

μR 100F RECORDERS

Continuous Pen Writing with 4 Distinct Colors...
Intelligent 4-channel industrial-use recorders.



YOKOGAWA

Bulletin 4D4B1-E

Multifunction & Maximum Reliability with User-friendly Operation.

The μ R100F is a new intelligent 100 mm recorder lineup which has been developed on the basis of YOKOGAWA long-term recorder technology.

Input can be DC voltage, nine types of TC's and/or RTD's. In addition to the clear, distinct analog recording, measured value, date and time and more can be printed out in digital form. The LED digital display and analog scales enable the measured value and the process variables to be read at a glance, so μ R100F is useful in a wide range of applications including process controls.

In order to meet a wide range of user's requirements, μ R100F can provide many optional features such as RS-422A interface, remote controls, pen offset compensation and alarms.

Main Features

■ Clear, distinct 4-color traces

μ R100F uses mess-free disposable felt-tip pen cartridges, which can be easily mounted and dismounted without pulling out an existing shelf, and provides consistent high quality traces.

■ Versatile periodical printout functions

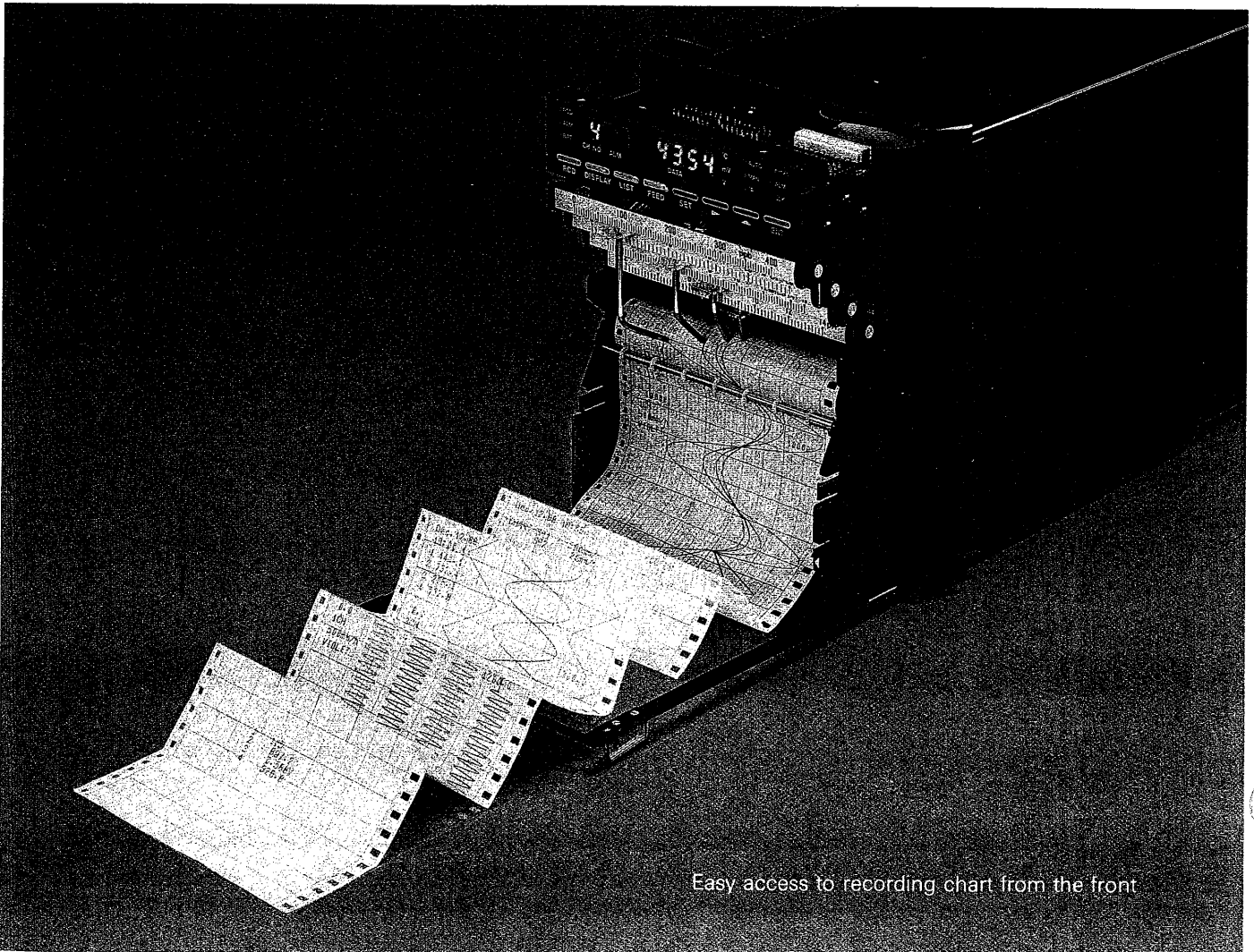
In addition to periodical printout, program list printout and alarm printout, μ R100F has optional printout features such as manual printout and message printout.

