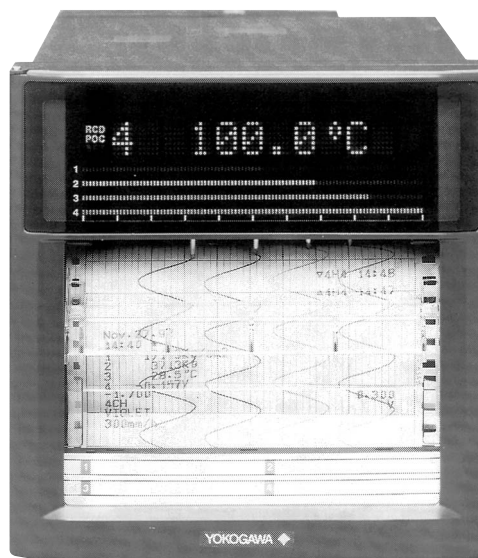# General Specifications

µR1000
Recorder

µ / 1000

GS 04D05B01-01E

The µR1000 is a small compact recorder with a recording width of 100mm. The model family consists of 1,2,3,4 pen and a 6 dot model. Pen models realize continuous recording for each channel, whereas the 6-dot model realizes a high recording speed of 6dot / 10sec. Its input is universal, which means that it is freely selectable to use inputs like direct voltage, Thermo-couple, Resistance Temperature Detector, digital input, etc. In addition to analog recording, digital data like date & time, measured values, tags, units, scale values, chart speed, alarms, calculated values, etc. can also be printed. High reliability is realized by in house developed contact free technology, such as high breakdown voltage semiconductor relays, and DC brushless servomotors. Furthermore the µR1000 has a short case of only 220mm. Good readability is realized by using 5×7 VFD display and its setting is made easy because of the interactive program menu. Real time data is also displayed as a bargraph. The µR1000 can be used as a monitoring device and as a quality control instrument in many applications (such as process temperature monitoring, pollution, construction, furnaces, field of medical diagnosis, field of refrigerating, etc.).

µR1000
(4-pen model)

STANDARD SPECIFICATIONS

General Specifications

Construction

Mounting:
Flush Panel Mounting (vertical), mounting next to each other (horizontal and vertical).

Mounting may be inclined up to 30˚, rear below front (with horizontal base).

Allowable panel thickness: 2 to 26mm

Material:
Case: drawn steel, front door: aluminium die casting.

Finish:
Case and door-frame: lamp black (Mansell 0.8Y2.5 / 0.4 or equivalent)

Door: Splash and dust-proof (based on DIN 40050-IP54).

Dimensions:
144×144×220mm (see dimensional drawings)

Weight (approx.):

1 pen	3.2kg
2 pen	3.4kg
3 pen	3.6kg
4 pen	3.8kg
6 dot	3.5kg

Model

1, 2, 3, and 4 pen, 6 dot-model.

Input

Inputs:

	DCV:	Direct Current Voltage input 20mV to 20V range.
	TC:	Thermo couple.
	RTD:	Resistance Temperature Detector.
	DI:	Digital Input (contact or DC Voltage, TTL level).
	DCA:	Direct Current Input (using external shunt resistor (10Ω, 100Ω, 250Ω))

Measuring range: selectable per channel

Input Type	Range	Measuring Range
DC V	20 mV	−20.00 to 20.00mV
	60 mV	−60.00 to 60.00mV
	200 mV	−200.0 to 200.0mV
	2 V	−2.000 to 2.000V
	6 V	−6.000 to 6.000V
	20 V	−20.00 to 20.00V

T0101.EPS

Input Type	Range	Measuring Range ˚C	Measuring Range ˚F
TC	R*1	0.0 to 1760.0˚C	32 to 3200˚F
	S*1	0.0 to 1760.0˚C	32 to 3200˚F
	B*1	0.0 to 1820.0˚C	32 to 3308˚F
	K*1	−200.0 to 1370.0˚C	−328.0 to 2498˚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 to 2372˚F
	W*3	0.0 to 2315.0˚C	32 to 4199˚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

Input Type	Range	Measuring Range ˚C	Measuring Range ˚F
RTD	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

Input Type	Range	Measuring Range
DI (Digital Input)	Voltage Input	less than 2.4V: OFF; more than 2.4V: ON (TTL)
	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, DIN 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

T0201.EPS

Measurement Interval:
Pen model: 125ms / channel.

Dot printing model: 2.5s / 6dot

A / D Integration Time:
AUTO / FIX selectable

AUTO: 20ms (50Hz) or 16.7ms (60Hz), automatically selected depending on the power supply frequency.

FIX: 20ms (50Hz), 16.7ms (60Hz) or 100ms (50 / 60Hz) can be set.

100ms integration time for dot printing model only

TC Burnout:
ON / OFF selectable (per channel).

Burnout upscale / downscale selectable (common for all channels)

Normal: less than 2kΩ, burnout: more than 10MΩ.

Measuring current: approx. 100nA.

Filter:
Pen model:

Signal damping (ON / OFF selectable per channel; in case of ON: time constant from 2, 5, 10sec).

Dot printing model:

Moving average (ON / OFF selectable per channel; in case of ON: averaging times from 2 to 16 scans).

Calculation:
Differential computation:

Between any two channels, however reference channel number must be less than measuring channel number.

Available for DCV, TC, and RTD range.

Both channels must have same range.

Linear scaling:

Available for DCV, TC and RTD range.

Scaling limits: −20000 to 20000

Data display & printout range: −19999 to 20000

Decimal point: user selectable (should be specified when entering scale value)

Unit: user settable, up to 6 characters (alphanumerical & special characters).

Square root:

Available for DCV range.

Scaling limits: −20000 to 20000

Data display & printout range: −19999 to 20000

Decimal point: user selectable

Unit: user settable, up to 6 characters (alphanumerical & special characters).

Recording and Printing
Recording Method:
Pen model: Disposable felt pens, Plotter pen

Dot printing model: 6 color wire dot.

Pen Offset Compensation:
ON / OFF selectable (Pen model only)

Effective Recording Width: 100mm
Chart:
Plain-paper Z-fold chart (16m)

Step Response Time (pen):
Less than 1sec (acc. to IEC TC85 method).

Recording Period:
Pen model:

Continuous for each channel.

