**S E R I E S**

# Configurable recorder
# 1, 2, 3 or 6 channels
# 100 mm recording span
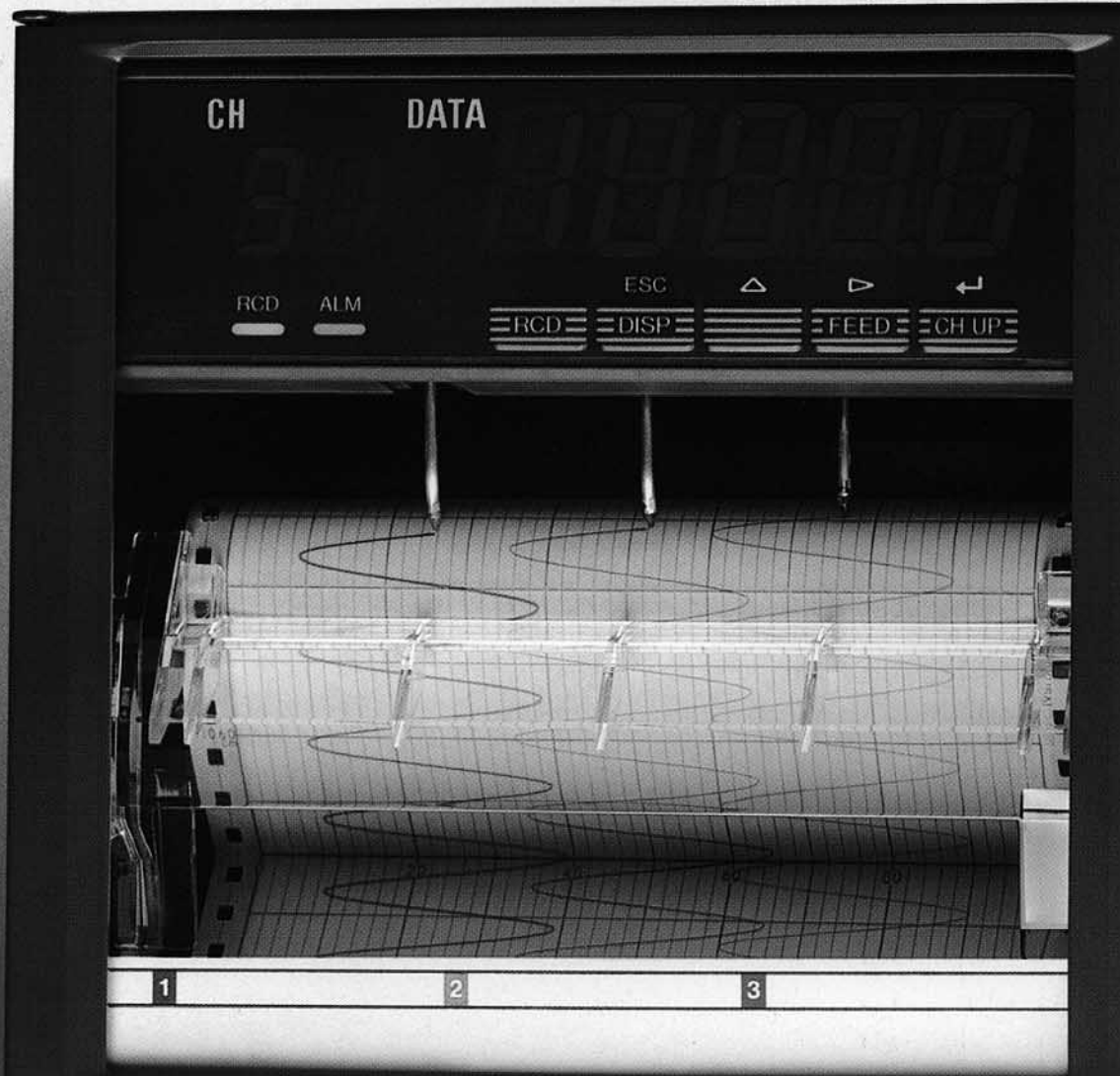# RZ100 line

