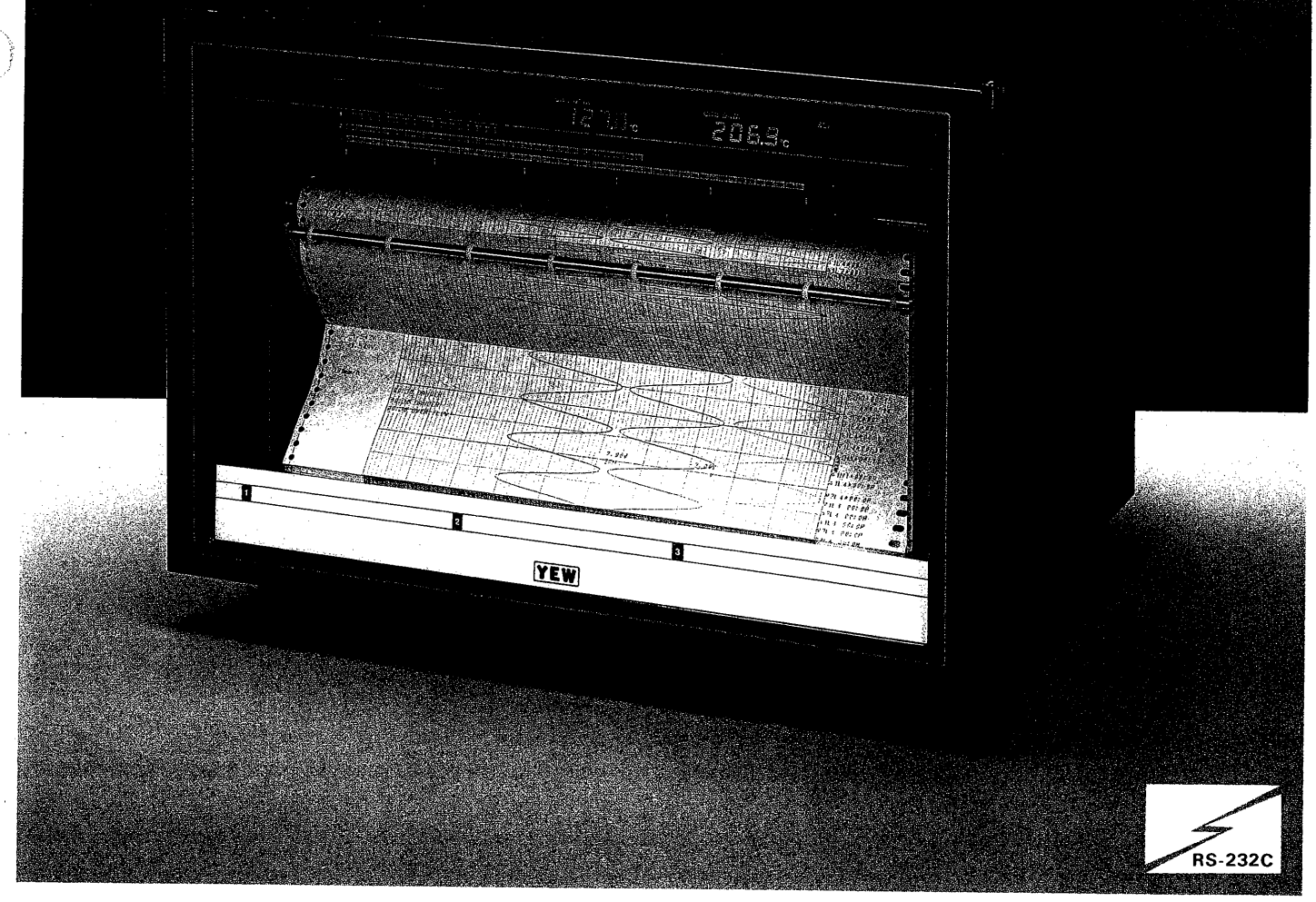
Bulletin

μR250 RECORDERS

New, Programmable 250 mm Recorder Line-Up
with maximum versatility in recording modes and alarms.



YOKOGAWA

Bulletin 4J1B1-E

A Full-Line of Convenient Features for Almost Unlimited Application Flexibility.

The μR 250 is a new, programmable 250 mm recorder line-up including three basic models — one-, two- and three-pen writing models. Input type can be DC voltage, nine types of thermocouples and/or resistance bulbs. Full-scale range, chart speed and alarms can be programmed via front-panel keyboard. In addition to highly visible analog recording, the μR 250 also provides both digital and analog (bar graph) monitoring displays, and digital data printout.

All models include versatile computing, recording and alarm modes such as delta T, scaling, square root, ZONE and partially expanded-scale recording.

Convenient Features

■ **A choice of 1-, 2- or 3-pen continuous writing models**

■ **A wide range of input types—DC V (20 mV to 50 V ranges), 9 types of TC's (ANSI, DIN or JIS),and/or RTD**

■ **Completely programmable for input types, full-scale ranges, chart speed (5 to 12,000 mm/h in 1 mm steps), alarms, tag number, and more**

■ **Maximum versatility in analog recording and digital printout**
Analog recording: Measured da.a (up to 3 colors) on full scale, ZONE and/or partially expanded-scale modes.
Digital printout: Measured data (including date & time, channel/tag numbers, chart speed, scale marking, and more), alarms, program list, and message (optional) printouts.

