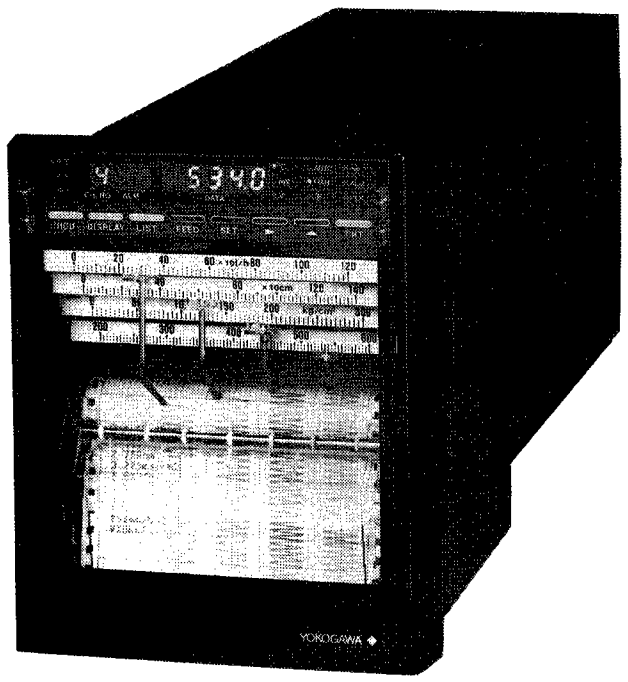
Technical Information

μR100F Recorders Sales Guide

μR100F

Confidential



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CONTENTS

1. OUTLINE

The μR100F Series is a new intelligent 100 mm recorder lineup which has been developed on the basis of YOKOGAWA's long - term recorder technology.
Input can be DC voltage, 11 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 measured value and process variables to be read at a glance, so μR100F Series is useful in a wide range of applications including process control use.

In order to meet the wide customers demands, μR100F Series can provide many optional features such as RS-422A communication function, remote control, pen offset compensation and alarm output.

2. SALES TARGET OF μR100F

<table>
<tr><th colspan="2">Sales Target</th><th>Model</th><th>features</th></tr>
<tr><td colspan="2">Replace with NRE and Foxboro SPEC200
Complement to SRHD</td><td>μR-F</td><td>● Continuous 1-to 4-pen writing model
● Panel cutout and mounting method are same as the those of NRE and SRHD
● Easy to slide into a shelf of Foxboro SPEC 200 recorders</td></tr>
<tr><td rowspan="2">General Purpose Use</td><td>End Users</td><td>μR</td><td>● Wide selection (μR100 / 180 / 250)
● Flexibility</td></tr>
<tr><td>Set Makers</td><td>μR-T</td><td>● Start recording at power ON
● Versatile TOKUCHU functions</td></tr>
</table>

3. PRODUCT CONCEPT OF μR100F

- Used for process data monitoring and recording.
- Side-by-side panel mounting sequently.

4. MAIN FEATURES

(1) Clear, Distinct 4-Color Traces

μR100F series use mess-free disposable felt-tip pen cartridges which can be easily mounted and dismounted without pulling out an existing shelf, provide consistent high quality traces.

(2) Versatile Digital Printout Functions

In addition to periodical printout, program list printout, alarm printout, μR100F Series has optional printout features such as manual printout and message printout.

(3) Process Variable Digital Values Displayed in Engineering Unit

The process variable values can be displayed, recorded and printed out by linear scaling function for all DC voltage input ranges.

(4) Program Function

In addition to range setting, selection of recording mode, unit setting, periodical printout ON / OFF and alarm printout ON / OFF can be easily programmed for each pen via front panel.

