SPECIFICATIONS

■ Input

Measurement points:

µR1000:1,2,3,4,(Pen),6(dot)point

µR1800:1, 2, 3, 4, (pen), 6, 12, 18, and 24 (dot) point

Input signals, Measurement range, and measurement range limits:

Input	RANGE	Measurement Range	
DC voltage (V)	20 mV	–20.00 to 20.00 mV	
	60 mV	–60.00 to 60.00 mV	
	200 mV	–200.0 to 200.0 mV	
	2 V	–2.000 to 2.000 V	
	6 V	–6.000 to 6.000 V	
	20 V	–20.00 to 20.00 V	
Thermo-couple (TC)	RANGE	Measurement Range °C	Measurement Range °F
	R *1	0.0 to 1760.0°C	32.0 to 3200.0°F
	S *1	0.0 to 1760.0°C	32.0 to 3200.0°F
	B *1	0.0 to 1820.0°C	32.0 to 3308.0°F
	K *1	–200.0 to 1370.0°C	–328.0 to 2498.0°F
	E *1	–200.0 to 800.0°C	–328.0 to 1472.0°F
	J *1	–200.0 to 1100.0°C	–328.0 to 2012.0°F
	T *1	–200.0 to 400.0°C	–328.0 to 752.0°F
	N *2	0.0 to 1300.0°C	32.0 to 2372.0°F
	W *3	0.0 to 2315.0°C	32.0 to 4199.0°F
	L *4	–200.0 to 900.0°C	–328.0 to 1652.0°F
	U *4	–200.0 to 400.0°C	–328.0 to 752.0°F
RTD	RANGE	Measurement Range °C	Measurement Range °F
	Pt100 *5	–200.0 to 600.0°C	–328.0 to 1112.0°F
	JPt100 *5	–200.0 to 550.0°C	–328.0 to 1022.0°F
Contact input (operation recording)	RANGE	Measurement Limit	
	DI 1 voltage input	Less than 2.4 V: OFF; 24 V or more: ON (TTL)	
	DI 2 contact input	Contact ON/OFF	

*1 R, S, B, K, E, J, T: ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
*2 N: Nicrosil-Nisil, IEC 584, DIN IEC 584
*3 W: W•5% Re-W•26% Re (Hoskins Mfg. Co.)
*4 L: Fe-CuNi, DIN 43710 U: Cu-CuNi, 43710
*5 Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751
JPt100: JIS C 1604-1981, JIS C 1606-1989

DC A: DC current signal input (using external resistor)

Measurement and Recording Accuracy:

Input Type	RANGE	Measurement (digital display)		Recording (analog)
		Measurement Accuracy	Maximum Resolution	Recording Accuracy
DC voltage (DC V)	20 mV	±(0.2% of rdg + 3 digits)	10 µV	Measurement accuracy ±(0.3% of recording span)
	60 mV	±(0.2% of rdg + 2 digits)	10 µV	
	200 mV	±(0.2% of rdg + 2 digits)	100 µV	
	2 V	±(0.1% of rdg + 2 digits)	1 mV	
	6 V	±(0.3% of rdg + 2 digits)	1 mV	
	20 V	±(0.3% of rdg + 2 digits)	10 mV	
Thermo-couple (TC)	R	±(0.15% of rdg + 1°C) But R,S: 0 to 100°C,±3.7°C 100 to 300°C, ±1.5°C B: 400 to 600°C, ±2°C no guarantee under 400°C	0.1°C	Measurement accuracy, ±(0.3% of recording span)
	S			
	B			
	K	±(0.15% of rdg + 0.7°C) But –200 to –100°C, ±(0.15 of rdg + 1°C)		
	E	±(0.15% of rdg + 0.5°C)		
	J	±(0.15% of rdg + 0.5°C) But J: –200 to 100°C, ±(0.15% of rdg + 0.7°C)	0.1°C	
	T			
	N	±(0.15% of rdg + 0.7°C)		
	W	±(0.15% of rdg + 1°C)	0.1°C	
	L	±(0.15% of rdg + 0.5°C) But L: –200 to 100°C, ±(0.15% of rdg + 0.7°C)	0.1°C	
	U			
RTD	Pt100	±(0.15% of rdg + 0.3°C)	0.1°C	Measurement accuracy ±(0.3% of recording span)
	JPt100			

Recording span = 100 mm/180 mm

(Performance under reference operating conditions:
temperature; 23°C ±2°C, humidity; 55% ±10% RH, power supply frequency; 50/60 Hz, Usable power voltage ranges; 90 to 132, 180 to 250 VAC, warm-up time; 30 minutes (min) (50/60 Hz), and no influence from operation of other instruments.)