Dot printing model:

Max. 6channel / 10sec, AUTO / FIX selectable

AUTO: Analog recording interval is depending on the chart speed

FIX: Analog recording interval is set to shortest period

Chart Speed:
Pen model: 5 to 12000mm/h (82 increments)

Dot printing model: 1 to 1500mm/h (1mm step)

Chart Speed Change:
speed 1, speed 2 change by remote control signals (option).

Chart Speed Accuracy:
within ± 0.1% (for recordings longer than 1000mm, related to the grid of the chart paper)

Relation between Chart Speed and Printout:

(Pen-model)

Chart Speed	• Periodic Printout	• Alarm Printout • Message Printout • Chart Speed Change Time Printout
5 to 9mm/h	No printout	Printout
10 to1500mm/h	Printout	Printout
1600 to 12000mm/h	No printout	No printout

T0301.EPS

(Dot-printing model)

Chart Speed	• Channel No. or Tag No.	• Periodic Printout	• Alarm Printout • Message Printout • Chart Speed Change Time Printout
1 to mm/h	Printout	No printout	Printout
10 to 100mm/h	Printout	Printout	Printout
101 to 1500mm/h	No printout	No printout	No printout

T0302.EPS

Relation between chart speed and printing intervals of periodic printouts:

(Pen-model)

Chart Speed	Printing Interval of Periodic Printout
5 to 9mm/h	No printout
10 to 18mm/h	Every 8 hours
20 to 36mm/h	Every 4 hours
40 to 72mm/h	Every 2 hours
75 to 135mm/h	Every hour
150 to 180mm/h	Every 30 minutes
200 to 320mm/h	Every 20 minutes
360 to 1500mm/h	Every 10 minutes
more than 1600mm/h	No printout

T0303.EPS

(Dot-printing model)

Chart Speed	Printing Interval of Periodic Printout
1 to 9mm/h	No printout
10 to 19mm/h	Every 8 hours
20 to 39mm/h	Every 4 hours
40 to 79mm/h	Every 2 hours
80 to 100mm/h	Every hour
101 to 1500mm/h	No printout

T0304.EPS

Recording Colors:

Pen model:

 pen1=red, pen2=green, pen3=blue,

 pen4=violet, plotter pen=purple

Dot printing model:

 ch1=purple, ch2=red, ch3=green, ch4=blue, ch5=brown, ch6=black (color can be assigned to any channel)

Recording Format:

1. Analog recording:

 Zone recording:

 Span: More than 5mm (in 1mm steps).

 Partial expanded recording:

 Boundary position: 1 to 99%

 Boundary value: Within recording span

2. Digital printout:

 Channel (dot model only):

 Channel number or TAG will be printed during analog recording. Approx. every 25mm this print will occur.

 Alarm:

 At the right side of the chart, CH. No. or TAG, Type of alarm, ON / OFF time (h/m) will be printed. It is selectable to get ON / OFF time of alarms, or ON time, or no alarms (common for all channels).

 Periodic printout:

 At the left side of the chart, date (m/d), time (h/m) chart speed, and measured data of every channel will be printed.

 Printing interval is INT / EXT selectable.

 INT: Using internal timer. Depending on chart speed or on interval which is selectable (up to 24 hours).

 EXT: Using remote control option

 Channel No. or TAG printout:

 Selectable, common for all channels.

 Measuring printout:

 ON / OFF selectable for each channel.

 Scale printout:

 Recording span more than 40mm, at 0% and 100% values will be printed. (When using partial expanded recording, boundary value will also be printed). ON / OFF selectable (common for all channels)

 Printout of recording colors (pen model only)

 Date, time and chart speed

 Message printout:

 Using panel key or remote control option. Up to 5 messages.

 Contents: time (h/m) and message (up to 16 characters).

 Record start time:

 Time (h/m) will be printed when recording starts, ON / OFF selectable

 Chart speed printout:

 Time (h/m) when chart speed is changed will be printed, ON / OFF selectable.

 List printout:

 Listings of range and alarm setting, etc. will be printed.

 Manual printout:

 Using panel key or remote control option. Measured values of that moment will be printed, while trend recording will be interrupted.

 SET UP List printout:

 Listings of settings in SET UP Mode will be printed.

Display

Display Method:

VFD (5 × 7 dot matrix, 11 characters).

Digitial Display:

AUTO   Channel No., kind of alarm, measured values, unit (front 3 characters), for each channel alternately

MAN   Channel No., kind of alarm, measured values, unit (front 3 characters), for one specific channel

DATE   Year / month / date will be displayed

TIME   Hour / min / sec will be displayed

VIEW   Operating status will be displayed

Bargraph Display:

Measured data   Left-referenced (%) bargraph and center zero bargraph (selectable for each channel).

Alarm   Setting level of alarm, in case of alarm flashing display.

Alarm status display:

Channel No. will be displayed in case of alarm (dot model only)

Other Displays:

RCD:Recording in progress, POC: Pen offset compensation (pen model only), SET: Set mode, ALM: Shared alarm (not corresponding to any channel), CHT: Chart end indicator (optional), BAT: Low battery.

Power Supply

Rated Power Voltage:

100 to 240VAC, automatically selected depending on the power supply voltage

Usable power voltage ranges:

90 to 132, 180 to 250VAC

Rated Power Frequency:

50 / 60 Hz, automatically selected

Power Consumption: **(approx.)**

	100VAC Power Source	240VAC Power Source	Maximum
4 pen	24VA*	34VA*	70VA
6 dot	18VA*	24VA*	50VA

∗ : In Balance

T0401.EPS

Alarm

Number of levels:

Up to four levels for every channel (High, Low, Delta high, Delta low, High-rate-of-change, Low-rate-of-change selectable).

Interval time of rate-of-change alarm is the measuring interval times 1 to 15 (selectable, and common for both rate-of-change alarms).

Display:

Set value:

It is indicated as a point on the bargraph.

In case of an alarm:

This point will start flashing on the bargraph and the digital display will show the kind of alarm and alarm indicator in different display will show alarm

For the dot model, the channel No. where the alarm occurred will also be displayed.

Hysteresis:

Approx. 0.5% of recording span (only High, Low alarm) and 0%, selectable (common for all channels and all levels).