(5) Easy-to-Read Analog Scale and Red LED

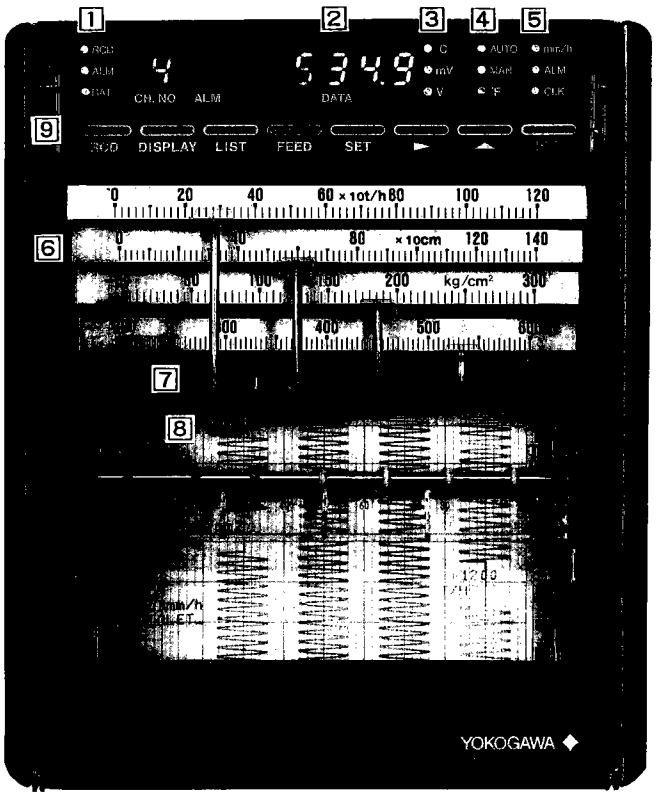
Both analog scales and pointers enable recording positions or measured values to be read at a glance.

(6) Maximum Reliability and Operating Life Through the Use of Non-Contact Servo Elements

Non-contact ultrasonic pen position transducer and brushless DC servomotor mean long-term reliability and operating life.

5. PANEL LAYOUT AND FUNCTIONS

5.1 Front Panel



1 Status Indicators

RCD : Lit during recording.

ALM : Lit during alarm ON.

BAT : Lit during battery replacement.

2 Digital Display

At recording : Channel numbers and measured value are displayed.

At alarm ON : Channel numbers and H · L · h · l sign 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. **ALM** : Alarm value.

CLK : Date and time. **LIT OFF** : Tag No.

6 Analog Scales

Analog scales for each channel are provided (standard).

7 Plotter

Digital data is 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) key** : 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.)

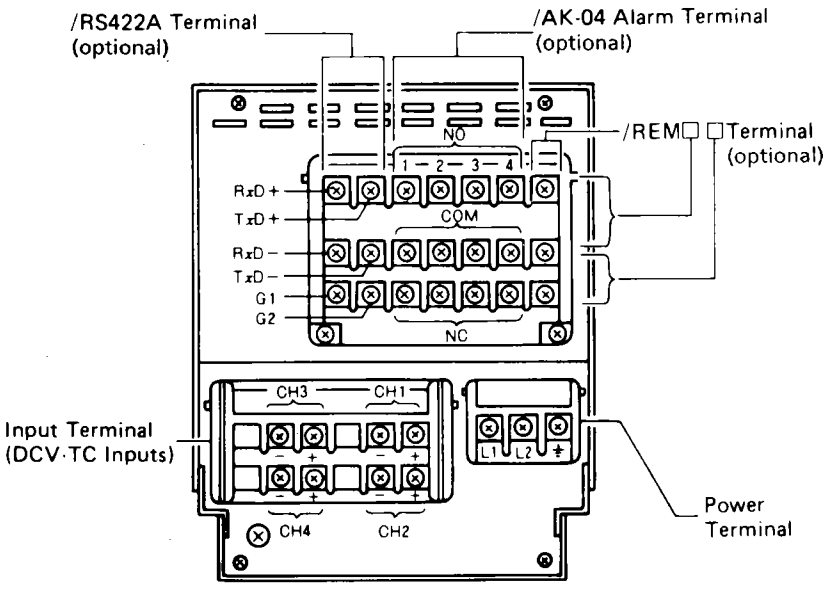
⑥ **►(Cursor) key** : Used for moving the cursor in the ► direction