Reference junction compensation accuracy: (more than 0°C)
Type R, S, B, W: ±1°C
Type K, J, E, T, N, L, U: ±0.5°C

Measurement interval:
Pen models: 125 ms/channel
Dot-model: 2.5 s/6,12,18,24 channels

A/D integration time:
20 ms (50 Hz), 16.7 ms (60 Hz),
100 ms (50/60 Hz, dot model only) selectable

Input resistance:
DC voltage 2 V and lower ranges, TC ranges: 10 MΩ min.
DC voltage 6 V and higher ranges: Approx. 1 MΩ

Input bias current:
10 nA max. (approx. 100 nA on a TC input if burnout detection selected)

Thermocouple burnout detection:
Available on TC ranges (on/off selectable for each channel)
2 kΩ max. normal, 10 MΩ or more detected as open circuit, current approx. 100 nA

Filter functions
Pen model: Signal damping (can be turned ON/OFF for each channel)
Dot model: Moving average (can be turned ON/OFF for each channel)

Temperature coefficients:
Effect of ambient temperature of 10°C
Digital display: Within ±(0.1% of rdg + 1 digit)
Recording: Within digital display ±0.2% of recording span (excluding RJC error)

Maximum input voltage:
2 V DC or lower and TC ranges: ±10 V DC (continuous)
6 to 20 V DC ranges: ±30 V DC (continuous)

Common mode rejection ratio:
120 dB (50/60 Hz ±0.1%, 500 Ω imbalance, between minus terminal and ground)

Normal mode rejection ratio: 40 dB (50/60 Hz ±0.1%)

■ Recording

Recording system:
Pen-writing: Disposable felt pens (analog recording), plotter pen (digital recording)
Dot-printing: 6-color wire-dot recording

Recording paper:
Z-fold chart: (**µR1000**: 16m / **µR1800**: 20m)

Effective analog recording width: 100/180 mm

Step response time (pen model):
µR1000: 1.0 s max. /IEC TC85
µR1800: 1.5 s max. /IEC TC85

Recording colors:
Pen-writing: Pen 1, red; Pen 2, green; Pen 3, blue; Pen 4, violet; plotter, purple
Dot-printing: CH. 1, 7, 13, 19 purple; CH. 2, 8, 14, 20, red; CH. 3, 9, 15, 21, green; CH. 4, 10, 16, 22, blue; CH. 5, 11, 17, 23, brown; CH. 6, 12, 18, 24, black
(color can be assigned for each channel)

Deadband: (pen model) 0.2% of recording span max.

Maximum recording resolution:
0.1 mm. (dot printing model)

Recording formats:
Normal recording
Zone recording
Partial expanded recording

Chart speed:
Pen model: 5 to 12,000 mm/h (82 increments)
Dot-printing model: 1 to 1,500 mm/h (1 mm steps)
Analog recording cycle:
Pen model: Continuous
Dot model: 6 dots/10 seconds (max.)
12 dots/15 seconds (max.)
18 dots/20 seconds (max.)
24 dots/30 seconds (max.)
Print cycle time: (dot printing model)
(AUTO mode) chart speed determines analog recording interval.
(FIX mode) recording is done at fastest analog recording cycle rate.
Chart speed accuracy:
Less than ±0.1% (chart running more than 1,000 mm continuously and related to the grid of the chart paper.)
Message printout: 5 message, 16 characters
Periodic printout:
Engineering unit (up to 6 alpha-numeries), tag number (up to 7 alphanumeric), scale marking (0/100%), the measured data printout.
List printout:
Prints listing of range settings, alarm settings, and other parameters.
Manual printout:
Provides a digital printout of measurement results.

■ Display

Display system:
VFD (5 × 7 dot matrix, 11character positions : **μR1000**
20 character positions:**μR1800**)
Display & status indicator items
Measured data (channel No., or tag name alarm type, measured value, engineering units), date, time.
Bar graph display:
Measured value: (1% resolution)
Left-referenced or center-zero bar graph display (individually selectable for each channel).
Alarm display:
Alarm setting level indication.
Channel number of channel in alarm (dot-printing model).