■ **Powerful computing functions through an easy-to-operate, membrane-sealed keyboard—ΔT, linear scaling and square root**

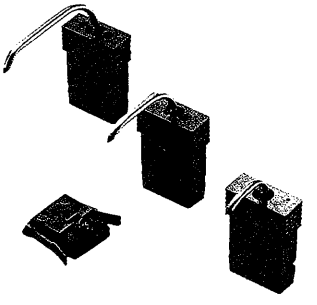
■ **Clear, distinct color traces by quick-change felt pens**

■ **Battery-backup memory and KEY lock selector**

■ **Internal illumination (standard)**
An internal fluorescent lamp is provided for quick chart reading even in low ambient light conditions.

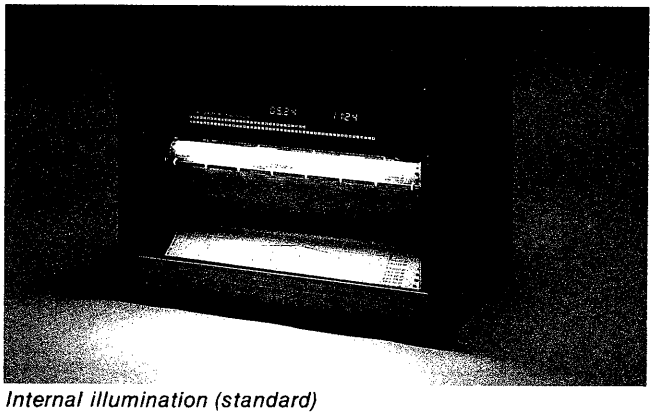
■ **A wide range of useful alarms**
- Up to 4 alarm set points/pen (H, L, ΔH, ΔL).
- Alarm printout: Channel No., alarm type, and the time of alarm ON/OFF.
- 6 or 12 common alarm outputs (optional).
- Change on alarm (optional): On alarm of any pen, the chart speed is automatically changed for detailed look at alarm conditions.

■ **Long-term reliability and operating life through the use of non-contact servo elements—Ultra-thin brushless DC servomotors and ultrasonic pen position transducers**

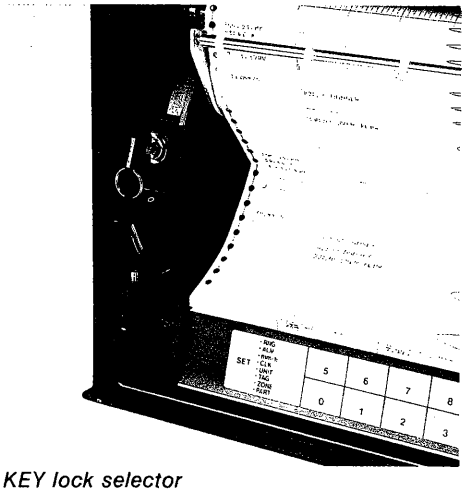


Disposable felt-tip pen cartridges & plotter pen

Ultra-thin brushless DC servomotor

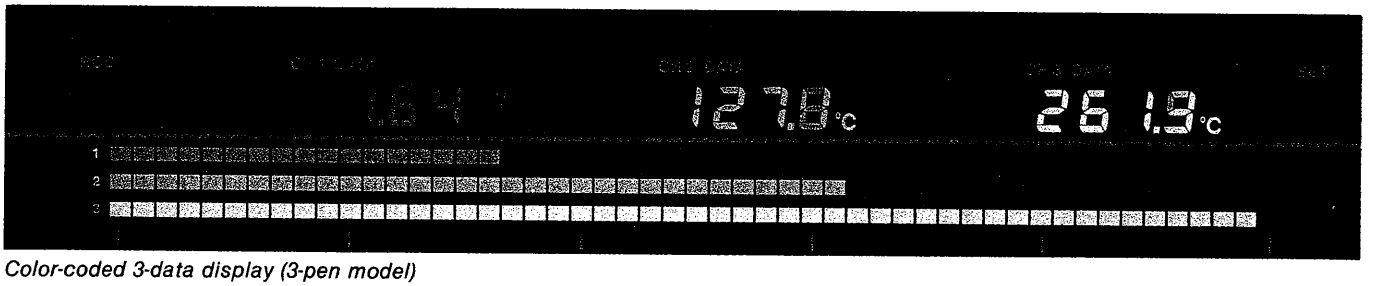


Internal illumination (standard)



KEY lock selector

Simultaneous Digital/Analog Data Display of up to 3 Pens.

