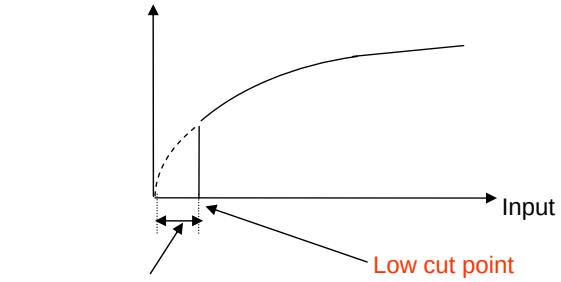
Low Level cut off

Input

Low level cut off for square root



Low level cut off for square root



Avoid negative value integration for flow meter .

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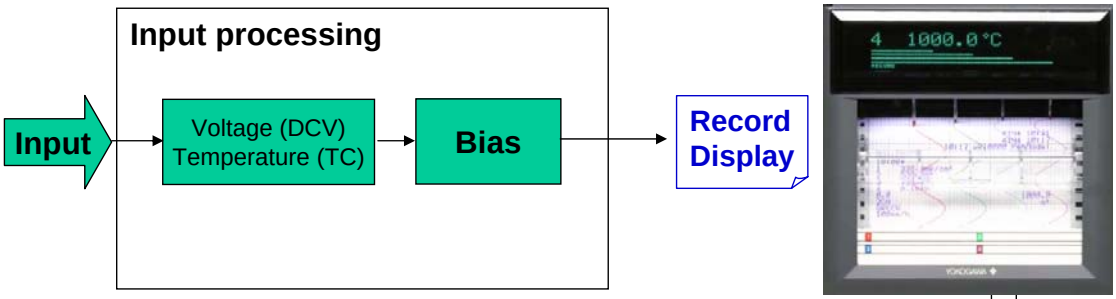
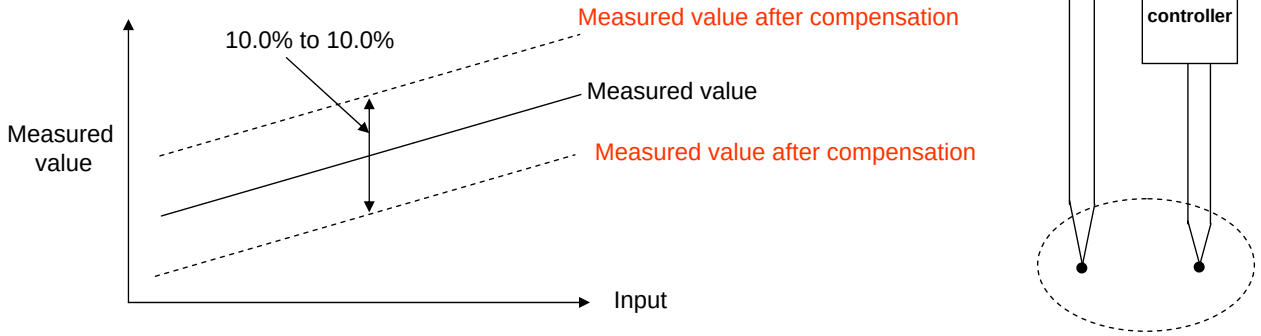
Input Bias

Input

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



Input bias



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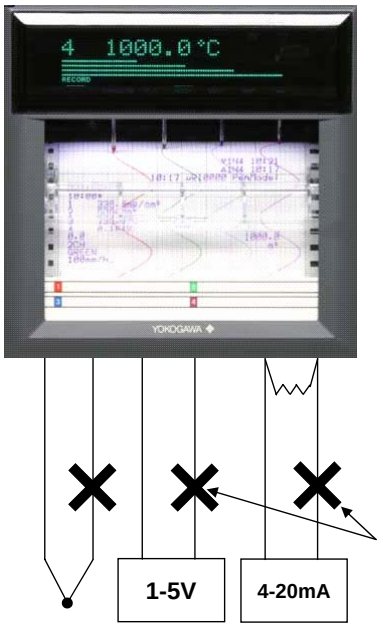
Burnout Detection