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

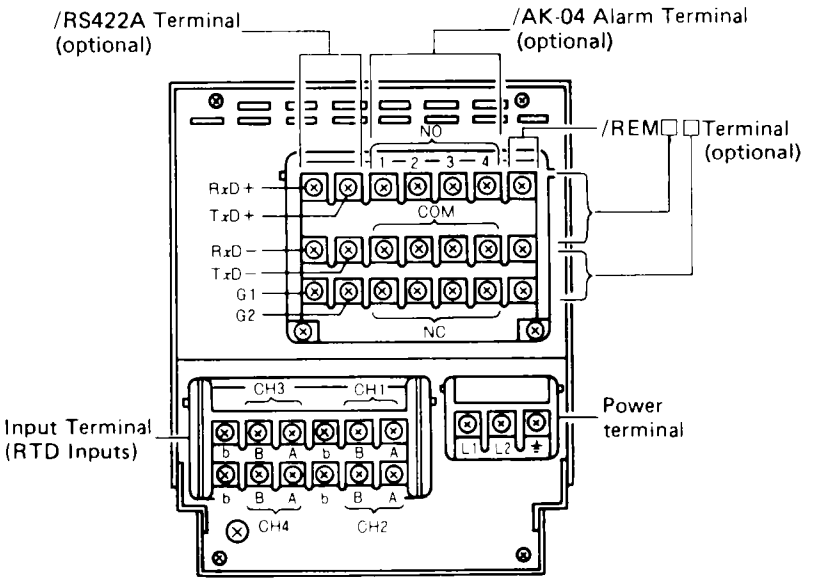
⑧ **ENT (Entry) key** : Used for storing each programming

5.2 Rear Panel (Rear Terminal Arrangements)

DC Voltage and TC Input



RTD Input



6. STANDARD FUNCTIONS

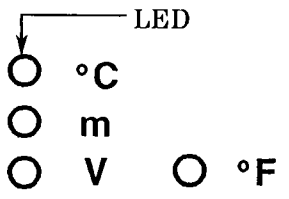
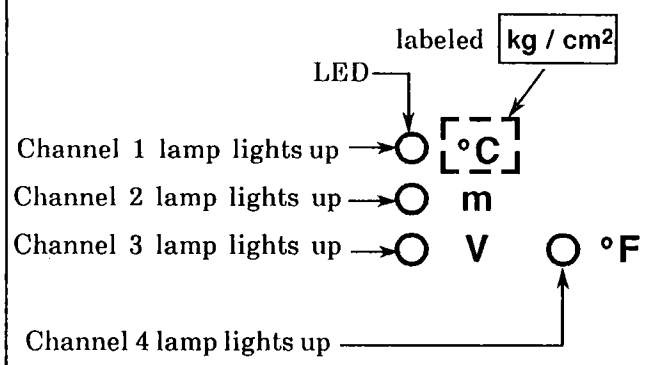
6.1 Standard Function Table

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 ± 50V.	Scaling value : (−19.999 to +20.000 with 30.000 span), recording span : 75% of recording range.
Square Root Computation	Square root computation for voltage from 5mV span up to ± 50V.	
Programming	**Operation Mode** : chart speed, alarm value, date and time, Tag No. can be programmed via front panel. (Internal lithium battery maintains all programing when power is removed. Battery life is about 10 years) **Set-up Mode** : range, scaling, recording span, engineering unit, △T recording, △T alarm, skip, periodical printout ON / OFF, alarm printout ON / OFF can be programmed. (Range can be programmable in both input groups of DC V / TC and RTD)	

6.2 Standard Functions

6.2.1 Engineering Unit Display

Any one of the standard unit and channel display modes can be selected. Use DIP switches to select display modes.

Mode	Standard Unit Display Mode	Channel Display Mode
Display		
Display Contents	Displays units when data is recorded. (Specify / **DF** when °F is displayed.) When scaling range is set, units are not displayed.	LEDs corresponding to channels light up. In four channel mode, scaling ranges are specified to display engineering units. For example, when / **UNT** is specified, 180 engineering units can be used.