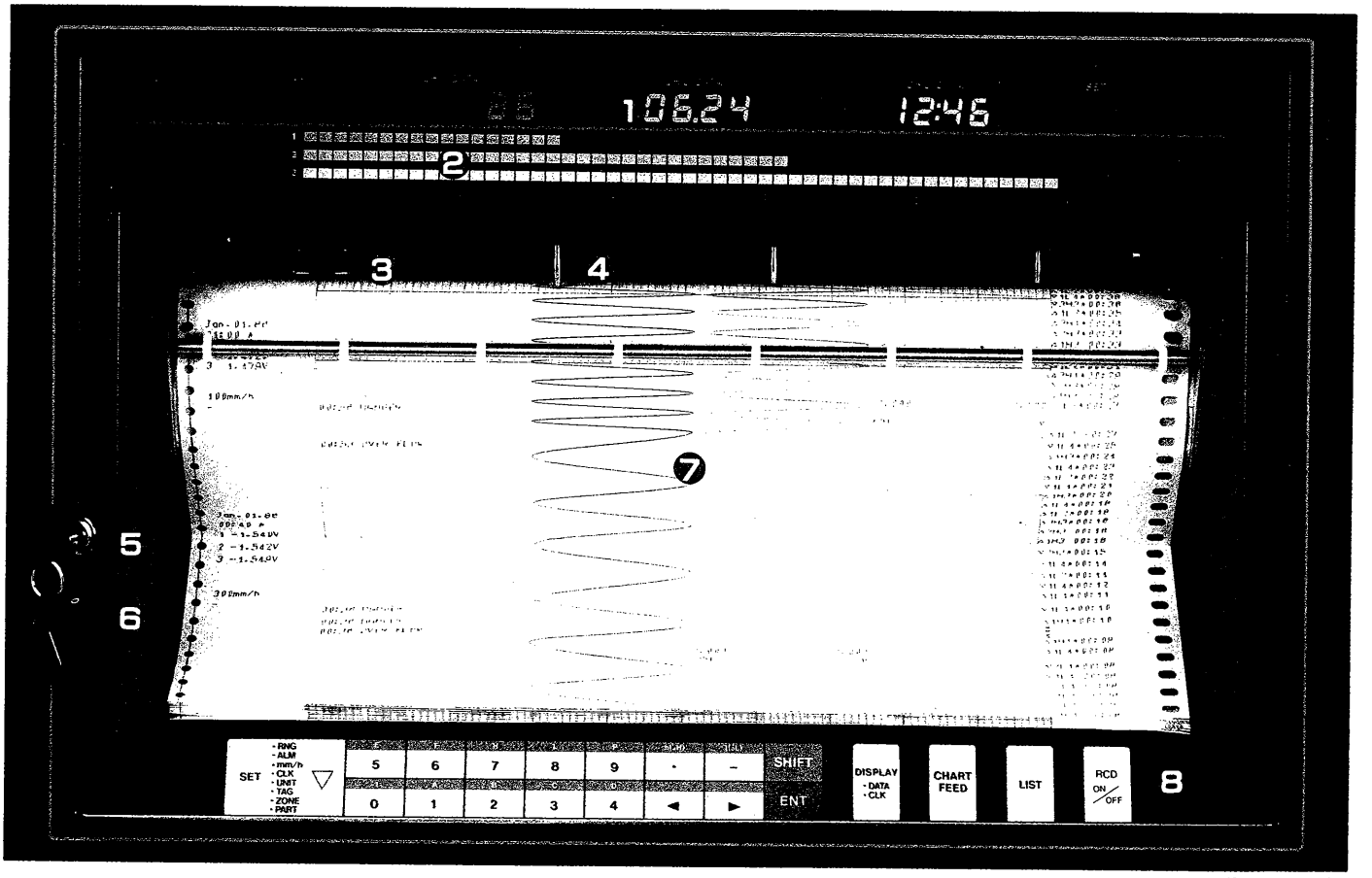


Color-coded 3-data display (3-pen model)

- **Color-coded LCD display of up to 3 measured data in both digital & analog (bar graph)**
  Highly visible, color-coded LCD display provides an easy-to-understand digital/analog information.
- **RS-232C interface (optional)**
- **Excellent price/performance advantage**

Panel Layout

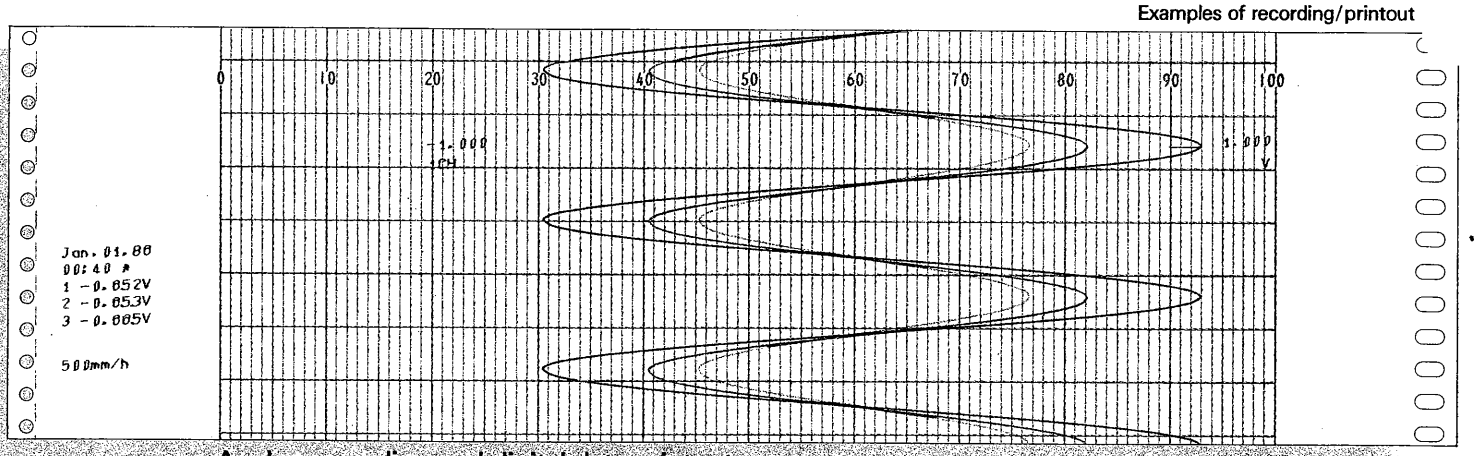
1. Alphanumeric display
2. Bar graph display
3. Plotter pen
4. Disposable felt-tip pens
5. KEY lock selector
6. Power ON/OFF selector
7. Z-fold chart
8. Programming keyboard