Alarm indication when ALARM ACK-key is pressed:

Non-hold-type:

Alarm display is not affected when the ALARM ACK-key is pressed.

Hold-type:

When alarm occurs, alarm indicator will start flashing. After ALARM ACK-key is pressed, indicator will show status of the alarm.
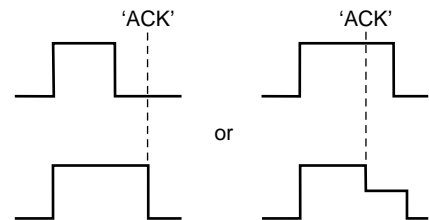

Hold-type:

Non-hold type:
No action will occur when ACK-key is pressed.
ALM indicator depends on alarm status.

F0401.EPS

Other Specifications

Clock:

With Calendar function

Clock Accuracy:

100 ppm, however not including error due to turning ON / OFF power

Panel Key Lock:

By actual key

Internal illumination:

By using the internal reflection of VFD indicator

Memory backup:

Lithium battery to protect setting parameters.

Life is approx. ten years (at room temperature, and for standard model) and is installed inside the recorder. If the battery runs down, it will be indicated on the front panel indicator.

Insulation Resistance:

Each terminal to ground terminal: more than 20MΩ (measured at 500VDC).

Dielectric Strength:

Power supply to ground terminal:

1500V AC (50 / 60Hz), 1 min

Contact output terminal to ground:

1500V AC (50 / 60Hz), 1 min

Measuring input terminal to ground:

1000V AC (50 / 60Hz), 1 min

Between measuring input terminals:

1000V AC (50 / 60Hz), 1 min

(except for RTD, since b-terminal is common).

Between remote control terminal to ground:

500V DC, 1min.

Machine noise:

Machine Noise Information Ordinance 3. GSGV, Jan. 18, 1991:

The maximum sound pressure level is equal or less than 60dB (A) according to ISO7779.

Safety Standards

Certified by CSA22.2 No. 1010.1

Complies with EN61010-1

EMC Standards

Complies with EN61326-1

Complies with AS/NZS 2064 1/2: 1997, Class A

Normal Operating Conditions

Power voltage: 90 to 132, 180 to 250VAC

Power frequency: 50Hz ± 2%, 60Hz ± 2%

Ambient temperature: 0 to 50˚C

Ambient humidity: 20 to 80% RH (at 5 to 40˚C)

Vibration: 10 to 60Hz, less than 0.02G

Shock: not permissible

Magnetic field: less than 400AT/m (DC and 50, 60Hz)

Noise:

Normal Mode (50 / 60Hz)

DCV   Peak value including signal must be less than 1.2 times the measuring range.

TC   Peak value including signal must be less than 1.2 times the measuring thermal electromotive force.

RTD   less than 50mV.

Common Mode (50 / 60Hz)

less than 250VAC rms. for the whole range

Maximum Differential Noise between Channels (50 / 60Hz)

Less than 250VAC rms

*In case of /N2 (3 leg RTD) is combined less than 200VAC rms for 6 dot model

Operating Position:

Frontwards: 0˚ Backwards: within 30˚ from horizontal

Warm-up Time:

Min 30 minutes after power has been turned ON.

Standard Performance

Measuring and Recording Accuracy:

(following specifications apply to operation of the recorder under standard operation conditions: temperature $23 \pm 2°C$, humidity $55 \pm 10\%RH$, power supply voltage 90 to 132V, 180 to 250V AC, power supply frequency 50/60Hz $\pm$ 1%, warm-up time at least 30 minutes, other ambient conditions like vibration should not adversely affect the recording operation).

Input	Range	Measuring (digital display)		Recording (analog)	
		Measurement Accuracy	Max. Resolution	Recording Accuracy	Resolution
DC V	20mV	$\pm$ (0.2% of rdg+3 digits)	10 µV	Measurement accuracy $\pm$ (0.3% of recording span)	Pen model dead band: 0.2% of recording span Dot printing model resolution: 0.1mm
	60mV	$\pm$ (0.2% of rdg+2 digits)	10 µV		
	200mV	$\pm$ (0.2% of rdg+2 digits)	100 µV		
	2V	$\pm$ (0.1% of rdg+2 digits)	1mV		
	6V	$\pm$ (0.3% of rdg+2 digits)	1mV		
	20V	$\pm$ (0.3% of rdg+2 digits)	10mV		

Input	Range	Measuring (digital display)		Recording (analog)	
		Measurement Accuracy	Max. Resolution	Recording Accuracy	Resolution
TC	R S B	$\pm$ (0.15% of rdg+1°C) but R, S : 0 to 100°C, $\pm$ 3.7°C 100 to 300°C, $\pm$ 1.5°C B : 400 to 600°C, $\pm$ 2°C accuracy less than 400°C is not specified	0.1°C	Measurement accuracy $\pm$ (0.3% of recording span)	Pen model dead band: 0.2% of recording span Dot printing model resolution: 0.1mm
	K	$\pm$ (0.15% of rdg+0.7°C) but –200 to –100°C $\pm$ (0.15% of rdg+1°C)			
	E	$\pm$ (0.15% of rdg+0.5°C)			
	J T	$\pm$ (0.15% of rdg+0.5°C) but J : –200 to –100°C $\pm$ (0.15% of rdg+0.7°C)	0.1°C		
	N	$\pm$ (0.15% of rdg+0.7°C)			
	W	$\pm$ (0.15% of rdg+1°C)	0.1°C		
	L U	$\pm$ (0.15% of rdg+0.5°C) but L : –200 to –100°C $\pm$ (0.15% of rdg+0.7°C)	0.1°C		

Input	Range	Measuring (digital display)		Recording (analog)	
		Measurement Accuracy	Max. Resolution	Recording Accuracy	Resolution
RTD	Pt100 JPt100	$\pm$ (0.15% of rdg+0.3°C)	0.1°C	Measurement accuracy $\pm$ (0.3% of recording span)	Pen model dead band: 0.2% of recording span Dot printing model resolution: 0.1mm

NOTE: Recording span is 100 mm.