Input

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



Burnout detection setting

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

Display and printout in burnout detection

Display: B . out

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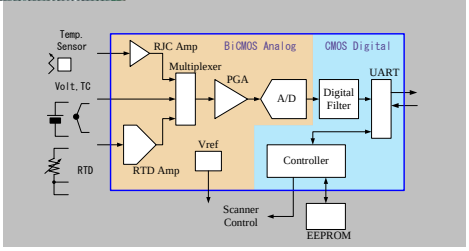
Improve accuracy of voltage range

- **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.

	μR10000	μR1000
Range	**Measuring accuracy**	**Measuring accuracy**
20mV	**±(0.1% of rdg +2digits)**	**±(0.2% of rdg +3digits)**
60mV		**±(0.2% of rdg +2digits)**
200mV		**±(0.2% of rdg +2digits)**
2V		**±(0.1% of rdg +2digits)**
6V		**±(0.3% of rdg +2digits)**
20V		**±(0.3% of rdg +2digits)**
50V	**±(0.1% of rdg +3digits)**	---------
1-5V	**±(0.1% of rdg +2digits)**	---------

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



Standard in GS
- μR10000 6 V range: ±(0.1% of rdg +2digits)
±(0.1% ×5V +2digits)=±(0.005V(5digits)+2digits)=**±7digits = ±0.007V**

-μR1000 6V range: ± (0.3% of rdg +2digits)
±(0.3%×5V +2digits)=±(0.015V(15digits)+2digits)=**±17digits = ±0.017V**

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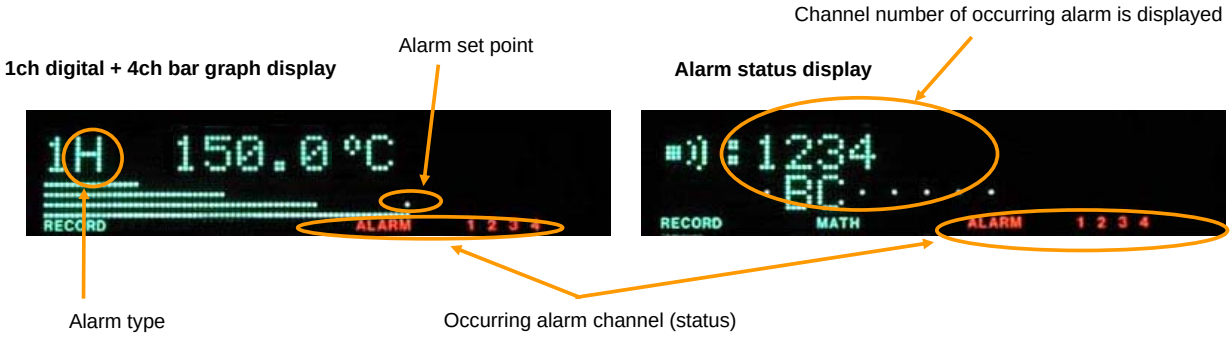
Alarm Function

Input

- **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



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New chart cassette

Operation

- 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.

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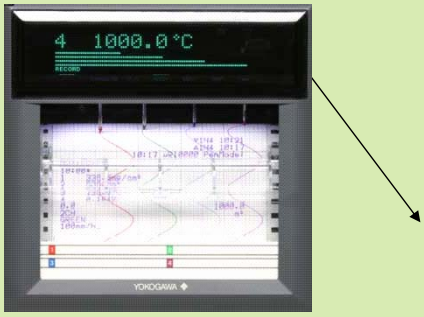
Internal Illumination

Operation

- 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.