6.2.2 Mode Programming

Any one of the three modes can be selected with DIP switches. Modes and set items are as follows :

Mode	Contents	Set Items
Operation Mode	Measures and records data (Built-in lithium battery will keep set items for about 10 years)	• Chart speed • Alarm value • Date and time • Tag No. • Message (optional)
Set-Up Mode	This mode allows the measuring range and record mode to be changed. { (1) Set items need not be backed up with a battery. (2) Range can be programmable in both input groups of DC V/TC and RTD. }	• Measuring range · Range · Recording span · Scaling span • Recording mode · Normal recording · ΔT recording · Skip • Units setting • Periodical printout ON / OFF • Alarm printout ON / OFF
Test Mode	Pen position (zero and full scale) can be adjusted. (No adjustment requires special tools. Use front panel keys)	Pen zero and full scale adjustment.

7. OPTIONAL FEATURES

7.1 Optional Feature Table

Name	Option Coders	Description
TC Burnout Protection	/BU	Upscale action; common to all points
TC Burnout Protection	/BD	Downscale action; common to all points
4 Common Outputs	/AK-04	Relay contact rating... 240V AC 3A, or 30V DC 3A; resistive load
Pen Offset Compensation	/PS	For 2-, 3- or 4-pen recording model with common time axis
Manual Printout	/MP	Measured data, engineering unit, alarm status can be printed out as necessary.
Mounting Kit	/MTS	Mounting kit for single panel mounting
Mounting Kit	/MTF	Mounting kit for Foxboro SPEC 200
Bezel Color	/SCF-G2M	Munsell 7.5BG4/1.5
RS-422A Interface	/RS422A	—
Remote Control	/REM □□ (Specify 1 to 5 in □)	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.
°F Disply	/DF	—
Engineering Unit Seal	/UNT	—

7.2 Optional Features

7.2.1 Remote Controls (/REM □□)

Recording start / stop (chart drive START / STOP), chart speed changing, list printout, message printout and manual printout are performed. Two of the following four specified functions are set as illustrated in the Figure.

[1] Recording can be started or stopped by external contact signal. The same function as the RCD key on the keyboard. However, the remote contact signal overrides the key operation.

[2] The chart speed is changed from the 1st set speed (normal chart speed) to the 2nd set speed (chart speed in remote control mode) by an external contact signal. When signals are cancelled, the chart speed returns to the 1st set speed.

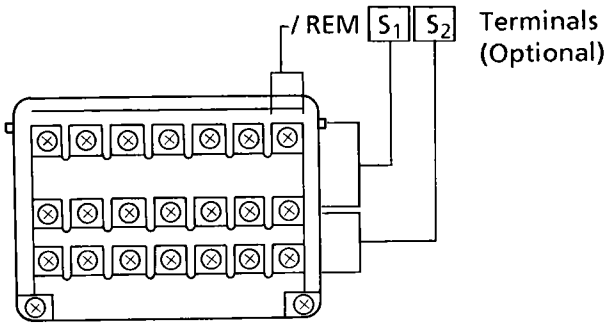
[3] Program list printout is performed by a contact signal.

[4] Message printout is performed by a contact signal.
Characters for a message is permitted up to 16 characters.

[5] Manual printout is performed by a contact signal and depressing LIST key.

In remote terminals, the upper rows are for S_1 terminals while the lower rows are for S_2 terminals.

Optional Specifications	Terminal Arrangement	
	S_1 Terminal	S_2 Terminal
/REM 12	1	2
/REM 13	1	3
/REM 14	1	4
/REM 15	1	5
/REM 23	2	3
/REM 24	2	4
/REM 25	2	5
/REM 34	3	4
/REM 35	3	5
/REM 45	4	5



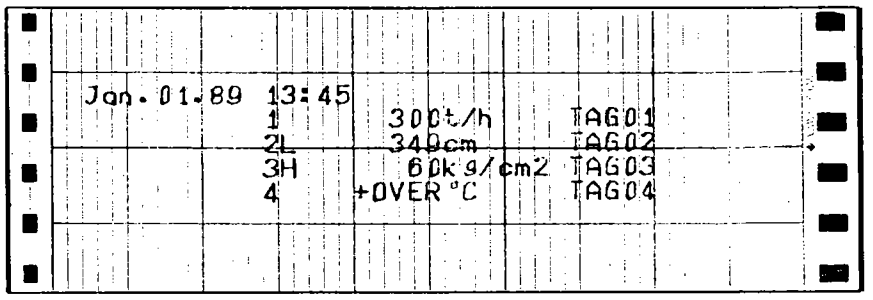
/REM Terminals
(Optional)

(For example, when /REM23 is specified, the righthand /REM terminal is for [2] function and the lefthand terminal is for [3] function.)