Accuracy in case of scaling:
accuracy during scaling (digits) =
  measuring accuracy (digits) $\times$ multiplier + 2 digits
  (rounded up)
  Where the multiplier = scaling span digits / recording span digits

Example:
  DCV 6V range
  recording span : 1.000 to 5.000V
  scaling span : 0.000 to 2.000
  measuring accuracy = $\pm$ (0.3% $\times$ 5V + 2 digits)
                       $\pm$ (0.015V (15 digits) + 2)
                       $\pm$ (17 digits)
  multiplier = 2000 digits (0.000 to 2.000 / 4000 digits
               (1.000 to 5.000V) = 0.5
  Accuracy during scaling =17 digits $\times$ 0.5 + 2 = 11 digits
                           (rounded up)

T0501.EPS

Maximum Allowable Input Voltage:
Less than 2VDC ranges and TC ranges: ± 10VDC (cont.)

6V to 20VDC: ± 30VDC (cont.)

Reference Junction Compensation:
INT / EXT selectable (per channel)

Reference Junction Compensation Accuracy (above 0 °C):
Type R, S, B, W: ± 1 °C

Type K, J, E, T, N, L, U: ± 0.5 °C

Input Resistance:
More than 10MΩ (TC, 20mV, 60mV, 200mV, 2V range)

Approx. 1MΩ (6, 20V range).

Input Source Resistance:
DCV, TC input: less than 2kΩ

RTD input: less than 10Ω / wire (Resistance is well-balanced between 3 wires)

Input Bias Current:
less than 10nA (however, when burnout is specified for TC:100nA).

Maximum Common Mode Voltage:
250VAC rms (50 / 60Hz)

Maximum Differential Noise between Channels:
250VAC rms (50 / 60Hz)

Interference between Channels:
120dB (500Ω, the deviation in the case that 30V is applied to another channel)

Common Mode Rejection Ratio:
120dB (50/60Hz ± 0.1%, 500Ω imbalance between '–' terminal and ground)

Normal Mode Rejection Ratio:
40dB (50 / 60Hz ± 0.1%)

Effect of Operating Conditions

Effect of Ambient Temperature:
Effect of ambient temperature variation of 10°C.

Digital display: within ± (0.1% of rdg+1 digit)

Recording: within Digital display ± 0.2% of recording span (excluding RJC error)

Effect of Power Supply:
Effect of variation within 90 to 132V or 180 to 250VAC in rated power supply voltage:

(50 or 60Hz is reference)

Digital display: within ± 1 digit

Recording: within ± 0.1% of recording span

Effect of rated power frequency variation of ± 2Hz

(100VAC is reference):

Digital display: within ± (0.1% of rdg+1 digit)

Recording: same as digital display

Effect of Magnetic Field:
Effect of AC (50 / 60Hz) or DC 400AT/m field:

Digital display: within ± (0.1% of rdg+10 digits)

Recording: less than ± 0.5% of recording span

Effect of radio-frequency Electromagnetic Field:
Effect of 27-500MHz 10V/m field

Digital display: within ± (5% of range +1 digit)

Recording: within ± (5% of range)

Effect of Input Source Resistance:
Effect of Input Source Resistance variation of +1kΩ :

DCV range:

Ranges less than 2V: within ± 10 μV

Ranges more than 6V: within –0.1% of rdg

TC range:

within ± 10 μV (However ± 100 μV when TC burnout protection is set)

RTD range:

Effect of 10Ω per wire (resistances of three wires must be equal):

Digital display: within ± (0.1% of rdg+1 digit)

Recording: within Digital display ± 0.1% of recording span

Effect of difference of three wires:

Digital display: 0.1°C per 40 mΩ (approx.)

Effect of Operating Position:
Digital display: within ± (0.1% of rdg+1 digit) (within 30° backwards)

Recording: within Digital display ± 0.1% of recording span (within 30° backwards)

Vibration:
Effect when sine-wave motion of frequency 10 to 60Hz and acceleration of 0.02G is applied to the instrument in the direction of three axes for two hours:

Digital display: within ± (0.1% of rdg+1 digit)

Recording: within Digital display ± 0.1% of recording span

Transport and Storage Conditions
No malfunction will occur under these conditions, however when returning to normal operation conditions, calibration might be necessary.

Temperature: –25 °C to 60 °C
Humidity: 5 to 95% RH (no condensation)
Vibration: 10 to 60Hz 0.5G
Shock: less than 40G (inside packing)

SPECIFICATIONS OF OPTIONAL FUNCTIONS

/ A1: Alarm Output Relay (2 contacts)

/ A2: Alarm Output Relay (4 contacts)

/ A3: Alarm Output Relay (6 contacts)

When alarm occurs, output relay on rear terminal will be activated.

1. Output is AND / OR selectable.
2. Energize/ non-energize selectable (common for all relays).
3. Hold type/ non-hold type selectable (common for all relays).
4. Reflash relay:
   When alarms occurs, specific output relay point can reflash (can be assigned to 3 points max)
5. Relay contact rating:　　DC 250V / 0.1A
   　　　　　　　　　　　　AC 250V / 3A
6. Type of relay output:　　NO-C-NC

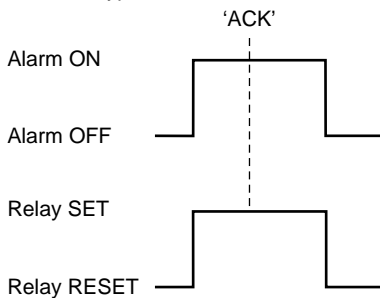Note : Alarm ACK key:
   Non-Hold type:
      No effect when ALARM ACK-key is pressed (no effect on output relay).
   Hold type:
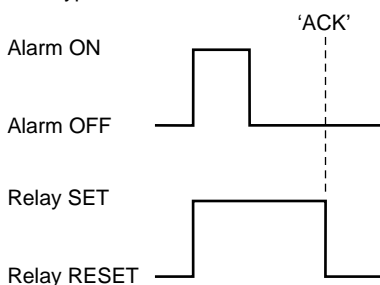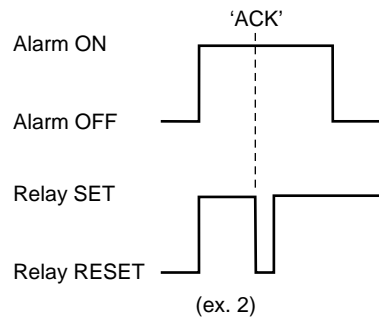   When-ALARM ACK-key is pressed, the output relay will be reset.