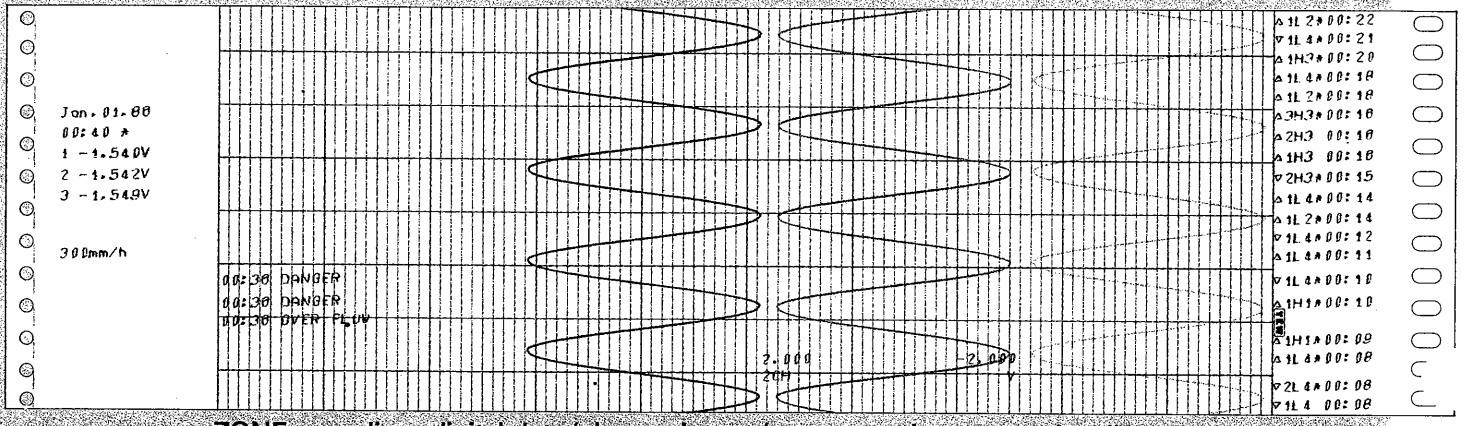
(3-pen model)

Maximum Versatility in Analog/Digital Recording Modes.