CE
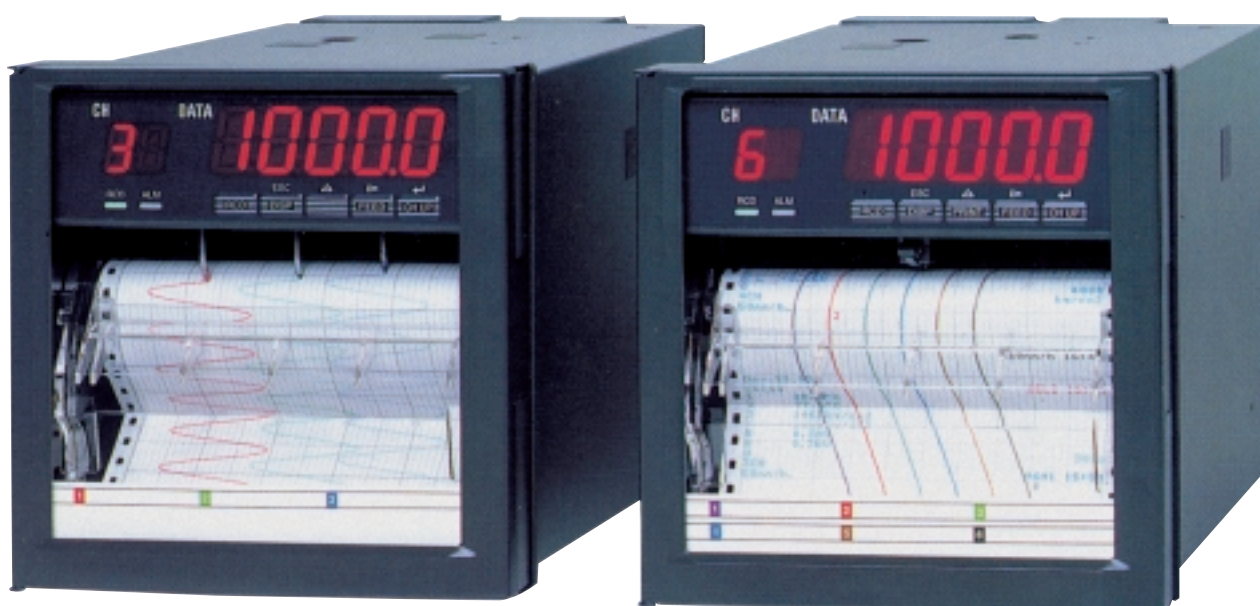


**E**

Certified **ISO 9001**
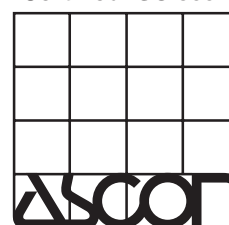
ascon

# Presenting the RZ100 Industrial with its clear, large digital displ and improved accuracy and reliability.

## Highly responsive and multi-functional

- 1-pen, 2-pen, 3-pen and 6-dot models
- Universal input (voltage)
- Various standard functions which cover many applications
- Equipped with generous digital printing functions

# recorder

## Large display

Large 10 x 180 mm LEDs which allow
displayed data to be read from afar.

# Highly reliable
# and compact

- High reliability realized by using contact-free
  technology (high-breakdown solid-state
  relays, brushless DC servo motor, ultrasonic
  pen position transducer)
- Reduced power consumption hight degree
  of integration (using ASICs)
- Super-compact (only 220 mm deep) and
  lightweight

## Large 10 x 18 mm Displays with Clear Data Visibility from Afar
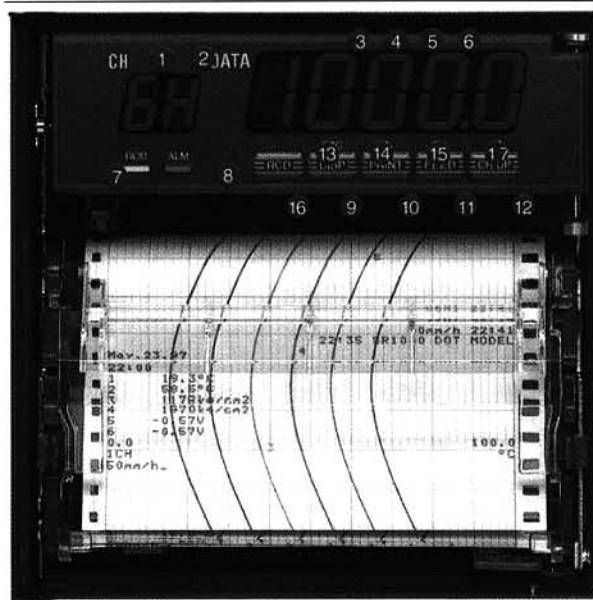
**Digital display**
**(Data display)**
① Channel number
② Alarm indications
③ Measured value
④ Day (year, month, day)
⑤ Time (hour, minute)
⑥ Battery end-of-life indication
**Status indicators**
⑦ Recording in progress
⑧ Shared alarm
**Panel keys**
**(Operation mode)**
Upper .... Display for operation mode
Lower .... Display for set mode
⑨ Changes data display screen and
switches the recorder between the
operation and set modes (in 3 seconds)