LED and light diffusion rod are installed behind display panel

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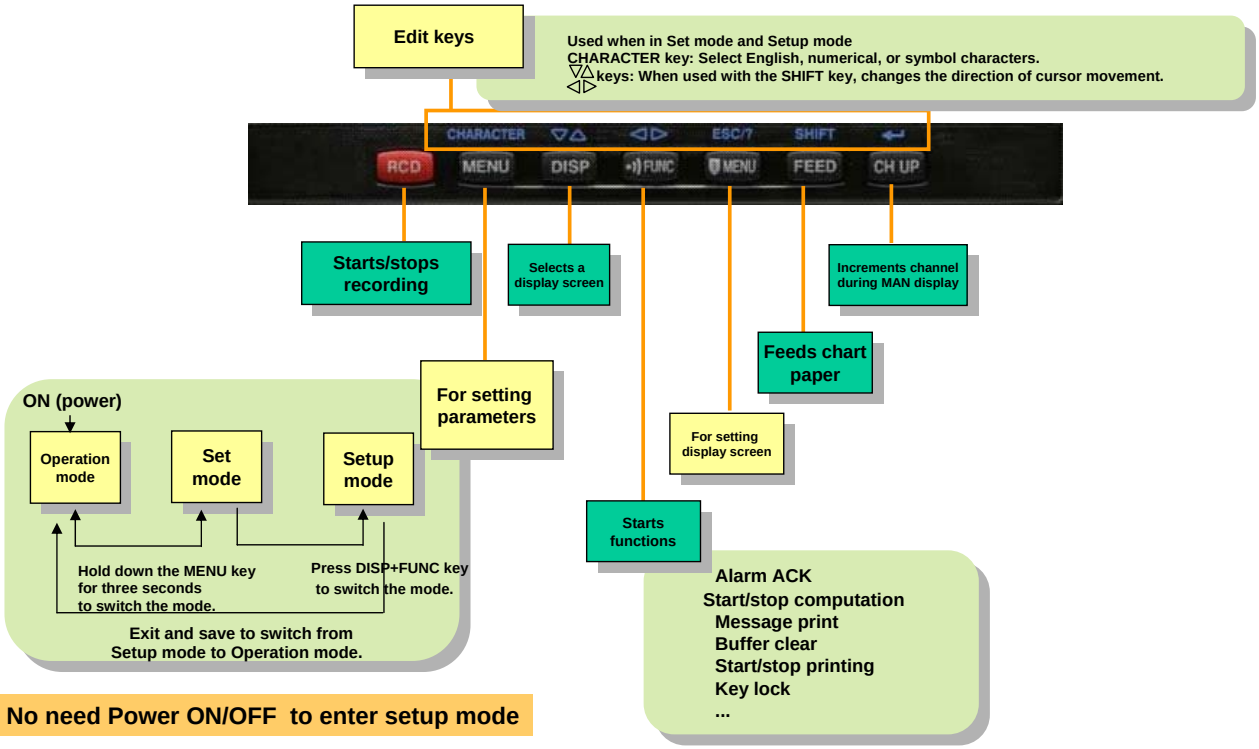
Easy-to-Use Operation Panel

Operation

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



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Improved Setting Entry Operation

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

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

(3) Message: Start Recording

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

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Easier Entry of Settings

Operation

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. (scrolls for 18 characters or more)

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.