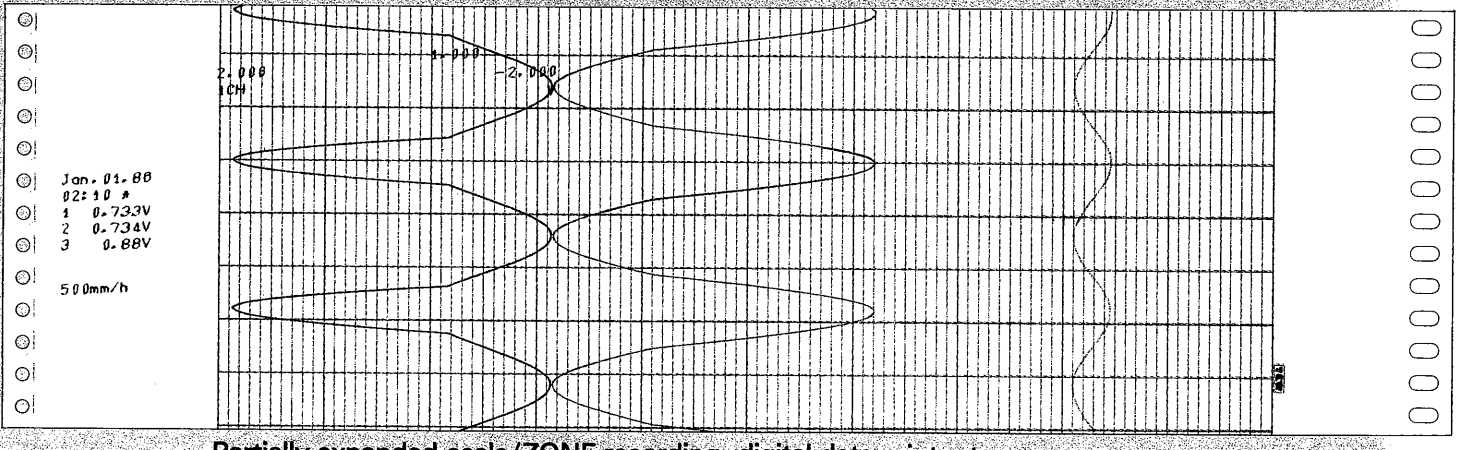
Examples of recording/printout



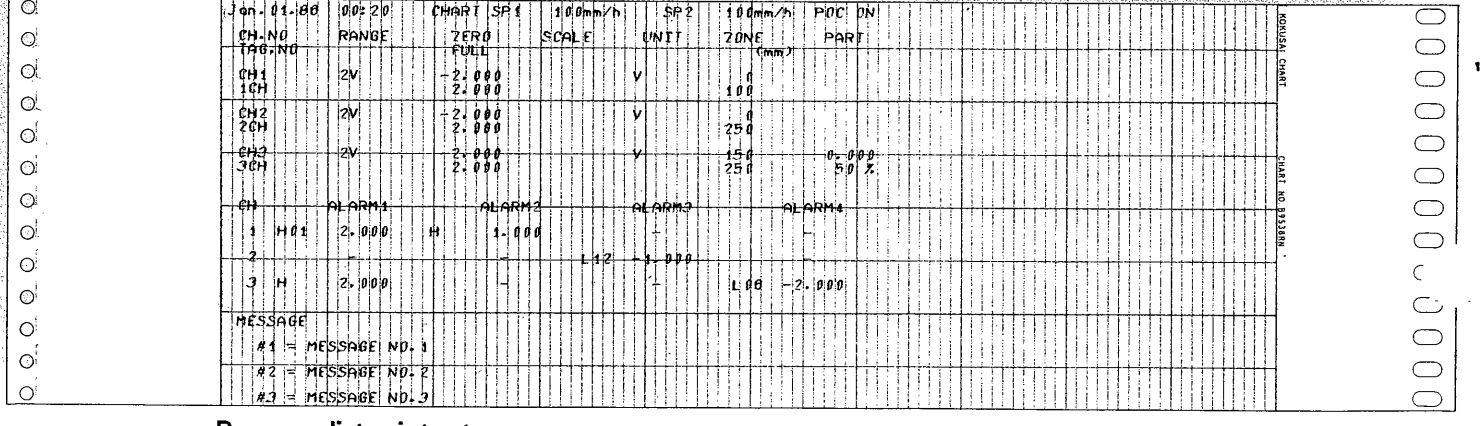
Analog recording and digital data printout



ZONE recording, digital data/alarm printout (message printout...optional)



Partially expanded-scale/ZONE recording, digital data printout



Program list printout

Simplified Programming via Front-Panel Keyboard.

Programming Configuration Table

Programming																			SET Mode
CLOCK						year			month	day				hour	minute				CLK
CHART SPEED	SPEED NO.		SPEED						CHART SPEED (mm/h)										mm/h
RANGE	CH NO.		SET CODE		RANGE CODE				LEFT END					RIGHT END					RNG
SCALING	CH NO.		A		RANGE CODE (30~35, 40~45)				LEFT END AT SCALING VALUE					RIGHT END AT SCALING VALUE					▶ RNG
ALARM	CH NO.		ALARM NO.	MODE		RELAY NO.			SETTING VALUE										ALM
UNIT	CH NO.			Unit					POSITION 0—6	-	CHARACTER CODE (ASCII)								UNIT
TAG NO.	CH NO.			tAG					POSITION 0—7	-	CHARACTER CODE (ASCII)								TAG
MESSAGE	NO. A-C			Print					POSITION 0—16	-	CHARACTER CODE (ASCII)								TAG
ZONE	CH NO.			LEFT END POSITION (mm)				-	RIGHT END POSITION (mm)										ZONE
PART	CH NO.		P/-			PART POSITION (%)			PART POINT										PART

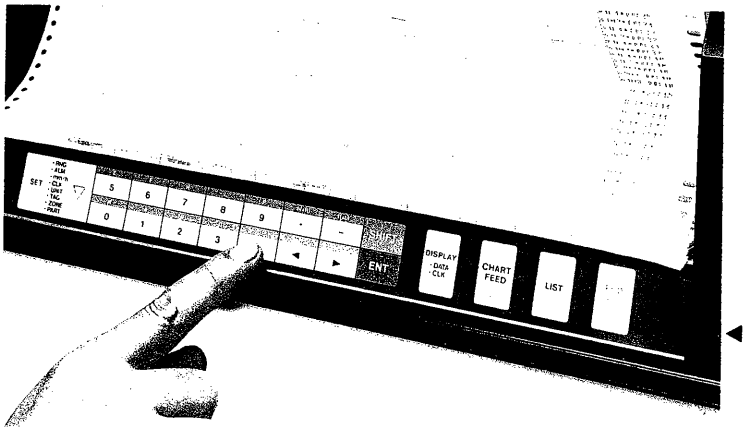
Blanking.