Non-hold-type:

Hold-type:

(ex. 1)

F0801.EPS

Hold-type:

(ex. 2)

F0802.EPS

/ C3: RS-422A Communication Interface

By using this communication function, setting and control of data can be done by a host-computer.

Data can also be output to the host-computer.

1. Synchronizing format:
   start-stop asynchronous transmission
2. Specifications:
   conform to EIA RS-422A standard
3. Communication system:
   4-wire half-duplex multi-drop connection
   (1: N (N=1 to 16))
4. Communication rate:
   75, 150, 300, 600, 1200, 2400, 4800, 9600bps
5. Data length:　　　　　　7 or 8 bit
6. Stop bit:　　　　　　　　1 or 2 bit
7. Parity:　　　　　　　　　Odd, even or none
8. Communication distance: Up to 500m
9. Communication mode:
   ASCII (control / setting / measured data) or
   Binary (measured data)

/ E1: IC Memory Card Slot

Saving and retrieving setting parameters

/ E2: IC Memory Card Slot

Specifications

Memory Data :	Setting data, measured data, calculated data and programmed parameter can be stored on a memory card. However, the retrieving and recording of math channels is not possible.
Sample Mode :	In writing : Free mode (sampling start manually) Trigger mode (sampling start by external trigger) In reading : Free mode
Sample Rate :	Pen model : Measurement interval (125ms)/ 1 sec./ 1 min./ 2min. Dot model : Measurement interval / 1 min. / 2 min.
Memory Capacity :	1M byte, 512k byte, 256k byte, or 64k byte
Data Length :	500 / 1000 / 2000 / 4000 / 8000 / 16000 / 32000 data / ch (measurement channel… 2 byte / data, math channel… 4 byte / data)

Trigger Conditions : External contact * (wire the relay output to the remote terminal in case alarm and chart-end detector is treated as trigger.)

Pre - Trigger : 0 to 100%, in ten steps

Output : Recording ;
* Regardless the number of inputs, the same products have interchangeability.
  ex. μR1000 2 pen model ←○→ μR1000 4 pen model
  μR1000 2 pen model ←×→ μR1800 4 pen model
  μR1000 2 pen model ←×→ μR1000 6 dot model
* Retrieving data is according to the measurement interval of the recorder which plays back.
* The recording interval of the dot model depends on the setting of the recorder which plays back.

Battery Backup : Lithium battery (battery life about 4 years / 64k, about 2 years / 256k, 512k, about 1year / 1M)

/ F1: FAIL / Chart End Detection and Output
If an error in the CPU board occurs, or when the chart reaches its end, output relay on the rear terminal will be activated. Besides, when the chart reaches its end, 'CHT' indicator will be shown on the display.
Relay contact rating:
    DC 250V / 0.1A, AC 250V / 3A

/ H1: Roll Chart Cassette
Provides roll chart cassette instead of Z-fold chart cassette
Chart length : 20m

/ H2: Clamped Input Terminal
Using clamped input terminals as input terminal.

/ H3: Non-glare Door Glass
Provides non-reflective glass in the front door.

/ H5□: Portable Type
Provides carrying handle and power code.

/ M1: Mathematical Functions
1. General computation:
   (1) General computation channel:
       Using measurement channels
   (2) Types:
       Arithmetic functions ($+$, $-$, $\times$, $\div$)
       SQR (square root)
       ABS (absolute value)
       LOG (y=log 10X)
       EXP (exponential)
       Relational computation ($<$, $>$, $=$, $\neq$)
       Logical computation (AND, OR, XOR, NOT). However, between two channels only.
   (3) Constant
2. Statistical computation
   (1) Types of statistics: MAX, MIN, AVE, SUM (Totalization)
   (2) Recording: Digital printout (time depends on interval) only. Analog recording is not possible.

/ N2: 3 Leg Isolated RTD Input
A, B, b legs are of isolated input type

/ P1: 24VDC Power Supply
Rated supply voltage:	24VDC
Applicable supply voltage range:	21.6 to 26.4VDC
Maximum power consumption:	Approx. 50VA

/ P5: 24VAC Power Supply
Rated supply voltage:	24VAC
Rated power frequency:	50 / 60 Hz
Applicable supply voltage range:	21.6 to 26.4VAC
Maximum power consumption:	Approx. 60VA

/ R1: Remote Control
5 are selectable from the below mentioned remote controls.

	Number of settings	Signal
Recording start / stop	1	level
Chart speed change	1	level
Message printout start*1	5	trigger
Manual printout start	1	trigger
TLOG start / stop*2	1	level
Periodic printout start	1	trigger
Start saving of measured data to IC memory card*3	1	trigger

*1 Up to 5 messages can be set
*2 / M1 option is necessary
*3 / E2 option is necessary

/ L1: French / German / English Display & Winter / Summer Time
English, German or French display can be selected. Winter and summer time can be set.
e.g.

English (=standard)	German	French
DISP=AUTO	ANZ=AUTO	AFFI=AUTO

T0901.EPS

/ N1: Cu10, Cu25 RTD input
Cu10 and Cu25 input become available instead of Pt100 and JPt100. If this option is specified, Pt100 and JPt100 input is not available.
Cu10, Cu25 Measurement Range

	Input Type	Measurement Range
RTD	Cu10(GE) : α =0.003855 at 25˚C Cu10(L&N) : α =0.003852 at 25˚C Cu10(WEED) : α =0.003862 at 25˚C Cu10(BAILEY) : Non-Linear Cu10 : α =0.00392 at 20˚C Cu10 : α =0.00393 at 20˚C Cu25 : α =0.00425 at 0˚C	–200 to 300˚C (–328 to 572˚F)

T0902.EPS

Measurement / Recording Accuracy

Input Type	Measurement Accuracy	Recording Accuracy
Cu10(GE) : α =0.003855 at 25˚C Cu10(L&N) : α =0.003852 at 25˚C Cu10(WEED) : α =0.003862 at 25˚C Cu10(BAILEY) : Non-Linear Cu10 : α =0.00392 at 20˚C Cu10 : α =0.00393 at 20˚C	± (0.4% of rdg + 1.0˚C)	Measurement Accuracy ± (0.3% of Recording span)
Cu25 : α =0.00425 at 0˚C	± (0.3% of rdg + 0.8˚C)	

T1001.EPS

/N3: Pt50, RTD, PR20-40, Platinel TC input

Pt50, PR20-40 and Platinel input become available. These inputs can be used in combination with all other standard inputs.