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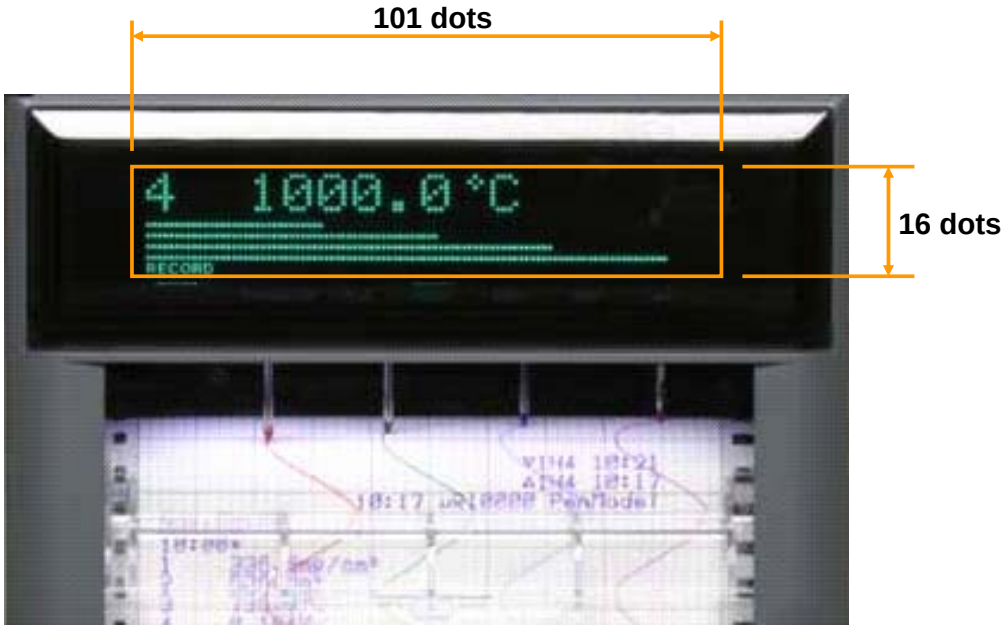
Large, VFD101 x 16 Full Dot Matrix Display

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.



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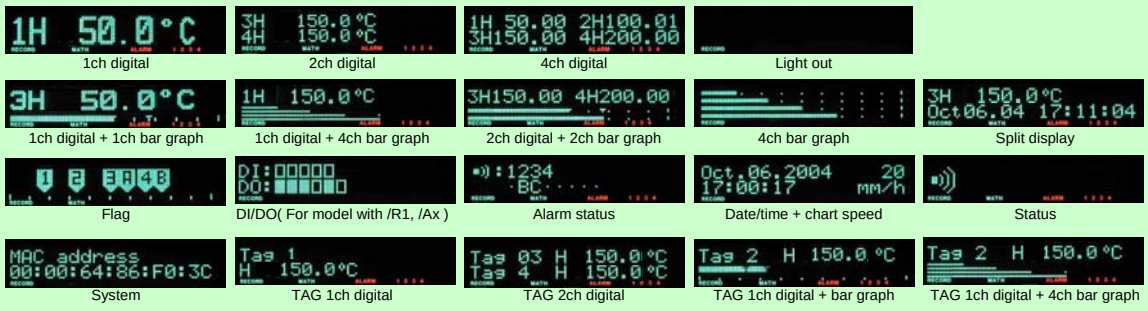
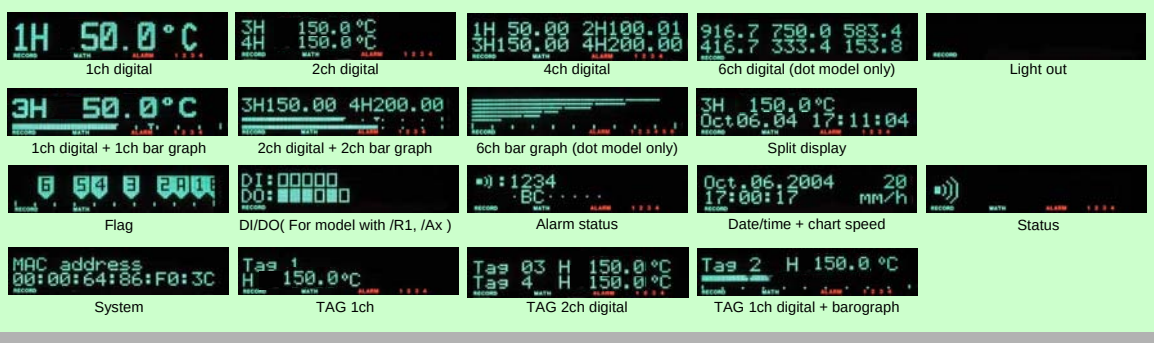
µR10000 Display (multiple display) variation (1)

Display

Basic displays: 19 types for pen model



Basic display: 18 types for dot model



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µR10000 Display (Multiple display) Variation (2)