■ Measuring values can be transmitted to process variables in display, recording, and printout

Linear scaling is possible for all DC voltage input ranges.

■ Versatile programming functions

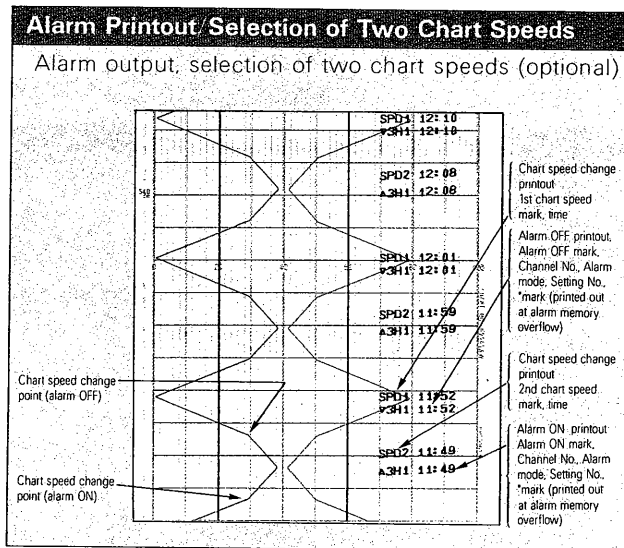
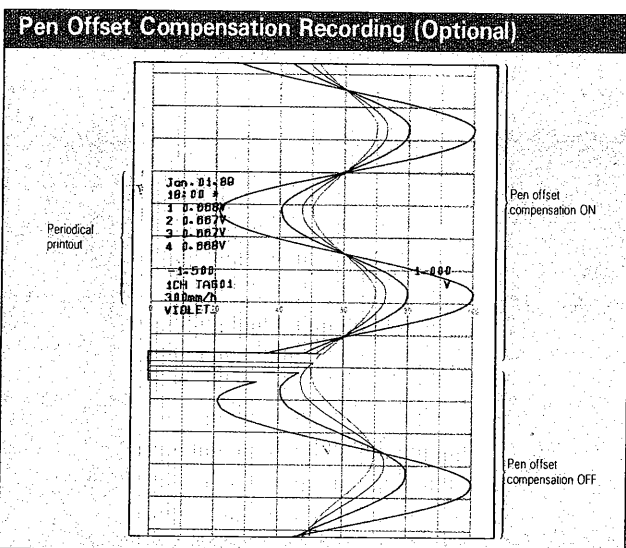
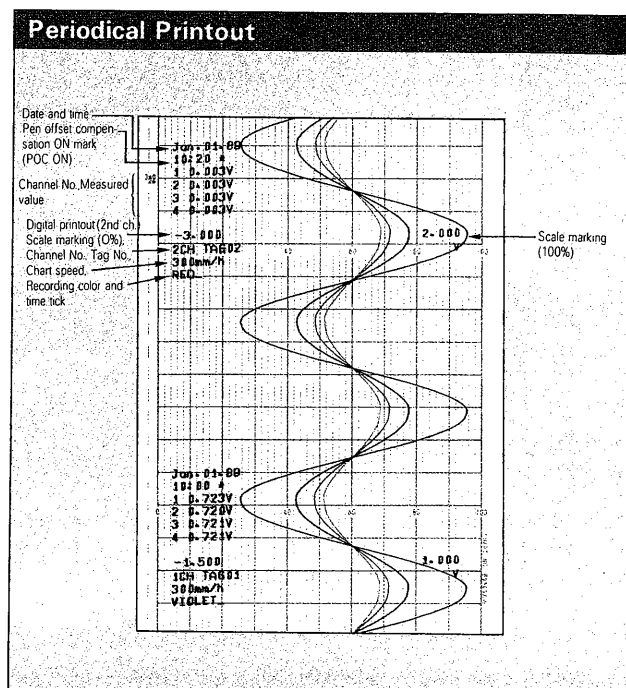
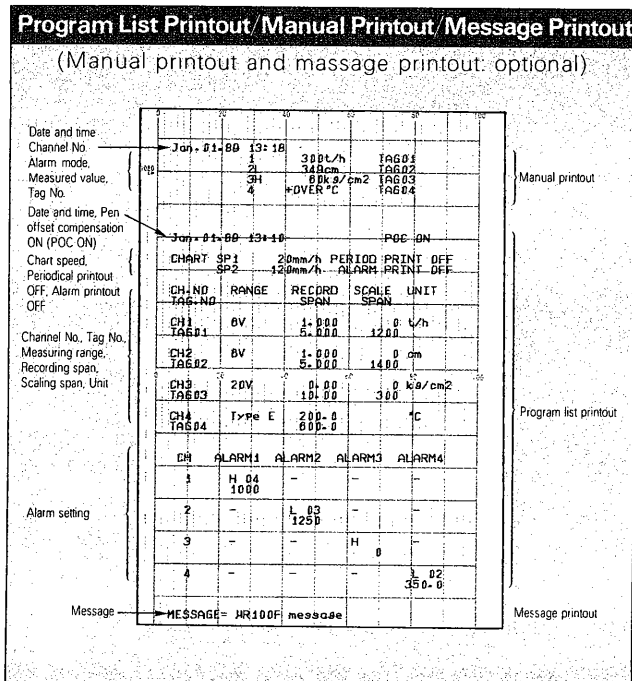
In addition to range setting, recording mode, engineering unit setting, digital printout ON/OFF and alarm printout ON/OFF can be easily programmed for each pen via front-panel keys.