⑩ Selects the list printout strat screen
(Dot model only)
⑪ Chart feed key
⑫ Channel-up key in manual display
**(Set mode)**
⑬ Returns recorder to initial setup
screen
⑭ Changes numeric value or selects an
alternate setup parameter
⑮ Moves cursor to right
**(Operation/Set mode)**
⑯ Recording star/stop key
⑰ DISP/PRINT execution key. Set mode
entry key

## Simpler Operation and Setup

Press the display (DISP) key for three seconds to switch from the operation
mode to the set mode. (Regular changes to parameters for daily operations
can be made from the operating mode, which is completely separated from the
set mode used for fixed configurations. In the operation mode, the keys are
used to change display contents such as measured values, data and time, and
also to printout lists; in the set mode they are used to set measurement ran-
ges, alarm settings and other parameters).

Set mode ⟷ **DISP** Operation mode
hold for three seconds
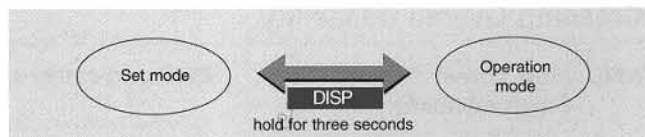
## User-Friendly Accessories
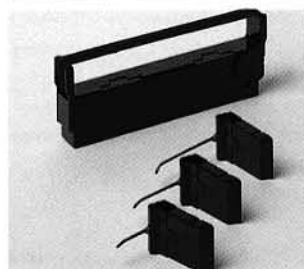
- Cassette ribbon
  (dot-printing model)
  Recording ribbon can be easily
  replaced.
- Disposable felt-tip pens
  (pen model)
  Recorder uses ordinary disposable
  felt-tip pens.
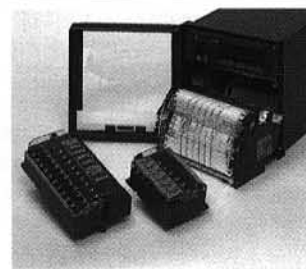
- Chart cassette
  Readily accessible chart cassette
  for easy installation of chart paper.
- Input and output terminal blocks
  Each input and output terminal
  block can be removed for
  convenience when wiring.

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# Highly reliable and compact
## Packed full of the latest technologies.

## No Moving Contacts

Moving contacts have always been the most important determinant of recorder life. In conventional recorders, input selector relays, pen position sensing slidewire potentiometers, and DC servo motor brushes limit instrument life, and make maintenance a real headache.

But these new recorders eliminate these sources of mechanical wear with high-voltage solid-state scanner relays, ultrasonic pen position transducers, and brushless DC servo motors that work with no moving contacts. The result is longer life, higher reliability, and a nearly maintenance-free instrument.
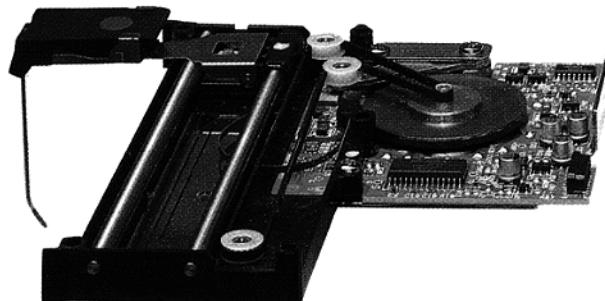


### High-voltage solid-state scanner

Dot-printing RZ100 models scan their inputs with particular solid-state relays that combine voltage-out-put photocouplers with high-voltage MOSFET's that withstand up to 1500 V DC with less that 3 nA leakage. The result is fast scanning at 6 points in 5 seconds, a long product-life and no annoying noise.