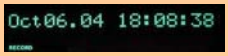
Display

7 types of displays for upper of split display

Upper part: 1ch digital

Upper part: 2ch digital

Upper part: TAG 1ch digital



Upper part: Date/time

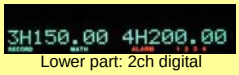
Upper part: Chart speed

Upper part: Alarm status


Upper part: Status

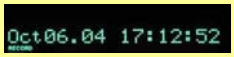
7 types of displays for lower of split display

Lower part: 1ch digital

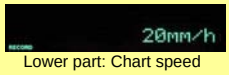


Lower part: 2ch digital

Lower digital: TAG 1ch digital



Lower digital: Date/time



Lower part: Chart speed

Lower part: Alarm status


Lower part: Status

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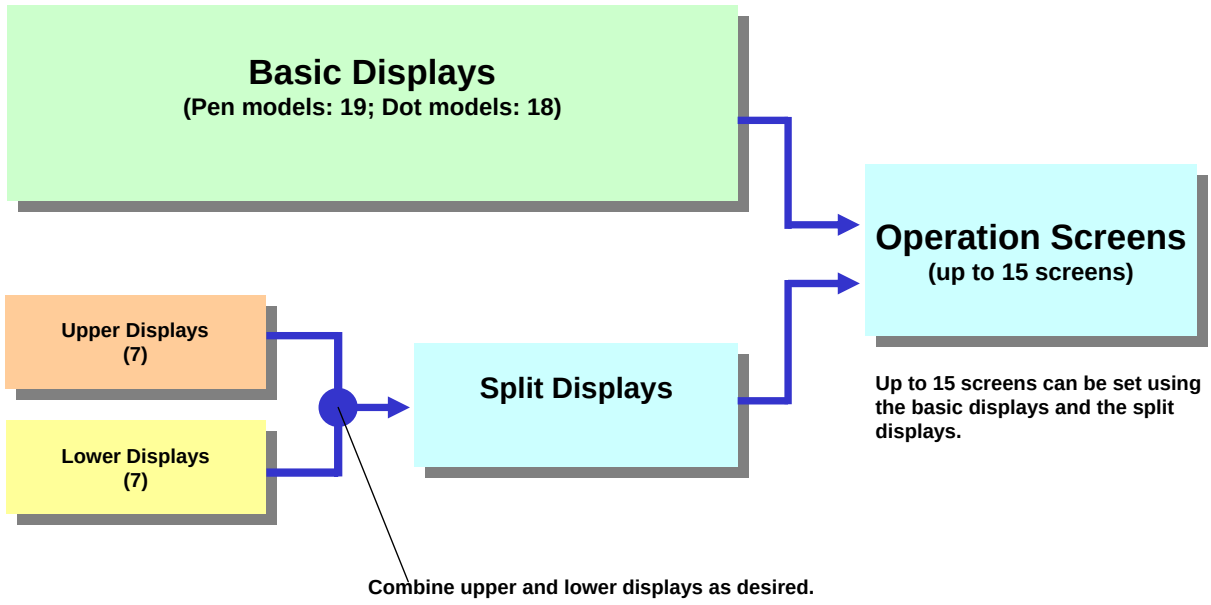
µR10000 Screen Structure

Display

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



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Example of screen for operation

Display

- 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).

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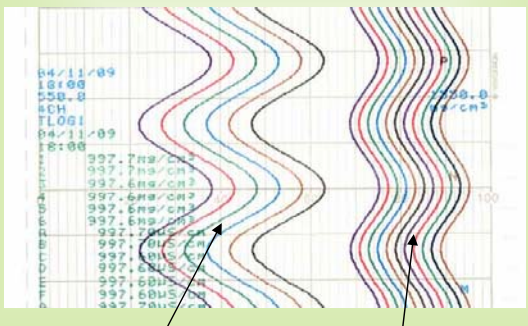
Powerful Math. Functions(/M1 option)

Computation

- 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)

Example of dot model analog recording (allows recording on up to 18 ch)



Meas. channels Comp. channels

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.