Easy access to recording chart from the front

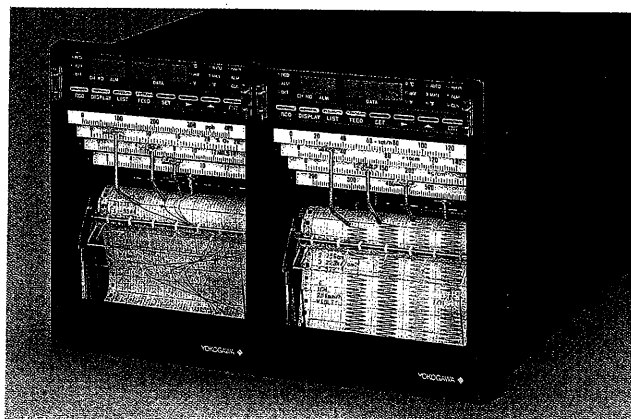
Versatile Printout Functions with Distinct Color Traces.

Printing Examples



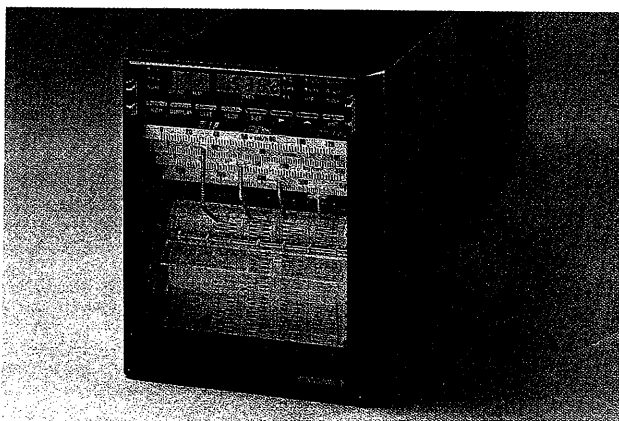
Side-by-side panel mounting

Flush panel mounting. Instruments are in the housing, and may be mounted individually or sequentially side-by-side.