■ Computing Functions

Linear scaling:
Scaling ranges: DCV, TC, RTD
Scaling limits: –20,000 to 20,000
Data display/printout range: –19,999 to 20,000
Decimal point position: User-set
Engineering units: User-set
(6 characters MAX.)
Interchannel difference:
Between any two channels (Reference CH < Measurement CH)
Range: DCV, TC, RTD
Square root:
Available for DCV range.
Scaling limits: –20,000 to 20,000
Data display/printout range: –19,999 to 20,000
Decimal point position: User-set
Engineering units: User-set
(6 characters MAX)

■ Alarms

Number of Alarm levels: Four levels/channel
Types:
High, Low, High-rate of change, Low-rate of change, delta high, and delta low.
* (Rate-of-change alarm time interval: Measurement interval × 1 to 15)
Alarm Indications:
Shared alarm indicator flashes. In case of dot-printing model, alarm status of channel in alarm is also displayed.
Alarm Recording:
Prints channel number, alarm type, and time ON or OFF on right side of chart.
Alarm relay contact output (optional function):
2, 4, 6, 12, and 24 points; AND or OR output selectable.
Energize or de-energize on alarm selectable (shared by all relays). Hold or non-hold output selectable. Reflash output is available (500 ms).

■ Construction /Power Source

Dimensions: approx.
μR1000: 144 (W) × 144 (H) × 220 (D) mm
μR1800: 288 (W) × 288 (H) × 220 (D) mm
Weight: approx.
μR1000 (4 pen: 3.8 kg, 6-dot: 3.5 kg)
μR1800 (4 pen: 9.4 kg, 6-dot: 9.1 kg, 24-dot: 9.6 kg)
Case: Drawn steel
Front door: Aluminum die casting
Color: Lamp black (Mansell 0.8 Y 2.5/0.4)
Power source:
Rated power voltage:
100 to 240 V AC
(model for /P1: 24V DC
model for /P5: 24V AC)
Usable power voltage ranges:
90 to 132, 180 to 250 V AC
(model for /P1: 21.6 to 26.4 V DC
model for /P5: 21.6 to 26.4 V AC)
Rated power frequency: 50/60 Hz
Power consumption:

(*standard condition)

μR1000	100 V AC*	240 V AC*	Max
4 pen	24 VA	34 VA	70 VA
6 dot	18 VA	24 VA	50 VA

μR1800	100 V AC*	240 V AC*	Max
4 pen	30 VA	40 VA	70 VA
dot	23 VA	32 VA	70 VA

■ General Specifications

Ambient temperature and humidity:
0 to 50°C, 20 to 80% RH (at 5 to 40°C)
Input source external resistance:
DC voltage, TC input: 2 kΩ max.
RTD input: 10 Ω max. each line
(Resistance is well-balanced)
Mounting: Up to 30° backward from vertical.
Insulation resistance:
Between terminals and ground:
20 MΩ or more (at 500 V DC)
Dielectric strength:
Power terminals to ground:
Contact output terminals to ground:
1,500 V AC (50/60 Hz) for one minute
Measuring Input terminals to ground:
1,000 V AC (50/60 Hz) for one minute
Input terminals to input terminals

(between measuring channels):
1,000 V AC (50/60 Hz) for one minute
(Except dot printing model's RTD–'b' terminals are interconnected.)

Memory backup:
Lithium battery to preserve setup parameters.
Life: approx. 10 years (at 23°C ±2°C, 55 ±10% RH, for standard model)
Battery end-of-life displays: 'BAT'status on recorder front.

Panel key lock: Key-switch type

Internal illumination:
Using internal reflection of VFD display.

Standard Accessories:
One Z-fold chart paper, one 6-color ribbon (dot model), one of each color of disposable pens and plotter pen (pen model), time-lag fuse, two mounting brackets, two keys (for key lock), one instruction manual

■ Optional functions

Alarm relay contact output (/A1, /A2, /A3, /A4, /A5):
Number of output points: 2, 4, 6, 12 or 24 points
Contact capacity: 250 V DC, 0.1 A (resistive load); 250 V AC, 3 A

RS-422A interface (/C3):
Conforms to EIA RS-422A
Can be used to output measured values, input and output setup parameters.
1: N (host: μ**R1000**/ μ**R1800**) multidrop compatible (N = 1 to 16)
Asynchronous: start-stop synchronization
Communication system: Half duplex
Wiring: 4 (5) wire
Data length: 7 or 8 bit
Stop bit: 1 or 2 bit
Parity: Odds even or none
Communication mode: ASCII or Binary (Measured data only)
Communication distance: 500 m
Communication rate: 75, 150, 300, 600, 1200, 2400, 4800, 9600 bps

IC memory card slot (/E1):
Read/write setup parameters.