Pt50, PR20-40, Platinel Measurement Range

Input Type		Measurement Range
TC	PR20-40	0 to 1900˚C (32 to 2552˚F)
	Platinel	0 to 1400˚C (32 to 2552˚F)
RTD	Pt50	–200 to 600˚C (–328 to 1112˚F)

T1002.EPS

Measurement / Recording Accuracy

Input Type		Measurement Accuracy	Recording Accuracy
PR20-40	0 to 450˚C	Not specified	Measurement Accuracy ± (0.3% of Recording span)
	450 to 750˚C	± (0.9% of rdg+3.2˚C)	
	750 to 1100˚C	± (0.9% of rdg+1.3˚C)	
	1100 to 1900˚C	± (0.9% of rdg+0.4˚C)	
Platinel		± (0.25% of rdg+2.3˚C)	
Pt50		± (0.3% of rdg+0.6˚C)	

T1003.EPS

/ N5: Remote RJC

Remote RJC function (compensating wire saving type) becomes available.
  * Measurement is possible only if the thermocouples of the reference channel (RJC channel) and the measurement channel are of the same type.
  * RJC channel must be smaller than the measurement channel.

MODEL AND SUFFIX CODES

Model Code	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
	/□	See option code table.

Note 1: only one of /A1, /A2, /A3 can be selected
Note 2: /A3 cannot be combined with /F1
Note 3: /H2 cannot be combined with /N2.
Note 4: If /N1 is specified, Pt100 and JPt100 input is not available.
Note 5: /H5□
      └B: Power cord JIS st'd
      └D: Power cord UL st'd
      └F: Power cord VDE st'd
      └R: Power cord AS st'd
      └J: Power cord BS st'd
    /H5□ cannot be combined with /P1 or /P5.

OPTION CODES

Option Code	Description
/ A1	Alarm output relay (2 contacts)
/ A2	Alarm output relay (4 contacts)
/ A3	Alarm output relay (6 contacts)
/ C3	RS-422A Interface
/ E1	IC Memory Card Slot with SET UP data read / write function
/ E2	IC Memory Card Slot with SET UP, measurement data read / write function
/ F1	FAIL / Chart end detection and output
/ H1	Roll chart cassette
/ H2	Clamped input terminal
/ H3	Non-glare door glass
/ H5□	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	24VDC power supply
/ P5	24VAC power supply
/ R1	Remote controls (5 plugs)
/ L1	French / German / English display & winter / summer time

STANDARD ACCESSORIES

Name		1 pen	2 pen	3 pen	4 pen	6 dot
Z-fold chart		1	1	1	1	1
6 color ribbon cassette		–	–	–	–	1
Disposable felt-pen cartridge	Red	1	1	1	1	–
	Green	–	1	1	1	–
	Blue	–	–	1	1	–
	Violet	–	–	–	1	–
Plotter pen	Purple	1	1	1	1	–
Mounting brackets		2	2	2	2	2
Key (for key lock)		2	2	2	2	2
Fuse (250V 800mA Timelag) (24VDC, AC model : 250V 5A Timelag)		1	1	1	1	1
Instruction Manual		1	1	1	1	1
Reference sheet (Quick operation guide)		1	1	1	1	1

SPARES

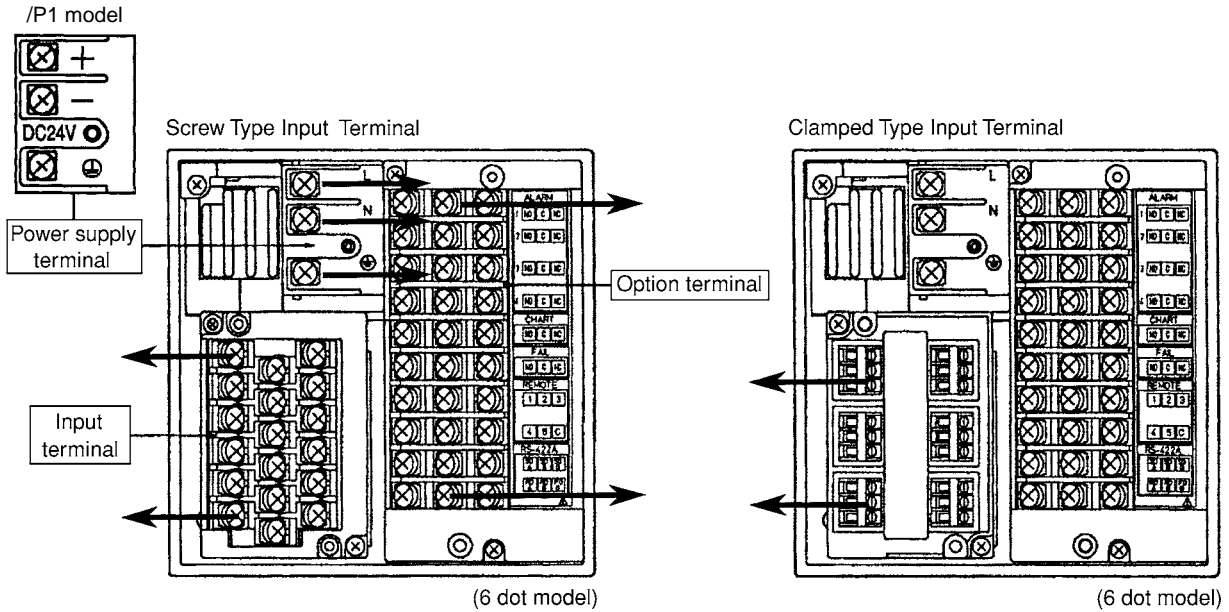| Name		Parts No.	Order Q'ty (units)	Description
Z-fold chart		B9565AW	10	1 chart / unit
Roll chart		B9902MY	10	1 chart / unit
6 color ribbon cassette		B9901AX	1	1 piece / unit
6 color ribbon cassette (for TAIWAN)		B9901AY*	1	1 piece / unit
Disposable felt-pen cartridge	Red	B9902AM	1	3 pieces / unit
	Green	B9902AN	1	3 pieces / unit
	Blue	B9902AP	1	3 pieces / unit
	Violet	B9902AQ	1	3 pieces / unit
Plotter pen	Purple	B9902AR	1	3 pieces / unit
Mounting brackets		B9900BX	2	1 piece / unit
Key (for key lock)		B9900HZ	2	1 piece / unit
Fuse (250V 800mA Timelag)		A1512EF	1	4 pieces / unit
Fuse for 24VDC, AC model (250V 5A Timelag)		A1513EF	1	3 pieces / unit

* In case of orders for spares for TAIWAN, please order this part No.