▼Program designation table

SET CODE	RANGE CODE		
A NORMAL	00 -20-20mV	TC	16 T -200-400℃
d DELTA	01 -200-200mV	10 R 0-1760℃	Cu-CuNi (DIN)
- SKIP	02 -2-2V	11 S 0-1760℃	17 N 0-1300℃
ALARM MODE	03 -6-6V	PtRh-Pt (DIN)	18 W 0-2315℃
H HIGH	04 -20-20V	12 B 400-1820℃	RTD Pt100Ω (Pt50Ω)
L LOW	05 -50-50V	13 K -200-1370℃	20 -200-550℃
h DELTA H	30-35 LIN SCALING	NiCr-Ni (DIN)	PART MODE
l DELTA L	40-45 SQUARE ROOTING	14 E -200-800℃	P ON - OFF
- OFF	(√‾) ⚠	15 J -200-1100℃	
		Fe-CuNi (DIN)	

▼ASCII character table

b \ a	2	3	4	5	6	7
0		0	@	P	'	p
1	!	1	A	Q	a	q
2	"	2	B	R	b	r
3	#	3	C	S	c	s
4	$	4	D	T	d	t
5	%	5	E	U	e	u
6	&	6	F	V	f	v
7	'	7	G	W	g	w
8	(	8	H	X	h	x
9	)	9	I	Y	i	y
A	*	:	J	Z	j	z
B	+	;	K	[	k	{
C	,	<	L	△	l	Ω
D	-	=	M	]	m	μ
E	.	>	N	▽	n	~
F	/	?	O	_	o	ひ



◀ Membrane-sealed programming keyboard

Standard Specifications

INPUT

Number of Inputs: 1, 2 or 3 (continuous writing pen models).

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).

Full-Scale Range Setting: Programmable via keyboard.

Measuring Ranges: ANSI, JIS (°C) and ANSI, DIN (°F) models.

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	
TC (ANSI, JIS, °C, ANSI, °F)	10	Type R ...0 to 1,760°C	32 to 3,200°F
	11	Type S ...0 to 1,760°C	32 to 3,200°F
	12	Type B ...400.0 to 1,820°C	752 to 3,308°F
	13	Type K ...-200.0 to 1,370°C	-328 to 2,498°F
	14	Type E ...-200.0 to 800.0°C	-328 to 1,472°F
	15	Type J ...-200.0 to 1,100°C	-328 to 2,012°F
	16	Type T ...-200.0 to 400.0°C	-328 to 752°F
	17	Type N** ...0 to 1,300°C	32 to 2,372°F
	18	Type W** ...0 to 2,315°C	32 to 4,200°F
RTD (JIS, °C, DIN, °F)	20	Pt 100 Ω ...-200.0 to 550.0°C	-328 to 1,022°F
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 (1 to 5 V, 4 to 20 mA)	
mA*	34	-20.00 to 20.00 V	
	35	-50.00 to 50.00 V	

*μR 250 can accept a current input when a current shunt is used.
**Type N (Nicrosil-Nisil), Type W (W5%Re-W26%Re)...not specified in ANSI, DIN and JIS.

DIN (°C) model...

Input Type	Range Code	Measuring Range
TC (DIN)	10	Type R ...0 to 1,760°C
	11	PtRh-Pt ...0 to 1,760°C
	12	Type B ...400.0 to 1,820°C
	13	NiCr-Ni ...-200.0 to 1,370°C
	14	Type E ...-200.0 to 800.0°C
	15	Fe-CuNi ...-200.0 to 900.0°C
	16	Cu-CuNi ...-200.0 to 400.0°C
	17	Type N** ...0 to 1,300°C
	18	Type W** ...0 to 2,315°C

Other ranges correspond to the ANSI, JIS (°C) model.

Maximum Allowable Input Voltage (Continuous): 10 V DC for ranges of less than 2 V DC, 100 V DC for ranges of 6 to 50 V DC.

RECORDING

Writing System: Ink writing using disposable felt-tip pen cartridges (analog data) and plotter (digital data).

Effective Recording Span: 250 mm (analog data).

Balancing Speed: Less than 2.0 s.

Scan Cycle Time (or Rate): 125 ms/pen.

Chart: Z-fold chart (344 mm x 20 m) with a calibrated width of 250 mm.

Chart Speeds: 5 to 12,000 mm/h (selectable in 1 mm steps via keyboard).

Recording Colors (Analog Data): 1st pen...red, 2nd pen...green, 3rd pen...blue.

Recording Accuracy: ±(digital display accuracy + 0.3% of span).

DIGITAL PRINTOUT

Digital Data Printout: Time tick, channel number, tag number, measured data, scale markings (at 0 & 100% of chart with engineering unit), chart speed, date and time.

Program List Printout: Date and time, measuring range, tag number, engineering unit, alarms, and chart speed.

Alarm Printout: Channel number, H or L sign, and the time of alarm ON/OFF.

DISPLAY

Type of Display: LCD.