IC memory card slot (/E2):
Read/write setup, measurement data and setup parameters.

FALL/chart end detection/output (/F1):
FAIL: CPU malfunction causes 'FAIL' output relay to de-energize. (transfer contact)
Chart end: At chart paper end, recording stops automatically system goes to monitor status, and 'chart end' output relay is energized. (transfer contact)

* If/F1 is installed /A5 can not be installed

Roll chart cassette (/H1):chart length 20m: only μ**R1000**

Clamped input terminals (/H2):
Provides clamped input terminal instead of screw input terminal.

Non-glare glass door (/H3):
Provides non-glare glass window in front door.

Portable type (/H5□):
Selectable for JIS,UL,VDE,SAA,BS st'd Power code.

Mathematical function (/M1):
(General computation)
Results of expressions using following operations can be assigned to measurement channels: Arithmetic operations, SQR (square root), ABS (absolute value), LOG (logarithm), EXP (exponent), relational operations, logical operations, totalization.
(Statistical computation)
Uses separate statistical computation channels. Enables time-series computations to obtain maximum, minimum, summation and average values for measurement channels. (can be recorded only digitally at the periodic printout interval)

Cu10, Cu25 RTD Input (/N1):

3-Leg Isolated RTD Input (/N2):
Provides input circuitry in which all RTD input terminals ("A", "B", and "b") for each channel are isolated from those of other channels.

24 V DC power supply (/P1):
Rated power voltage: 24 V DC
Usable power voltage ranges: 21.6 to 26.4 V DC
Maximum power consumption: 50 V A (approx.)

Pt50 RTD, PR20-40, platinal TC input (/N3):

Remote RJC (/N5):

Remote control (/R1):
Enables any mix of the following to be assigned to five contact inputs: recording start/stop, chart speed change, message printout start (up to five), manual printout start, statistical computation start/stop (with/M1 option), and digital periodic printout start (with /E1 option), start saving of measured data to IC memory card (with/E2 option).
Input signal:
TTL, open collector, contact
Input signal pulse width:1 second min.

Language and summer/winter time (/L1):
French/German/English display selectable.
Summer/Winter time.

24 V DC power supply (/P1):

24 V AC power supply (/P5 (only μ**R1000**)):

AVAILABLE MODELS

Model	Option Code	Description
436001	/ □	μR1000 1-pen recorder
436002		μR1000 2-pen recorder
436003		μR1000 3-pen recorder
436004		μR1000 4-pen recorder
436006		μR1000 6-dot recorder
437001	/ □	μR1800 1-pen recorder
437002		μR1800 2-pen recorder
437003		μR1800 3-pen recorder
437004		μR1800 4-pen recorder
437006		μR1800 6-dot recorder
437012		μR1800 12-dot recorder
437018		μR1800 18-dot recorder
437024		μR1800 24-dot recorder

■ OPTIONAL FEATURES

Option Code	Description
/A1	Alarm output relay (2 points)
/A2	Alarm output relay (4 points)
/A3	Alam output relay (6 points)
/A4	Alarm output relay (12 points, **µR1800**)
/A5	Alarm output relay (24 pooints, **µR1800**)
/C3	RS-422A Interface
/E1	IC Memory Card Slot (Setting data save/load)
/E2	IC Memory Card Slot (Setting, measurement data read/write)
/F1	FAIL/Chart end detection and output
/H1	Roll chart cassette for **µR1000**
/H2	Clamped input terminal
/H3	Non-glare door glass
/H5□ *1	Portable type
/M1	Mathematical Computations
/N1	Cu10, Cu25 RTD input
/N2	3 leg RTD (Dot printing model only)
/N3	Pt50 RTD, PR20-40, Platinel TC input
/N5	Remote RJC
/P1	24 V DC power supply
/P5	24 V AC power supply (**µR1000**)
/R1	Remote controls
/L1	French/German/English display & winter/summer time

Notes 1: Only one of /A1, /A2, /A3, /A4, /A5 can be selected
2: /F1 cannot be combined with /A5.
In case of 6 dot model,
/F1 cannot be combined with /A4.
/H2 cannot be combined with /N2.
3: /H5□ cannot be combined with /P1.
4: *1: /H5□
- B: Power cord JIS st'd
- D: Power cord UL st'd
- F: Power cord VDE st'd
- R: Power cord SAA st'd
- J: Power cord BS st'd

5: /N1 cannot be combined with /N3.
6: /N1 cannot be used together with Pt100/JPt100.