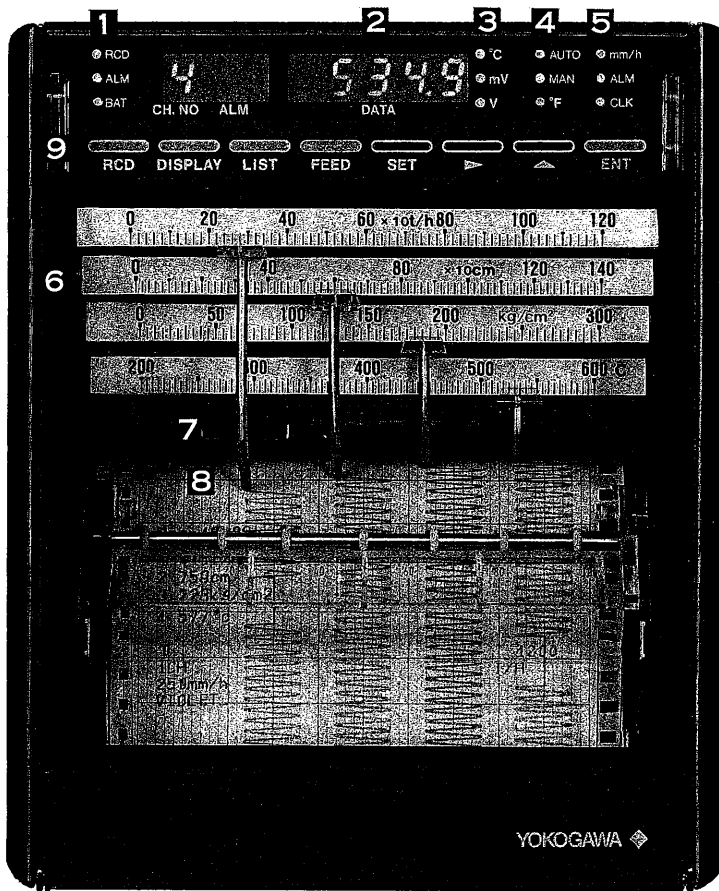


Internal illumination (standard)

An internal lamp is provided for quick chart reading even in low ambient light conditions.



Versatile Display and Recording Functions like Conventional Analog Recorders.



1 Status Indicators

- RCD:** Lit during recording.
- ALM:** Lit during alarm ON.
- BAT:** Lit during battery replacement.

2 Digital Display

At recording: Channel number and measured value are displayed.

At alarm ON: Channel numbers and H·L·h·l signs are displayed.

At programming: Contents of programming are displayed.

3 Unit Display

Displays measured value unit in °C or °F, mV, V, or lit corresponding to each channel.

4 Digital Display Mode

AUTO: Measured value is displayed by channel to channel.

MAN: Displays the measured values for a single channel.

Lit OFF: No digital display.

5 Programming Mode Display

- mm/h:** Chart speed.
- CLK:** Date and time.
- ALM:** Alarm value.
- Lit OFF:** Tag No.

6 Analog Scales

Analog scales for each channel are provided (standard).

7 Plotter

Digital data are printed out with a plotter.

8 Disposable Felt-Tip Pens

Clear, crisp analog traces by using quick-change felt-tip pens, which can be replaced from the front. The pen is linked to each pointer.

9 Programming Keys

- 1 **RCD (Record) keys:** Recording ON/OFF.
- 2 **DISPLAY key:** AUTO or MAN display, or display OFF.
- 3 **LIST key:** ON/OFF of program list printout.
- 4 **FEED key:** Used for feeding the chart.

5 **SET key:** Used for selecting programming modes (chart speed/alarm value/date and time/tag No).