7.2.2 Manual Printout (/MP and /REM □5)

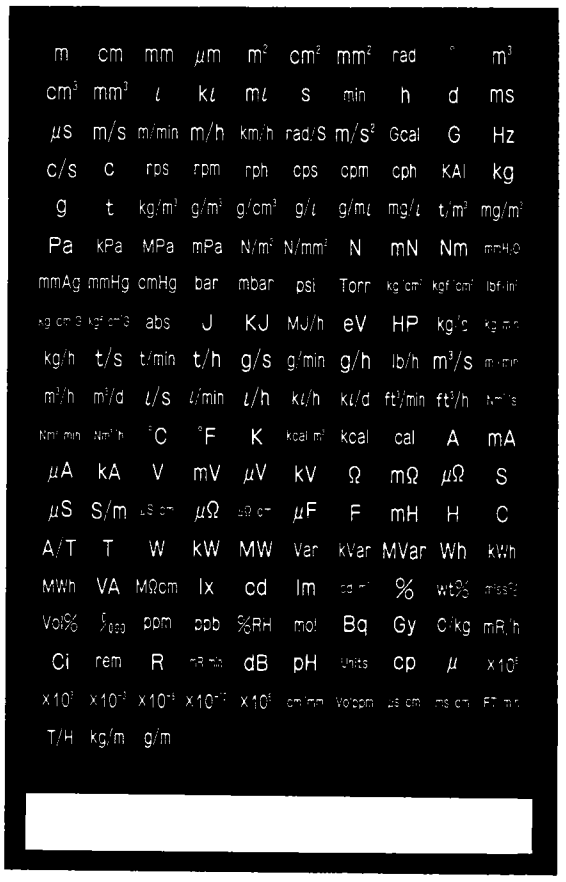
Measured data, units and alarm statuses are printed at any time. During printout, analog recording is suspended. For /MP option, manual printout can be executed with a LIST key ; or when /REM □5 is added. Manual printout can be executed either with a LIST key or by a remote contact input.

[Printout Example]



7.2.3 Engineering Units Sheet (/UNT)

180 types of engineering units are attached (with four sheets).
Use this sheet for channel display mode as well.



8. ORDERING INFORMATION

8.1 Model and Suffix Codes

Model	Suffix Codes	Description
4351		µR100F recorder (1-pen model)
4352		µR100F recorder (2-pen model)
4353		µR100F recorder (3-pen model)
4354		µR100F recorder (4-pen model)
1-pen model, 1st pen of 2-pen, 3-pen or 4-pen model	**-00 to -45**	
2nd pen of 2-pen, 3-pen or 4-pen model		
3rd pen of 3-pen or 4-pen model	**-00 to -45**	
4th pen of 4-pen model	**-00 to -45**	
Power Requirements	**-1** 100V AC **-3** 115V AC **-5** 200V AC **-7** 230V AC	
Frequency	**1** 50Hz **2** 60Hz	
Optional Features	/□	Refer to the optional features (page 11)

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	10	R 0 to 1,760 °C 32 to 3,200 °F
	11	S 0 to 1,760 °C 32 to 3,200 °F
	12	B 400 to 1,820 °C 752 to 3,308 °F
	13	K -200 to 1,370 °C -328 to 2,498 °F
	14	E -200 to 800 °C -328 to 1,472 °F
	15	J -200 to 1,100 °C -328 to 2,012 °F
	16	T -200 to 400 °C -328 to 752 °F
	17	N 0 to 1,300 °C 32 to 2,372 °F
	18	W 0 to 2,315 °C 32 to 4,200 °F
	19	L -200 to 900 °C -328 to 1,652 °F
	1A	U -200 to 400 °C -328 to 752 °F
RTD	20	Pt 100Ω(JPt) -200 to 550°C -328 to 1022 °F
	21	Pt 100Ω -200 to 550°C -328 to 1022 °F

8.2 Ordering Information

Specify the following, when ordering;

(1) Model and suffix codes.
(2) Optional codes.
(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 in each channel.