■ OPTIONAL ACCESSORIES

Name	Model	Specifications
Shunt resistor [For clamped input terminal block]	**4389 20**	250 Ω ± 0.1%
	4389 21	100 Ω ± 0.1%
	4389 22	10 Ω ± 0.1%
Shunt resistor [For screw input terminal block]	**4159 20**	250 Ω ± 0.1%
	4159 21	100 Ω ± 0.1%
	4159 22	10 Ω ± 0.1%
IC memory card	**3789 03**	64 K bytes
	3789 04	256 K bytes
	3789 05	512 K bytes
	3789 06	1 M bytes

■ SPARES

• for µR1000

Name		Part Number for Supplies	Order Q'ty
Z-fold chart paper (1 chart/unit)		**B9565AW**	10 unit
Roll chart paper (1 chart/unit)		**B9902MY**	10 unit
6-color ribbon (1 pc/unit)		**B9901AX**	1 unit
Disposable felt pens (3 pc/unit)	Red	**B9902AM**	1 unit
	Green	**B9902AN**	1 unit
	Blue	**B9902AP**	1 unit
	Violet	**B9902AQ**	1 unit
Plotter pen (3 pc/unit)	Purple	**B9902AR**	1 unit
Mounting hardware (1 pc/unit)		**B9900CW**	2 unit
Key (for key lock) (1 pc/unit)		**B9900HZ**	2 unit
Lubricating oil (1 pc/unit, dot model only)		**B9901AZ**	1 unit

• for µR1800

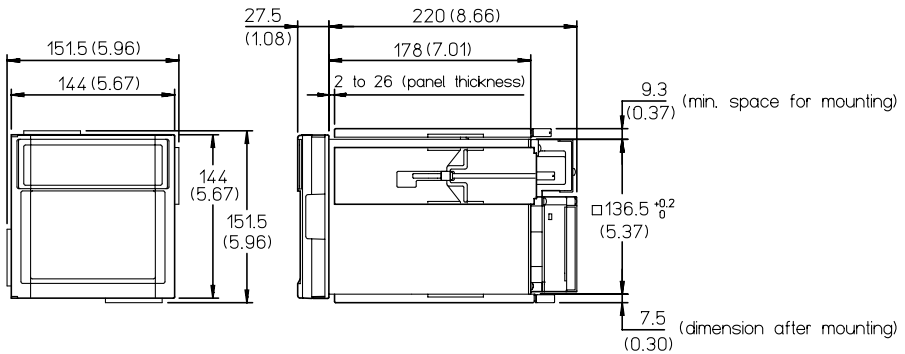
Name			Part Number for Supplies	Order Q'ty
Z-fold chart paper (1 chart/unit)			**B9573AN**	10 unit
6-color ribbon (1 pc/unit)			**B9906JA**	1 unit
Disposable felt pens (3 pc/unit)	1 pen	Red	**B9902AM**	1 unit
	2 pen	Green	**B9902AN**	1 unit
	3 pen	Blue	**B9902AP**	1 unit
	4 pen	Violet	**B9902AQ**	1 unit
Plotter pen (3 pc/unit)		Purple	**B9902AR**	1 unit
Mounting hardware (1 pc/unit)			**B9900CW**	2 unit
Key (for key lock) (1 pc/unit)			**B9900HZ**	2 unit
Lubricating oil (1 pc/unit, dot model only)			**B9901AZ**	1 unit

DIMENSIONS

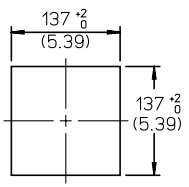
< µR1000 >

Unit: mm (approx, inch)

Note: The µR1000 should be mounted by only two brackets, either on the top & bottom of the recorder, or on the left & right side of the recorder.



Panel Cutout



Note: In case of side by side mounting horizontally or vertically, please refer to the General Specification (GS 4D5B1-01E).

< µR1800 >

Unit: mm (approx, inch)

Note: The µR1800 should be mounted by only two brackets, either on the top & bottom of the recorder, or on the left & right side of the recorder.