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Powerful Math. Functions

Computation

Computation ch	Uses measurement channels, communication digital input, and remote input.
No. of computation channels	Pen models: 8 Dot models: 12
Computations	The four arithmetic operations (+, -, ×, ÷), square root, absolute value, common logarithm (y=log10x), exponents (eX), 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

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Enables Computation and Recording of Relative Humidity

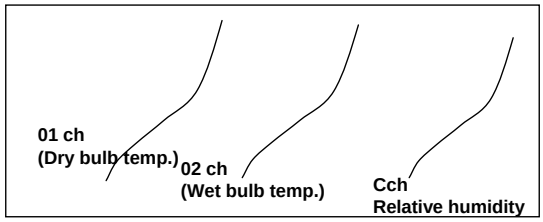
Computation

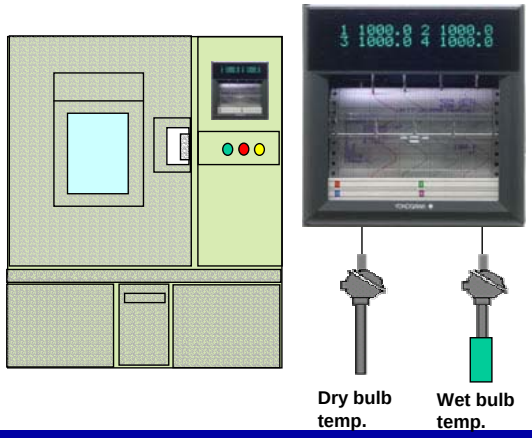
- Actual input: Dry bulb temperature, wet bulb temperature
- Computation: Convert actual input to relative humidity (using arithmetical and power calculations)
- Computed results: Recorded in analog

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 (web bulb temp.)
C ch relative humidity
Analog recording: 01 ch, 02 ch and the computed results Cch.

Analog Recording (Image)





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: 0.67077
K06: 0.000662 (wind speed 2.5 m or more) * 1013.25 (atmospheric pressure hPa)

Equation for Relative Humidity

Relative humidity rh (%Rh) = (100/ed) (ew-A*P*(Td-Tw))
ed:Saturated vapor pressure of dry bulb temp(hPa) = 6.11＊10^(7.5＊Td/(Td+237.3))
ew:Ssaturated vapor pressure of wet bulb temp(hPa) = 6.11＊10^(7.5＊Tw/(Tw+237.3))

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Enables Computation of the F Value for Sterilization Process Control

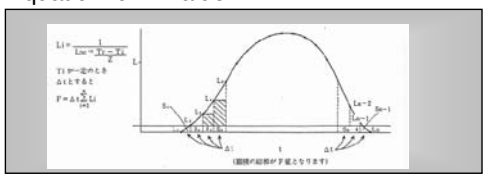
Computation

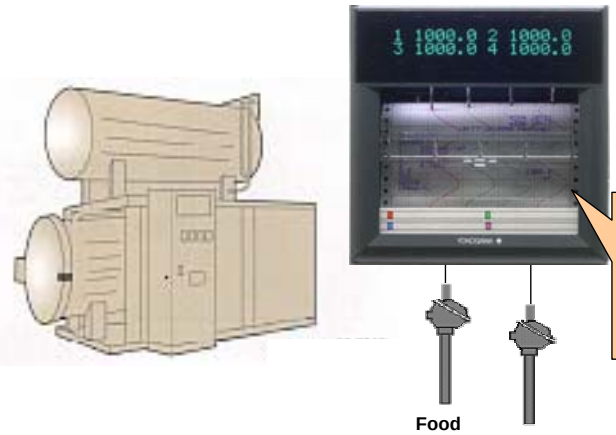
- Actual input: Food temperature
- Computation: Compute the F value from actual input (using relational operations, and arithmetical and power calculations).
- Computed results: Recorded in analog