6 **▷ (Cursor) key:** Used for moving the cursor in the ▷ direction.

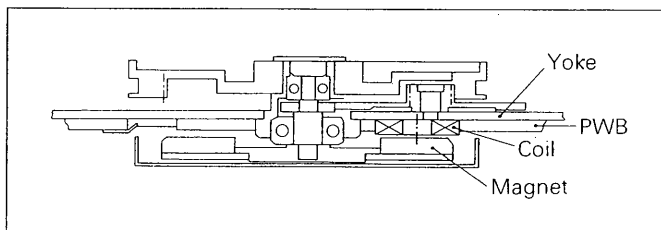
7 **△ (Up) key:** Used for changing the program values.

8 **ENT (Entry) key:** Used for storing each programming value.

Maximum Reliability and Operating Life through the Use of Non-Contact Servo Elements.

■ Ultra-thin brushless DC servomotor

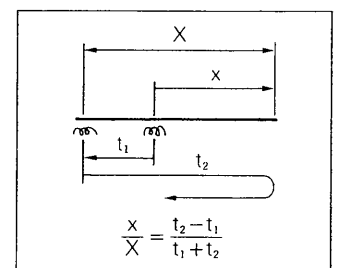
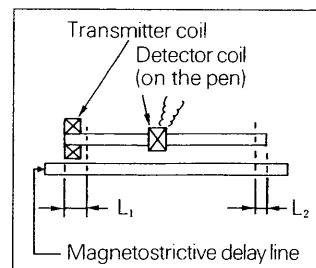
The wear-free brushless DC servomotor completely eliminates motor brushes, leadwires and connectors, and is directly mounted on the PCB (the thickness and the weight are approx. 1/5 of those of other YOKOGAWA's models). By mating this ultra-thin DC servomotor with a non-contacting ultrasonic pen position transducer, the μ R100F provides greater reliability and longer maintenance-free operating life.



Cross sectional view of brushless DC servomotor

■ Ultrasonic pen position transducer

The ultrasonic pen position transducer utilizes magnetostriction — an electromotive force generated and propagated at the speed of ultrasonic waves by the deformation of a material having magnetostrictive properties. The pen position is automatically measured from the propagation time of an ultrasonic longitudinal wave (pulse) in a magnetostrictive delay line.