8.3 Check List when Ordering

Model	Model	Range Code	Power Requirement	Optional Specifications
1. Model 2. Range Code 3. Power Supply 4. Line Frequency 5. Optional Specifications	4351 4352 4353 4354	-□□ -□□-□□ -□□-□□-□□ -□□-□□-□□-□□	-□□	/□

Items Must Be Specified for Each Channel	1 CH	2 CH	3 CH	4 CH
6. Recording Span	□ to □ Unit : [ ]	□ to □ Unit : [ ]	□ to □ Unit : [ ]	□ to □ Unit : [ ]
7. Scaling Value (To be specified for range code 3□ or 4□)	□ to □	□ to □	□ to □	□ to □
8. Specifications of Scale Forms	□ to □ Unit : [ ] UNIF	□ to □ Unit : [ ] UNIF	□ to □ Unit : [ ] UNIF	□ to □ Unit : [ ] UNIF

8.4 Estimation and Procurement Precautions

(1) Scaling Range

① When recording span is specified, measuring range is limited to 75 %.
Example: When range code 33 (DC V, linearscaling: −6,000 to +6,000 V) is specified, specify max. 9 V of recording span.

② When scaling value with engineering unit can not be specified when ordering, but they are programmable at user-side.

③ When scaling is specified, the position of the decimal point in the digital display is as shown below.

High Scaling Value		No. of Decimal Places to be Displayed	Scaling Value Designation Example		Example of Display	
			Low Limit	High Limit	Low Limit	High Limit
0 to 9	0 to −9	Up to the 3rd decimal place	0	1	0.000	1.000
10 to 99	−10 to −99	Up to the 2nd decimal place	0	10	0.00	10.00
100 to 999	−100 to −999	Up to the 1st decimal place	0	100	0.0	100.0
1000 to 20000	−1000 to −19999	No decimal place indication	0	1000	0	1000

(2) Scale

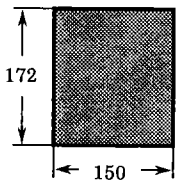
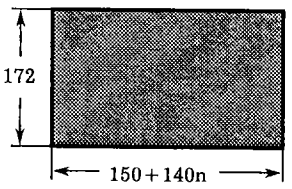
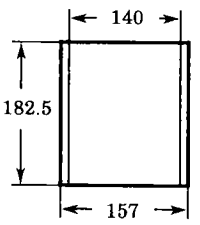
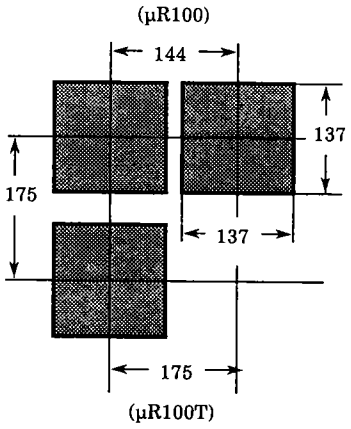
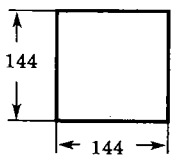
① Specify the scale graduations (actual scale). When the scale is divided uniformly, an optional code is not required.
Example: 0 to 500°C UNIF
0 to 1200 kg/cm^2 UNIF

② When scale graduations are not specified, a 0 to 100 uniform (having no units) scale is sent.

③ Issue special order sheets when specially graduated scales or special engineering units.

④ Up to three characters can be used for the scale graduations, for example 12×10^2 or 1.2×10^3 for 1200.