OPTIONAL ACCESSORIES

Name	Model Code	Specification
Shunt resistor (for screw input terminal)	4159 20	250Ω ± 0.1%
	4159 21	100Ω ± 0.1%
	4159 22	10Ω ± 0.1%
Shunt resistor (for clamped input terminal)	4389 20	250Ω ± 0.1%
	4389 21	100Ω ± 0.1%
	4389 22	10Ω ± 0.1%
IC Memory Card	3789 04	256k byte
	3789 05	512k byte
	3789 06	1M byte

T1101.EPS

REAR TERMINAL ARRANGEMENTS

/P1 model

Power supply terminal

Input terminal

Screw Type Input Terminal

Clamped Type Input Terminal

Option terminal

(6 dot model)

(6 dot model)

Note: The arrows show the direction in which the wires will be running when connected to the terminal.

Input Terminals

4 Pen Screw Type

CH1
CH2
CH3
CH4

/B   -/b   +/A

6 Dot Screw Type

CH1
CH2
CH3
CH4
CH5
CH6

/b   -/B   +/A

4 Pen Clamped Type (/H2)

CH2
CH4

+/A
-/b   CH1
/B
CH3

6 Dot Clamped Type (/H2)

CH2
CH4
CH6

+/A
-/B
CH1
/b
CH3
CH5
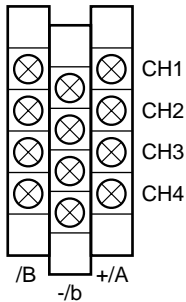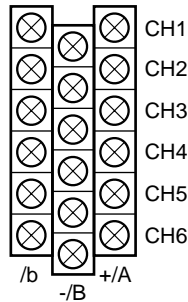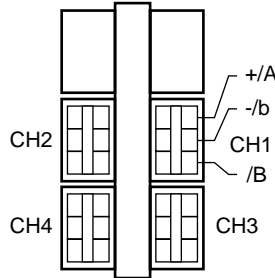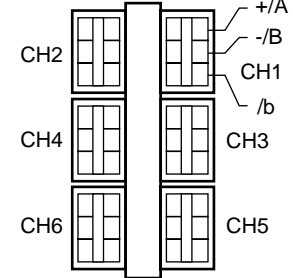
Option Terminals

/A2 /C3 /F1 /R1 Combination

NO	C	NC	1
NO	C	NC	2
NO	C	NC	3
NO	C	NC	4

Alarm Output Relay (/A2)

| NO | C | NC | Chart End Output |
| NO | C | NC | FAIL Output |

(/F1)

| ① | ② | ③ |
| ④ | ⑤ | C |

Remote Control (/R1)

| SD Ⓐ | SD Ⓑ | SG |
| RD Ⓐ | RD Ⓑ | FG |

Communication (RS-422A) (/C3)

/A3 /C3 /R1 Combination

NO	C	NC	1
NO	C	NC	2
NO	C	NC	3
NO	C	NC	4
NO	C	NC	5
NO	C	NC	6

Alarm Output Relay (/A3)

| ① | ② | ③ |
| ④ | ⑤ | C |

Remote Control (/R1)

| SD Ⓐ | SD Ⓑ | SG |
| RD Ⓐ | RD Ⓑ | FG |

Communication (RS-422A) (/C3)

T1001.EPS

DIMENSION

Bracket

Door

Unit: mm
(approx: inch)

2 to 26
Panel thickness

Keyboard

195°

102°

92°

Display

Door
(Side-by-side mounting)

130°

Opening Angle of the Door, Keyboard and Display

151.5 (5.96)

27.5
(1.08)

220 (8.66)

178 (7.01)

151.5 (5.96)

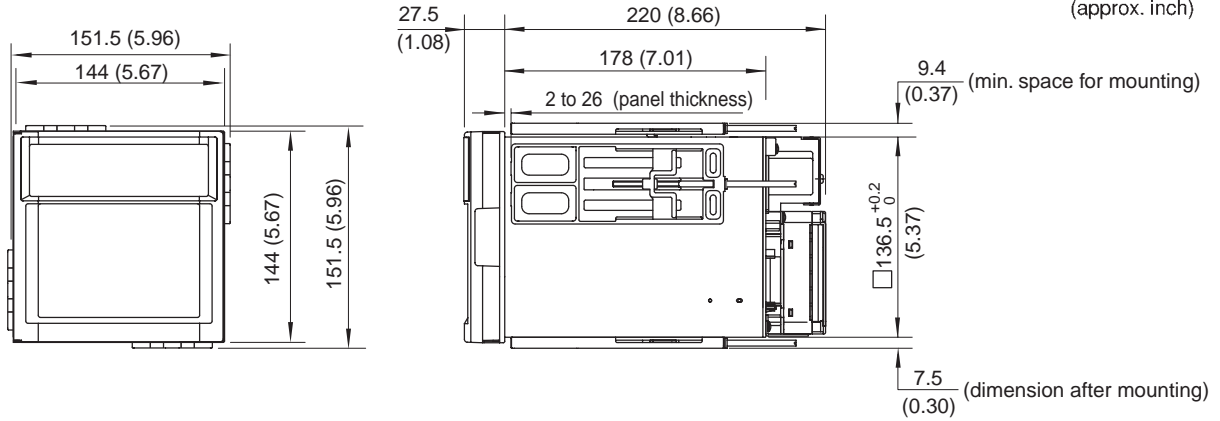144 (5.67)

144 (5.67)

151.5 (5.96)

□ 136.5 $^{+0.2}_{0}$
(5.37)

Note: If not specified, the tolerance is ± 3%. However, in case of less than 10 mm the tolerance is ± 0.3 mm.