Digital Data Display: Measured data (simultaneous display of up to 3 pens, DC V...3-1/2 digits, temperature...0.1°C), alarm H or L sign), channel number, date and time, or chart speed.

Bar Graph Display: Measured data, alarm set point (2% resolution).

Measurement (Display)Accuracy & Max. Resolution: DC V ...±0.1% to ±0.3% (10 μV), TC & RTD...±0.15% (0.1°C).

ALARMS

Number of Alarm Set Points: Up to 4 set points/pen (H, L, delta H, delta L) via keyboard.

Alarm Display: ALM (H or L) lights up on alarm (bar graph...alarm set point display, or flashing on alarm).

Hysteresis: Approx. 0.5% of span.

GENERAL SPECIFICATIONS

Dead Band: Less than 0.2% of full scale.

Input Impedance: More than 10 MΩ (without voltage divider), approx. 1 MΩ (with voltage divider) on 6 to 50 V ranges.

Input Source Resistance: DC V or TC input...less than 2 kΩ, RTD input...less than 10 Ω/wire.

Ambient Temperature: 5 to 40°C (41 to 104°F).

Humidity: 35 to 85% relative humidity.

Dielectric Strength: 1,500 V AC for one minute between power line and case, or 1,000 V AC for one minute between input terminals (except for RTD input), or between input terminals and case.

Insulation Resistance: More than 20 MΩ at 500 V DC between terminals and case.

Mounting: Flush panel mounting (may be inclined up to 30° backward from vertical).

Case: Drawn steel with gasketed, dust-tight door.

Finish: Black case, semi-gloss black door.

KEY Lock Selector: Provided on the front panel.

Internal Illumination: Fluorescent lamp.

Dimensions: Approx. 288 x 444 x 317.5 mm (11-3/8 x 17-1/2 x 12-1/2").

Weight (Approx.): 1-pen model...19.0 kg (41.9 lbs), 2-pen model...19.5 kg (43.0 lbs), 3-pen model...20.0 kg (44.1 lbs).

Power Requirements: 100, 115, 200 or 230 V AC, 50 or 60 Hz (must be specified).

Power Consumption (Approx.): 1 pen model...50 VA, 2-pen model...55 VA, 3-pen model...60 VA.

MODEL AND SUFFIX CODES

Model	Suffix Codes			Description
4181				1-pen continuous writing model
4182				2-pen continuous writing model
4183				3-pen continuous writing model
Input type (1st pen)	**-1**			DC V & TC (ANSI, JIS), °C RTD (JIS), °C
	-2			
	-3			DC V & TC (ANSI), °C RTD (DIN), °C
	-4			
	-5			DC V & TC (ANSI), °F RTD (DIN), °F
	-6			
	-7			DC V & TC (DIN), °C RTD (DIN), °C
	-8			
Input type (2nd pen)		**0**		Always **0** (1-pen model)
		1		DC V & TC (ANSI, JIS), °C RTD (JIS), °C
		2		
		3		DC V & TC (ANSI), °C RTD (DIN), °C
		4		
		5		DC V & TC (ANSI), °F RTD (DIN), °F
		6		
		7		DC V & TC (DIN), °C RTD (DIN), °C
		8		
Input type (3rd pen of 3-pen model)			**0**	Always **0** (1-pen & 2-pen models)
			1	DC V & TC (ANSI, JIS), °C RTD (DIN), °C
			2	
			3	DC V & TC (ANSI), °C RTD (DIN), °C
			4	
			5	DC V & TC (ANSI), °F RTD (DIN), °F
			6	
			7	DC V & TC (DIN), °C RTD (DIN), °C
			8	
Power requirements				**-1** 100V AC
				-3 115V AC
				-5 200V AC
				-7 230V AC
				1 50 Hz
				2 60 Hz
Optional features				/□ Refer to Optional Features

Note: Input combinations are limited to the Suffix Codes as shown in the table.

Possible Combination of Suffix Codes

Model	Model & suffix codes	Possible combination of suffix codes in □
1-pen	**4181-□00**	**1** to **8**
2-pen	**4182-□□0**	**1** or **2**, **3** or **4**, **5** or **6**, **7** or **8**
3-pen	**4183-□□□**	

Standard Functions of μR 250

Standard Function	Description
Full-scale range setting	Programmable via keyboard for each pen.
Program list printout	Contents of entire program memory are listed on the chart.
Digital printout	Time tick, channel & tag numbers, measured data, scale markings, chart speed, date and time are printed out in digital.
Digital display	Channel number, alarm, measured data, date & time, or setting value is displayed.
Bar graph display	Measured data or alarm set point is displayed.
ΔT measurement	Analog recording of temperature difference between the reference and any other point.
Scaling	Scaling for input ranges of 3 mV span to 50 V (−19999 to 20000, 30000 span).
Battery-backup memory	Three 1.5 V batteries maintain all programming when power is removed.
Square root	Square root computation for DC voltage input.
ZONE recording	Recording position of left and right ends can be programmed for each pen.
Partially expanded-scale recording	Any portion within full scale can be expanded or reduced for each pen.