9. COMPARISON TABLE OF DIMENSIONS (4-PEN MODEL)

Panel Cutout and Spacing	Dimensions (Unit : mm)
Single Panel Mounting  **Side-by-side Panel Mounting**  	 (Width with Bezel) **µR100F** 480 **NRE** 650 **SRHD** 480 **SRHD** (With Signal Conditioner) 660.3
(µR100)  (µR100T)	 **µR100** **µR100T** 230 — **1-Pen Model Dot Printing Model** **µR100** **µR100T** 290 — **2- or 3-Pen Model**

10. COMPARISON TABLE OF 4-PEN RECORDERS (1/2)

		YOKOGAWA μR100F	YOKOGAWA SRHD	YOKOGAWA NRE	FOXBORO SPEC 200	OHKURA RE 10
INPUT	No. of inputs	1, 2, 3, 4	4	1, 2, 3 ,4	1, 2, 3, 4	1, 2, 3, 4
	Input signal	DCV : 20 mV to ± 50V TC : R, S, B, K, E J, T, N, W, L,U RTD : Pt100Ω programmable (Specify when ordering)	DCV : 1 to 5 VDC with signal conditioner • DCV : 10 to 100mVDC • TC : K, E, J, T, B, R, S • RTD : 100Ω (Specify when ordering)	3 to 1000 mV DC DVC : 1 to 5 VDC TC : PR, CA, IC, CC RTD : Pt100Ω, NR227 (Specify when ordering)	DVC : 0 to 10 VDC (Specify when ordering)	DVC : 1 to 5V, ±2 to ±50mV TC : K, T, J, E, B S, R RTD : Pt100Ω, Cu10Ω pH : ±1V (Specify when ordering)
	Accuracy	Display : 0.1% of rdg + 2 digit (2V range) Recording : display accuracy + 0.3% of span	Display : 0.3% of span Recording : 0.5% of span	0.5% of span	0.5% of span	0.5% of span
RECORDING	Writing system	Ink writing using disposable felt-tip pen cartridge	Dot-printing and trace recording by 4-color pen heads	Pen writing	Pen writing (ink bottle type)	Felt-tip pen cartridge
	Recording color	1st ··· violet, 2nd ··· red 3rd ··· green, 4th ··· blue plotter ··· purple	1st ··· red, 2nd ··· green 3rd ··· blue, 4th ··· black	1st ··· red, 2nd ··· green 3rd ··· blue, 4th ··· brown	1st ··· red, 2nd ··· green 3rd ··· blue, 4th ··· purple	1st ··· red, 2nd ··· blue 3rd ··· green, 4th ··· purple
	Scan cycle time	125ms	Data scan : 250msec, automatically determined by chart speed setting from 1.5 to 90 sec.	Continuous	←	←
	Balancing time	1sec (90% step)	——	Approx. 5 sec. F.S.	←	Less than 2 sec F.S.
	Chart speed	5 to 12000 mm/h programmable (82 steps)	10 to 1200 mm/h programmable	19 mm/h or 19mm/min	19 mm/h (other chat speeds are for optional)	10, 30, 60 mm/h or 10, 30, 60 mm/min
	Effective recording span	100 mm	100 mm (selectable the recording pan table)	102 mm (recording span must be specified)	101.6 mm ←	100 mm ←
	Chart	Z-forld chart 16m	←	Z-forld chart 8m	←	Z-fold chart (8m) or thermal paper
PERFORMANCE AND CHARACTERIS-TICS	Dead band	0.2% of span	——	Less than 0.1%	Less than 0.25%	Less than 0.1%
	Input impedance	10MΩ 1MΩ (More than 6V)	1MΩ	1MΩ	100MΩ	More than 8MΩ 3KΩ (1 to 5V)
	CMRR NMRR	More than 128dB More than 40dB	——	——	——	More than 128dB More than 60dB
POWER SUPPLY	Power requirement	100, 115, 200, 230 VAC	80 to 138 VAC 20 to 130 VAC, or 138 to 264 VAC 120 to 340 VDC	100, 110, 115 VAC 24 VDC	±15 VDC ±5% 24 VAC	100, 110, 115, 120, 200, 220 VAC
	Frequency	50 or 60Hz	47 to 63 Hz	50 or 60Hz	←	←
	Power consumption (Approx.)	1 pen model ··· 26 VA, 2 pen model ··· 28VA, 3 pen model ··· 31VA 4 pen model ··· 35VA	22 VA	20 VA	12 W	25 VA
	Insulation resistance	More than 20MΩ at 500VDC between each terminal and ground terminal	More than 10MΩ at 500VDC under the following condition. (between input terminal and case, between power terminal and case, between input terminals)	——	——	More than 20KΩ at 500VDC between input terminal and case or between power terminal and case.
	Directric strength	1000VAC for 1min. between input terminal and case. 1000VAC for 1min. between input terminals, 1500VAC for 1min. between power terminal and case,	500VAC for 1min. between input terminal and case. 500VAC for 1min. between input terminals, 1000VAC (100 V) for 1min. between power terminal and case, 1500VAC (200 V) for 1min. between power terminal and case,	——	——	1000VAC for 1min,. between power terminal and case.