### Ultrasonic pen position sensing - no slide wire contacts

Pen position is sensed from the propagation time of an ultrasonic pulse imparted to a magnetostrictive strip by a piezoelectric transducer. This totally eliminates the sliding mechanical contacts and slide wear that limit the life of conventional potentiometers.

What's more, ultrasound velocity variation with temperature is cancelled by a offset calculation for highly accurate positioning.

### Brushless DC servo motors

RZ100 use a thin motor to meet the DIN case size of 144mm x 144mm, and 220mm depth. Rising to the challenge, it has been developed a motor a mere 11.5mm thick - and eliminated moving contacts with a brushless design.

In conventional DC motors where the coils spin with the rotor, a commutator and sliding brushes are needed to supply current to the coils. Sliding continuously over the commutator surface, the brushes are subject to severe mechanical wear and become the major factor limiting motor life.

In a brushless motor, in contrast, the magnets turn, the coils are fixed, and electronics do the coil current switching, eliminating the commutator and brush wear that limits life.

With on-board coils directly connected to the ultrasonic pen position sensing circuits, this motor even eliminates leadwires and contacts, ensuring highly reliable recording throughout many years of use.

## Creasing Overall Reliability

### ASIC = low power + high reliability

By integrating the circuitry with ASIC (Application Specific Integrated Circuits) technology, it has slashed both parts count and power consumption. For exampie, the programmable gain amplifier and A to D converter are now combined in one chip (= A - D LSI). Furthermore, the servo integrated circuit has been converted into one chip as well. With this lowpower circuit technology fewer parts are left to fail, and their low heat generation offers even more reliability.

### EMC and safety standards

As further evidence of their quality and reliability, these industrial recorders are designed based on with EMC and safety standards.

Safety standards: Certified by CSA 22.2 NO.1010.1
Complies with EN 61010-1
EMC standards: Complies with EN 55011 Group 1
Classe A
Complies with EN 50082-2

### Splash-proof front door

The recorder front door meets DIN 40050-IP54 standards for panel mount installations.

# Highly responsive and multi-functional

## Intelligent recorders, solving all types of applications and problems

### Various Alarm Functions

Four differnt alarms can be set for each channel

- Hight limit, low limit, high delta limit and low delta limit alarms. These alarms can be transmitted via the optional 2-point, 4-point or 6-point relays.
- Programmable OR setting for alarm relay output contacts.
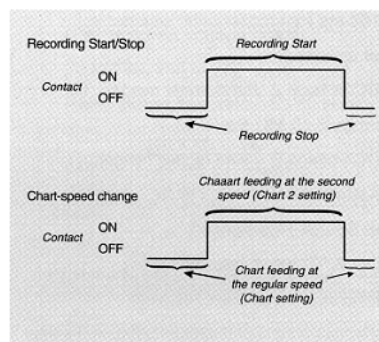
### OR Alarm Relay Output Contact
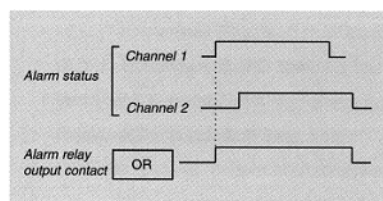


### Remote control

Can perform up to five commands from any of the following

- Recording start/stop (See the figure below)
- Chart speed change (See the figure below)
- Start message printout (up to five user-defined messages)



### Pen Offset Compensation

Offset compensation for the recording time axis between pens is provided on 2 and 3 pen recorders. This is just one of the many standard functions widelyused on these recorders.

### Other standard functions include

| Functions | Capabilities |
|---|---|
| Filtering | Filtering of inputs. (Signal damping in the pen model; and moving averages in the dot-printing model) |
| Scaling | Arbitrary scaling of input voltage (DC V) (Scaling limits: - 199999 a + 20000). |
| Offset Function | Compensation of inputs for each DCV, TC, RTD, SCL, range. (The accuracy level is within 10% of the recording span). |
| Interchannel Differential (delta) Recording | The difference between the reference channel and another channel in the same range are recorded. (Avail, and RTD inputs). |
| Thermocouple Burnout Detection | Measured values are clamped when the thermocouple reaches burnout at either 0% or 100% |

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## Extensive Recording Functions

### Normal Recording

❶ Analog recording
Recordings of 100 mm for up to 3 channels on the pen mode; 6 channels on the dot printing model.