Standard Accessories and Spares

Item		Standard accessories 1-pen	2-pen	3-pen	Part No. as spare
Z-fold chart		1	1	1	**B9538RN** (6 charts)
Disposable felt-tip pen cartridge	Red	1	1	1	**B9565AP** (3 pcs.)
	Green	–	1	1	**B9565AQ** (3 pcs.)
	Blue	–	–	1	**B9565AR** (3 pcs.)
Plotter pen (purple)		1	1	1	**B9565AS** (3 pcs.)
Key		2	2	2	Order by name
Fuse		1	1	1	Order by name
Battery (1.5 V)		3	3	3	Order by name

Optional Features

Option Code	Name (Description)
/BU	Thermocouple burnout protection (upscale action)
/BD	Thermocouple burnout protection (downscale action)
/AK-06	Alarms (internal, 6 common outputs)
/AK-12	Alarms (internal, 12 common outputs)
/REM	Remote controls (chart drive start/stop and chart speed by external contact signal)
/PS	Pen offset compensation (2- or 3-pen model recording with common time axis)
/MSG	Message printing
/RS232C	RS-232C interface

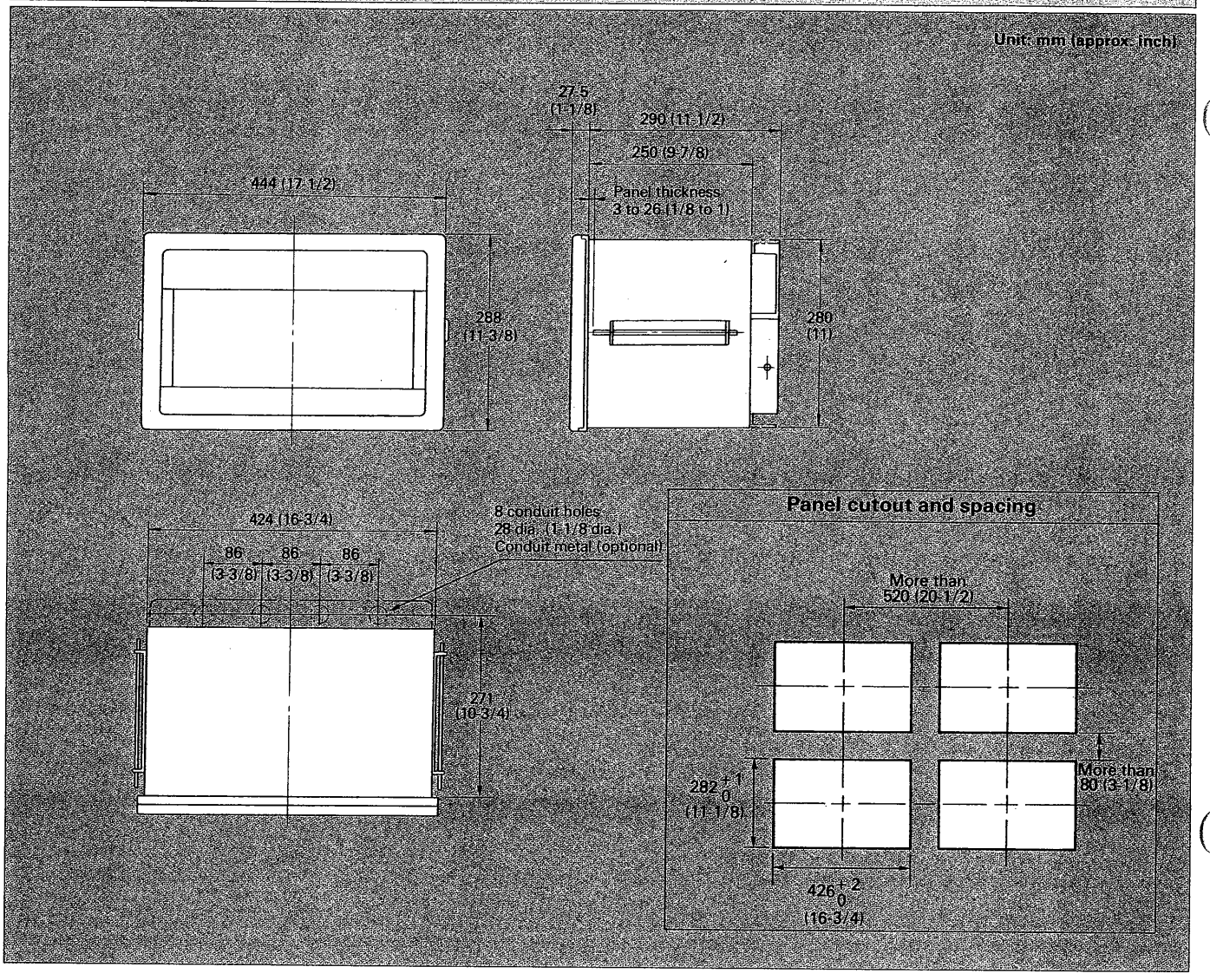
Optional Accessories

Current shunt

415920 (250Ω ± 0.1%), **415921** (100Ω ± 0.1%),
415922 (10Ω ± 0.1%)

Dimensions

Unit: mm (approx. inch)



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