Model and Suffix Codes

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4351		μ R100F recorder (1-pen model)																																																																								
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1-pen model, 1st pen of 2-pen, 3-pen or 4-pen model	-00 to -45	<table border="1"> <thead> <tr> <th>Input Type</th> <th>Range code</th> <th>Measuring Range</th> </tr> </thead> <tbody> <tr> <td rowspan="5">DC V</td> <td>00</td> <td>-20.00 to 20.00 mV</td> </tr> <tr> <td>01</td> <td>-200.0 to 200.0 mV</td> </tr> <tr> <td>02</td> <td>-2.000 to 2.000 V</td> </tr> <tr> <td>03</td> <td>-6.000 to 6.000 V</td> </tr> <tr> <td>04</td> <td>-20.00 to 20.00 V</td> </tr> <tr> <td>05</td> <td>-50.00 to 50.00 V</td> </tr> <tr> <td rowspan="5">DC V (Linear scaling)</td> <td>30</td> <td>-20.00 to 20.00 mV</td> </tr> <tr> <td>31</td> <td>-200.0 to 200.0 mV</td> </tr> <tr> <td>32</td> <td>-2.000 to 2.000 V</td> </tr> <tr> <td>33</td> <td>-6.000 to 6.000 V</td> </tr> <tr> <td>34</td> <td>-20.00 to 20.00 V</td> </tr> <tr> <td>35</td> <td>-50.00 to 50.00 V</td> </tr> <tr> <td rowspan="5">DC V (Square root scaling)</td> <td>40</td> <td>-20.00 to 20.00 mV</td> </tr> <tr> <td>41</td> <td>-200.0 to 200.0 mV</td> </tr> <tr> <td>42</td> <td>-2.000 to 2.000 V</td> </tr> <tr> <td>43</td> <td>-6.000 to 6.000 V</td> </tr> <tr> <td>44</td> <td>-20.00 to 20.00 V</td> </tr> <tr> <td>45</td> <td>-50.00 to 50.00 V</td> </tr> <tr> <td rowspan="10">TC</td> <td rowspan="10">-00 to -45</td> <td>10</td> <td>R (Pt13Rh-Pt) 0 to 1,760°C 32 to 3,200°F</td> </tr> <tr> <td>11</td> <td>S (Pt10Rh-Pt) 0 to 1,760°C 32 to 3,200°F</td> </tr> <tr> <td>12</td> <td>B (Pt30Rh-Pt6Rh) 400 to 1,820°C 752 to 3,308°F</td> </tr> <tr> <td>13</td> <td>K (NiCr-Ni) -200 to 1,370°C -328 to 2,498°F</td> </tr> <tr> <td>14</td> <td>E (NiCr-CuNi) -200 to 800°C -328 to 1,472°F</td> </tr> <tr> <td>15</td> <td>J (Fe-CuNi) -200 to 1,100°C -328 to 2,012°F</td> </tr> <tr> <td>16</td> <td>T (Cu-CuNi) -200 to 400°C -328 to 752°F</td> </tr> <tr> <td>17</td> <td>N (Nicrosil-Nisil) 0 to 1,300°C 32 to 2,372°F</td> </tr> <tr> <td>18</td> <td>W (W5%Re-W26%Re) 0 to 2,315°C 32 to 4,200°F</td> </tr> <tr> <td>19</td> <td>L (Fe-CuNi) -200 to 900°C -328 to 1,652°F</td> </tr> <tr> <td>1A</td> <td>U (Cu-CuNi) -200 to 400°C -328 to 752°F</td> </tr> <tr> <td rowspan="2">RTD</td> <td rowspan="2">-00 to -45</td> <td>20</td> <td>* J Pt 100 -200 to 550°C -328 to 1,022°F</td> </tr> <tr> <td>21</td> <td>** Pt 100 -200 to 550°C -328 to 1,022°F</td> </tr> </tbody> </table>	Input Type	Range code	Measuring Range	DC V	00	-20.00 to 20.00 mV	01	-200.0 to 200.0 mV	02	-2.000 to 2.000 V	03	-6.000 to 6.000 V	04	-20.00 to 20.00 V	05	-50.00 to 50.00 V	DC V (Linear scaling)	30	-20.00 to 20.00 mV	31	-200.0 to 200.0 mV	32	-2.000 to 2.000 V	33	-6.000 to 6.000 V	34	-20.00 to 20.00 V	35	-50.00 to 50.00 V	DC V (Square root scaling)	40	-20.00 to 20.00 mV	41	-200.0 to 200.0 mV	42	-2.000 to 2.000 V	43	-6.000 to 6.000 V	44	-20.00 to 20.00 V	45	-50.00 to 50.00 V	TC	-00 to -45	10	R (Pt13Rh-Pt) 0 to 1,760°C 32 to 3,200°F	11	S (Pt10Rh-Pt) 0 to 1,760°C 32 to 3,200°F	12	B (Pt30Rh-Pt6Rh) 400 to 1,820°C 752 to 3,308°F	13	K (NiCr-Ni) -200 to 1,370°C -328 to 2,498°F	14	E (NiCr-CuNi) -200 to 800°C -328 to 1,472°F	15	J (Fe-CuNi) -200 to 1,100°C -328 to 2,012°F	16	T (Cu-CuNi) -200 to 400°C -328 to 752°F	17	N (Nicrosil-Nisil) 0 to 1,300°C 32 to 2,372°F	18	W (W5%Re-W26%Re) 0 to 2,315°C 32 to 4,200°F	19	L (Fe-CuNi) -200 to 900°C -328 to 1,652°F	1A	U (Cu-CuNi) -200 to 400°C -328 to 752°F	RTD	-00 to -45	20	* J Pt 100 -200 to 550°C -328 to 1,022°F	21	** Pt 100 -200 to 550°C -328 to 1,022°F
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Power requirements	-1 -3 -5 -7	100V AC 115V AC 200V AC 230V AC																																																																								
Frequency	1 2	50 Hz 60 Hz																																																																								
Optional features	/BU	TC burnout protection (Upscale action; common to all points)	Can not specify both for same recorder																																																																							
	/BD	TC burnout protection (Downscale action; common to all points)																																																																								
	/AK-04	4 common outputs (Relay contact rating... 240V AC 3A, or 30V DC 3A; non-inductive load)																																																																								
	/PS	Pen offset compensation... 2-, 3- or 4-pen recording model with common time axis																																																																								
	/MP	Manual printout																																																																								
	/RS422A	RS-422A interface																																																																								
	/REM <input type="checkbox"/> <input type="checkbox"/>	Remote controls by external contact signal. Specify two functions out of the following five functions. 1. Chart drive and recording start/stop. 2. Selection of two chart speeds. 3. Program list printout. 4. Message printout. 5. Manual printout.																																																																								
	/UNT	Engineering unit seal																																																																								
	/MTS	Specify for each single mounted unit, or for one side-by-side mounted unit.																																																																								
	/SCF-G2M	Bezel color: Munsell 7.5 BG4/1.5 (/MTS must be specified)																																																																								
/MTF	Mounting kit for Foxboro SPEC 200 Series (/MTF must be specified when sliding into the shelf of Foxboro SPEC 200)																																																																									
/DF	*F display																																																																									