(2/2)

		YOKOGAWA μR100F	YOKOGAWA SRHD	YOKOGAWA NRE	FOXBORO SPEC 200	OHKURA RE 10
OPERATING CONDITION	Ambient temperature	0 to 50°C (32 to 132°F)	0 to 50°C (32 to 132°F)	−10 to 50°C (14 to 132°F)	0 to 50°C (32 to 132°F)	−10 to 50°C (14 to 132°F)
	Humidity	20 to 80% RH	5 to 85% RH	——	——	35 to 90% RH
DIMENSION (Approx.: inch)		140×182.5×480mm (6-3/16×7-3/16×18-15/16"), width with bezel: 157 mm (6-3/16")	140×182.5×480mm (6-3/16×7-3/16×18-15/16"), depth with signal conditioner: 660 mm (25-9/16"), width with bezel: 157 mm (6-3/16")	140×182.5×650 mm (6-3/16×7-3/16×25-9/16"), width with bezel: 157 mm (6-3/16")		1- to 3- pen model: 144×144×350 mm (5-11/16×5-11/16×17-11/16"), 4 pen model: 144×144×450 mm (5-11/16×5-11/16×17-11/16")
DISPLAY		7 seg. LED analog scale, measured value: 3-1/2 digit, engineering unit	7 seg. LED, pointers, +, −, measured value: 4 digit	Analog scale	←	←
PRINTOUT		Pen plotter, Periodical printout, Program list printout, Message printout, Manual printout	Periodical printout, Program list printout, Event printout	——	——	——
STANDARD FUNCTION	Main functions	SQR computation Linear scaling, Programmable, Internal illumination	SQR computation, Zero bias correction, Versatile recording functions (instaneous value, average, min-max) Input filter, Automatic chart loading with chart detecting sensor, Event trigger, Internal illumination	——	——	——
	Battery life (Approx.)	10 years	5 years (normal operation), 1 year (back-up operation)	——	——	——
OPTIONAL FUNCTIONS	Alarm	No. of alarm outputs: 4 outputs/channel (H, L, ΔH ΔL), alarm indicator, hysteresis: approx. 0.5% of recording span, contact rating: 240VAC 3 A or 30VDC 3A.	No. of alarm outputs: 4 alarm outputs / channel + filter (H, L, high rate of change, low rate of change) ALM LED display, alarm setting accuracy: 0.5% of span, contact rating: 30VDC 0.2A	No. of alarm outputs: 3 to 6 outputs/channel, alarm setting accuracy: ±3%, hysteresis: 1.5%, contact rating: 100VAC 0.3A or 24 VDC 0.2A	——	No. of alarm outputs: 4 outputs/channel (H, L, ΔH, ΔL), alarm setting accuracy: 0.5%
	Other optional functions	/POC: Pen offset compensation, /BU: TC burnout protection (up scale), /BD: TC burnout protection (downscale), /MP: Manual printout, /RS422A: RS-422A interface, /REM□□: Remote controls, /UNT: Engineering unit seal, /MTS: Mounting kit, /SCF-G2M: Bezel color changes, /MTF: Mounting kit for Foxboro SPEC 200, /DF: °F display	/BU, /BD TC burnout protection	Inclining mounting	——	/BU, /BD TC burnout protection, Thermal recording, Airpurge, Roll chart

TI 4D4B1 - E

Subject to change without notice
FD No. TI 4D4B1-E

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