❷ Periodic printout (Dot model only)
At fixed intervals set by the chart speed, the recorder prints the date and time, channel number, measured value, scale, engineering units, alarm status, and chart speed. Printing can be enabled or disabled by the user.
Scale printout.
Prints scale positions of 0% to 100% simultaneously with the periodic printout.

❸ Alarm printout (Dot model only)
Prints alarm channel number, alarm type, and the time when an alarm changes state. (Alarm printing can be set to "on/off" for printing of both status changes; "on" for printing alarm activation only; or "no" printing for disabled alarm).
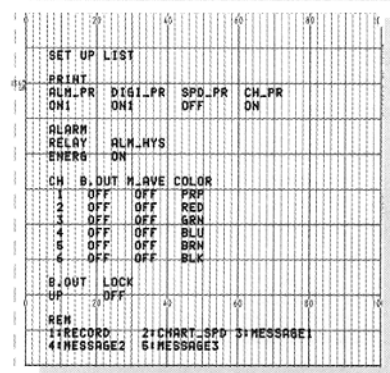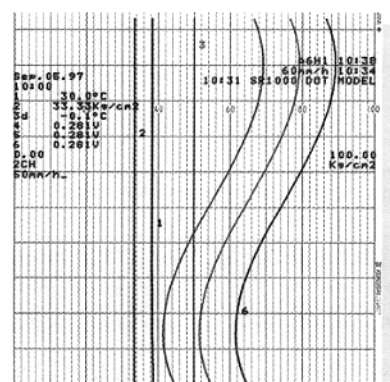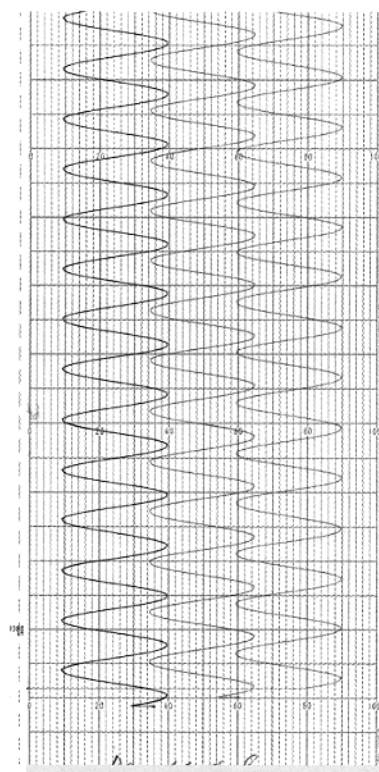


❹ Message printout (Dot model only)
The user-defined 16-character messages and time can be printed out using the optional remote control.

❺ Chart-speed change printout (Dot model only)
The changed chart speed and the time it occurred is printed. (This can also be enabled or disabled by the user).

❻ List printout (Dot model only)
Prints all the user-defined parameters such as chart speed, ranges, and span.

## Input

### Input signals:

Measurement range, and measurement range limits:

| Input | Range | Measurement range | |
|---|---|---|---|
| DC voltage (V) | 20mV | -20.00 to 20.00 mV | |
| | 60mV | -60.00 to 60.00 mV | |
| | 200mV | -200.00 to 200.00 mV | |
| | 2V | -2.000 to 2.000 mV | |
| | 6V | -6.000 to 6.000 mV | |
| | 20V | -20.00 to 20.00 mV | |
| | **Range** | **Measurement range °C** | **Measurement range °F** |
| Thermo-couple (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 | -3280 to 2498 °F |
| | E*1 | -200.0 to 800.0 °C | -3280 to 1472.0 °F |
| | J*1 | -200.0 to 1100.0 °C | -3280 to 2012.0 °F |
| | T*1 | -200.0 to 400.0 °C | -3280 to 752.0 °F |
| | N*1 | 0.0 to 1300.0 °C | 32 to 2372 °F |
| | W*2 | 0.0 to 2315.0 °C | 32 to 4199 °F |
| | L*3 | -200.0 to 900.0°C | -3280 to 1652.0 °F |
| | U*3 | -200.0 to 400.0 °C | -3280 to 752.0 °F |
| | **Range** | **Measurement range °C** | **Measurement range in °F** |
| RTD | Pt100*4 | -200.0 to 600.0 °C | -3280 to 1112.0 °F |
| | JPt100*4 | -200.0 to 550.0 °C | -3280 to 1022.0 °F |