Note:
* J Pt 100 : JIS C1604-1989, JIS C1606-1989
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DIN IEC751, IEC751

Standard Functions of μ R100F

Function	Description
Periodical Printout	Prints out measured values, date and time, units, scale markings (0%, 100% sides), channel No., TAG No. and chart speed.
Program List Printout	Prints out measuring ranges, recording spans, units, alarms, date and time, TAG No. chart speed, etc.
Alarm Printout	Prints out channel No., H-L-h-l, ON or OFF time and mark.
Digital Display	At measuring: Displays measured values in each channel (or turns off all the display). At programming: Displays the programming contents.
Status Indicators	Displays statuses in each mode of operation; digital display and programming.
Unit Display	Displays each measurement unit (*C or *F, mV, V).
Analog Indication	Analog scales and pointers.
Linear Scaling	Linear scaling for voltage ranges from 5mV span up to \pm 50V.
Square Root Computation	Square root computation for voltage range from 5mV span up to \pm 50V.
Programming	Operation mode: chart speed, alarm value, date and time, tag No. can be programmed via front panel. (Internal lithium battery maintains all programming when power is removed. Battery life is about 10 years) Set-up mode: Range, scaling, recording span, engineering unit, Δ T recording, Δ T alarm, skip, digital printout ON/OFF, alarm printout ON/OFF can be programmed. (Range can be programmable in both input groups of DC V/TC and RTD)

Scaling value: (-19.999 to +20.000 with 30,000 span),
recording span: 75% of measuring range.