PANEL CUTOUT & SPACING

Unit: mm
(approx. inch)

151.5 (5.96)
144 (5.67)
144 (5.67)
151.5 (5.96)

27.5 (1.08)
220 (8.66)
178 (7.01)
2 to 26 (panel thickness)

9.4 (0.37) (min. space for mounting)

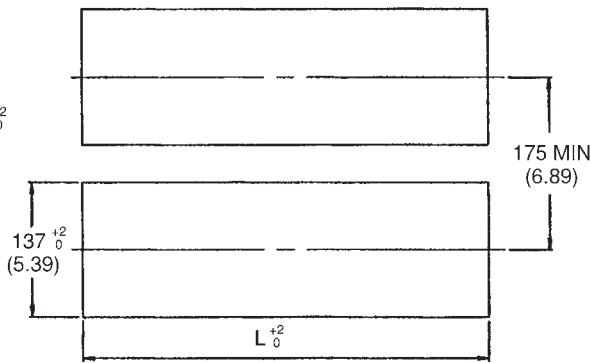$\square 136.5\,^{+0.2}_{0}$ (5.37)

7.5 (0.30) (dimension after mounting)

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.
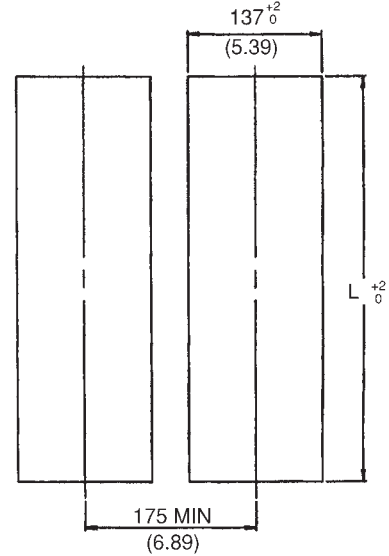
Single-Unit Mounting

$137\,^{+2}_{0}$ (5.39)

$137\,^{+2}_{0}$ (5.39)
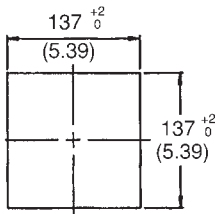
Side-by-side Mounting (horizontally)

175 MIN (6.89)

$137\,^{+2}_{0}$ (5.39)

$L\,^{+2}_{0}$

Side-by-side Mounting (vertically, max. 3 units)

$137\,^{+2}_{0}$ (5.39)

$L\,^{+2}_{0}$

175 MIN (6.89)

Units	$L\,^{+2}_{0}$ (mm)
2	282
3	426
4	570
5	714
6	858
7	1002
8	1146
9	1290
10	1434
n	$(144 \times n) - 6$

Weight:
4360 01: 3.2kg
4360 02: 3.4kg
4360 03: 3.6kg
4360 04: 3.8kg
4360 06: 3.5kg

Note: If not specified, the tolerance is ± 3%. However, in cases of less than 10 mm, the tolerance is ± 0.3 mm.
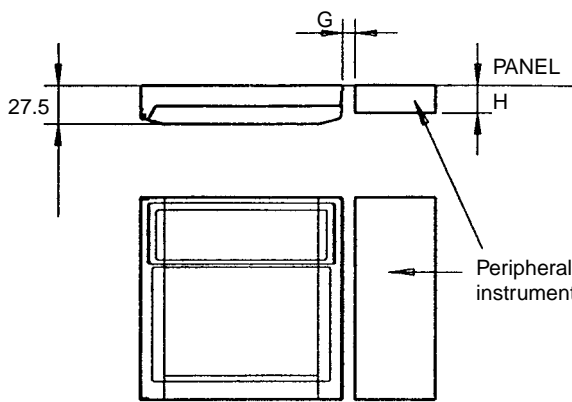
F1401Z.EPS

Relationship between Bezel Height of Peripheral Equipment and Space between Measurement Instruments
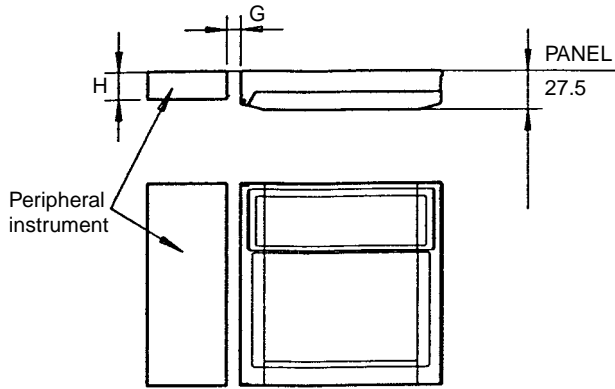
(In case mounted at the left side of μR1000)

Height of Bezel from Panel Less than H (mm)	Space More than G (mm)
20	0
24	1
28	2
32	3
More than 36 unlimited	4

Note: For instruments which do not have taper and angle R

(In case mounted at the right side of μR1000)

Height of Bezel from Panel ; H (mm)	Space ; G (mm)
less than 23.5	0
more than 23.5	more than 3

Note: For instruments which do not have taper and angle R

Spacing for μR1000 and YS100 when Mounted together
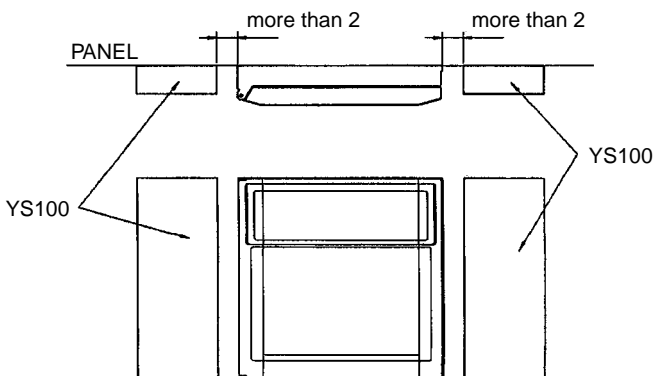
Mounting Place	Space ; G (mm)
Mount at the right side of YS100	more than 2
Mount at the left side of YS100	more than 2

F1501Z.EPS