Example of Computation and Recording of the F Value

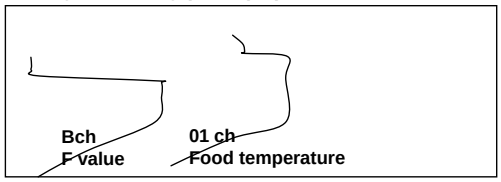
Measurement channel: 01 ch (food temperature)
Computation channel: Ach (computation of fatality rate of bacteria)
Bch (F value computation)
The F value computation is reset when the food temperature is 100°C or lower.
Analog recording: Records measured results from 01 ch, and the computed results of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

Equation for F Value





Analog Recording (Example)



Setting Equations
Relative humidity is displayed on Cch, and recorded.
01 ch: Food temperature (°C)
Ach: K01**((1-K3)/K2)
Bch: (B + A * 4) * (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.

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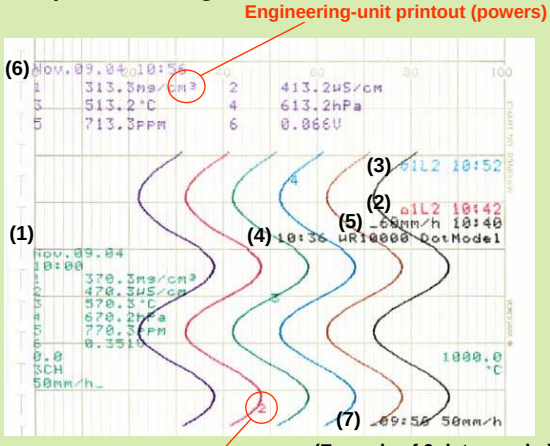
Variety of Digital Printing Functions (1)

Record

- 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



(Example of 6-dot recorder)

CH No. printout can be turned ON/OFF

(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."

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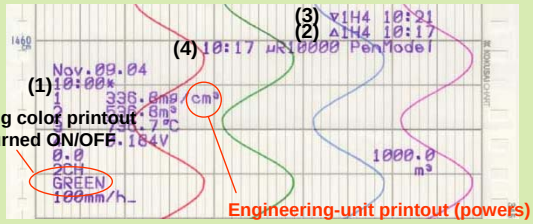
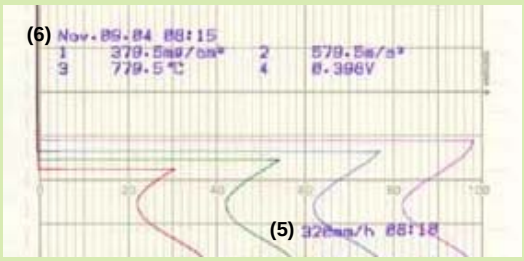
Variety of Digital Printing Functions (2)

Record

- 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."

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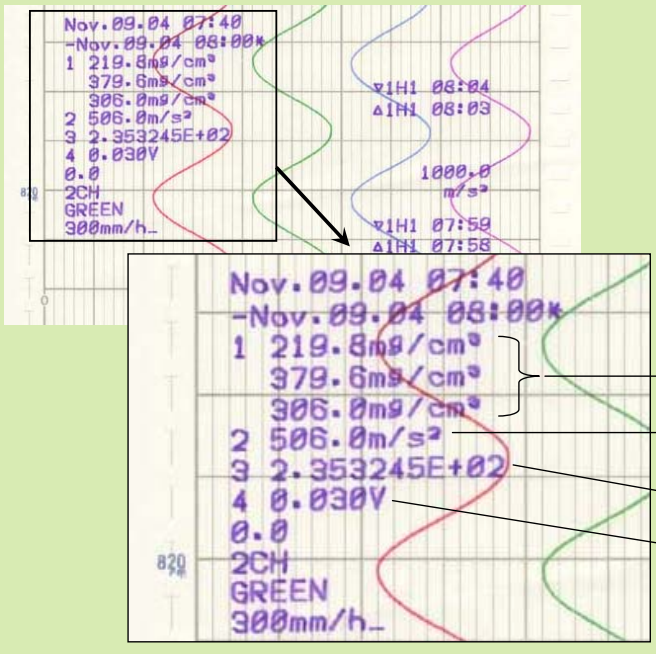
Variety of Digital Printout Function(3)