Specifications

- Number of Inputs :** 1, 2, 3 or 4.
- Scan Cycle Time :** 125 ms.
- Input Signal Levels :** DC V...20 mV to 50 V ranges, TC...more than 100 °C span and 3 mV, RTD...more than 50 °C span (Pt 100Ω).
- Measuring Range :** Refer to measuring range table (Page 4).
- Recording Span :** Specify in each channel.
- Type of Display :** LED (red).
- Accuracy :** ±(0.1% of reading + 2 digits) on the reference range (2V).
- Digital Data Display :** At measuring ; Measured value (DC voltage...3-1/2 digits, temperature...down to the first decimal place) and CH NO., At alarm ON ; H, L, h or l, At programming ; chart speed, alarm value, date and time, TAG No, At set up: SET UP Mode and setting value.
- Analog Scale :** Background : white, letters/lines/units : black.
- Writing System :** Disposable felt-tip pens (analog), and plotter (digital).
- Effective Recording Span :** 100 mm (4").
- 90% Step Response :** Less than 1s.
- Print Cycle Time :** Continuous recording per channel.
- Chart :** Z-fold chart (16 m 52.5').
- Chart Speeds :** 5 to 12,000 mm/h.
- Recording Colors :** 1st (violet), 2nd (red), 3rd (green), 4th (blue), plotter (purple).
- Number of Alarm Set Points :** Up to 4 set points/channel via keyboard. (H, L, h, l can be freely selectable).
- Alarm Display :** LCD (digital display or ALM display).
- Hysteresis :** Approx. 0.5% of recording span.
- Dead Band :** Less than 0.2% of span.
- Input Impedance :** More than 10 MΩ (without voltage divider), approx. 1 MΩ (with voltage divider, 6 to 50 V ranges).
- External Input Resistance :** Less than 2kΩ for DC voltage and TC input, less than 10Ω/wire for RTD input. (load resistance of 3 wires being equal).
- Insulation Resistance :** More than 20 MΩ at 500 V DC between each terminal and ground terminal.
- Dielectric Strength :** 1,000 V AC for one minute between input terminals (except for RTD input type model), 1,500 V AC for one min. between power terminal and ground, 1,000 V AC for one minute between input terminal and ground.
- Ambient Temperature :** 0 to 50°C (32 to 122°F).
- Humidity :** 20 to 80% R.H. (at 5 to 40 °C).
- Mounting :** Flush panel mounting (may be inclined up to 30° backward from vertical).
- Case :** Drawn steel.

- Finish :** Black case and door frame.
- Weight (Approx.) :** 1-pen model...8.3 kg (18.3 lbs), 2-pen model...8.5 kg (18.7 lbs), 3-pen model...8.8 kg (19.4lbs), 4-pen model...9.0 kg (19.8 lbs).
- Dimensions (Approx.) :** 140 × 182.5 × 480 mm (5-1/2 × 7-3/16 × 18-7/8"), width with bezel...157 mm (6-3/16").
- Power Requirements :** 100, 115, 200 or 230 V AC, 50 or 60 Hz (must be specified).
- Power Consumption (Approx.) :** 1-pen model...26 VA, 2-pen model...28VA, 3-pen model...31 VA, 4-pen model...35 VA.
- Battery Life :** Approx. 10 years (at room temperature).

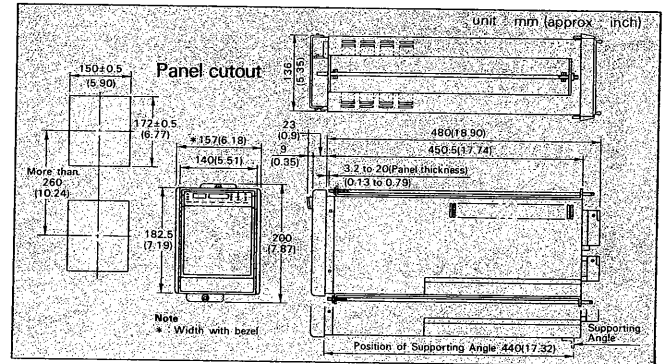
Ordering Information

- Specify the following, when ordering:
1. Model, suffix codes.
 2. Optional feature(s), if required.
 3. Recording span in each channel.
 4. Scaling value in the case of range code 30 to 35, 40 to 45.
 5. Scale graduations and scale values.

Accessories & Spares

Name	Standard Accessories				Spares	
	1 pen	2 pen	3 pen	4 pen	Part No.	Order Qty.
Disposable felt-tip pen cartridge	Violet	1	1	1	B9625AY	1 unit (3 pcs./unit)
	Red	—	1	1	B9588KG	
	Green	—	—	1	B9588KH	
	Blue	—	—	—	1	
Plotter pen (purple)	1	1	1	1	B9565AS	
Z-fold chart	1	1	1	1	B9565AW	6 units (1 chart/unit)
Fuse (100 V)	1	1	1	1	B9039KF	2 units (1 pc./unit)
Fuse (200 V)	1	1	1	1	B9078KF	
Rack adapter	2	2	2	2	—	
Screw for terminal	1	1	1	1	B9565AZ	10 units (1 pc./unit)
Instruction manual	1	1	1	1	—	

Dimensions



YOKOGAWA

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