Record

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

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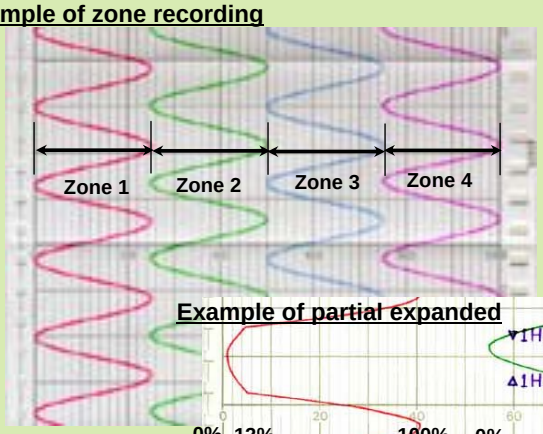
Variety of Analog Record Function

Record

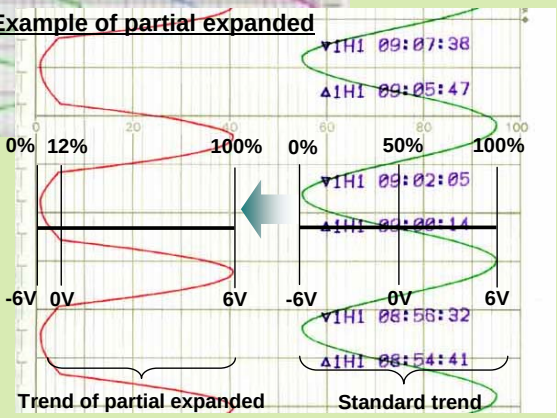
"Partial Expanded" and "Zone Recording" Available to Monitor Target Data

Example of zone recording



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.

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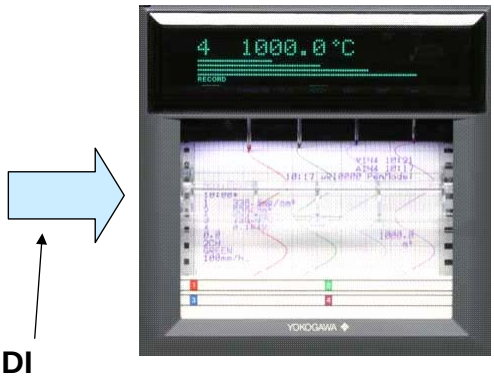
Remote Control

Remote control

/R1: Remote control



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

	Number of available setting	Signal type
- 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)		

The above actions can be selected up to 5 items.

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Ethernet Interface

Communication

/C7 (Ethernet Interface) Option

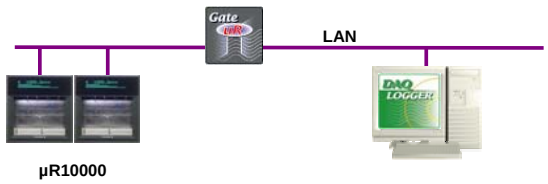
The following functions are available through the command interface.

- **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.**



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μR10000 Model Code

Model code	Suffix	Option code	Description
436101			1 pen recorder
436102			2 pen recorder
436103			3 pen recorder
436104			4 pen recorder
436106			6 dot recorder
Language	-1		Japanese
	-2		English (deg F,DST)*
Option		/A1	Alarm output (2 contacts)*1
		/A2	Alarm output (4 contacts)*1
		/A3	Alarm output (6 contacts)*1,*2
		/C3	RS-422A/485 communication interface *3
		/C7	Ethernet communication interface *3
		/F1	FAIL,/chart end detection and output*2
		/H2	Clumped input terminal *4
		/H3	Non glare glass
		/M1	Computation function
		/N1	Cu10, Cu25 input
		/N2	3 legs isolated RTD *4,*5
		/N3	Expansion inputs
		/R1	Remote control

* 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.)

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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 µR10000 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

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.