★ 1 R, S, B, K, E, J, T, N: IEC584-1 - 1995, DIN IEC584, JIS C 1602-1995

★ 2 W: W-5%Rd-W-26%Rd (Hoskins Mfg Co.) ASTM E988

★ 3 L: Fe-CuNi, DIN 43710, U: Cu-CuNi, DIN 43710

★ 4 Pt100: JIS C1604-1997, IEC 751 - 1995, DIN IEC751 - 1996, JPt100: JIS C 1604-1989, JIS C 1606-1989

### Measurement and Recording Accuracy:

| Input type | Range | Measurement (digital display) | | Recording (analog) |
|---|---|---|---|---|
| | | Measurement accuracy | Measurement resolution | Recording accuracy |
| DC voltage (V) | 20mV | ±(0,2% of rdg + 3 digits) | 10µV | |
| | 60mV | ±(0,2% of rdg + 2 digits) | 10µV | Measurement accuracy ± (0,3% of recording span) |
| | 200mV | ±(0,2% of rdg + 2 digits) | 100µV | |
| | 2V | ±(0,1% of rdg + 2 digits) | 1mV | |
| | 6V | ±(0,3% of rdg + 3 digits) | 1mV | |
| | 20V | ±(0,3% of rdg + 2 digits) | 10 mV | |
| Thermo-couple (TC) | R | ±(0,15% of rdg + °C) Except 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) | | |
| | S | | | |
| | B | | 0,1°C | |
| | K | ±(0,15% of rdg + 0,7°C) Except at -200 to -100°C ±(0,15% of rdg + 1°C) | | Measurement accuracy ± (0,3% of recording span) |
| | E | ±(0,15% of rdg + 0,5°C) | | |
| | J | ±(0,15% of rdg + 0,5°C) Except at -200 to -100°C ±(0,15% of rdg + 0,7°C) | | |
| | T | ±(0,15% of rdg + 0,7°C) | 0,1°C | |
| | N | | | |
| | W | ±(0,15% of rdg + 1°C) | 0,1°C | |
| | L | ±(0,15% of rdg + 0,5°C) But at -200 to -100°C ±(0,15% of rdg +0,7°C) | | |
| | U | | 0,1°C | |
| RTD | Pt100 | ±(0,15% of rdg + 0,3°C) | 0,1°C | Measurement accuracy ± (0,3% of recording span) |
| | JPt100 | | | |

Recording span = 100mm

(Performance under reference operating conditions:

temperature 23°C ± 2°C; humidity 55% ±10% R.H., power supply frequency 50/60 Hz; Usable power voltage ranges 90 to 132, 180 to 250 V AC; 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: 5 sec/6 dots

A-D integration time:

20 ms (50 Hz), 16.7 ms (60 Hz), 100 ms (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 Source Resistance:

DC V, TC input: less than 2 kΩ

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

Input bias current:

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

Thermocouple burnout detection:

Available on TC rances (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

(The damping time constant can be set to 2, 5 or 10 seconds for each channel, or it can be disabled).

Dot model: Moving averages

(For averaging, 2 to 16 samples can be assigned for each channel, or alternatively averaging can be disabled).

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)

Maximum common mode voltage:

250 V AC rms (50/60 Hz)

Interference between channels:

120 dB (500Ω, the deviation in the case that 30 V is applied to another channel).

Common mode rejection ratio:

120 dB (50/60 Hz ± 0.1%, 500Ω imbalance, between (-) and ground)

Normal mode rejection ratio:

40 dB (50/60 Hz ± 0.1%).

## Recording

Recording system:

Pen-writing: Disposable felt pens (analog recording)

Dot-printing: 6-color wire-dot recording

Recording paper:

Z-fold chart (total length, 16m)

Effective analog recording width:

100 mm

Step response time (pen model):

1 sec. max./IEC TC85

Recording colors:

Pen-writing: Pen 1, red; Pen 2, green; Pen 3, blue

Dot-printing: CH. 1, purple; CH. 2, red; CH. 3, green; CH. 4 blue; CH. 5, brown; CH. 6 black

Deadband: (pen model)

0.2% of recording span max.

Maximum recording resolution;

0.1mm. (dot printing model)

Chart speed:

Pen model:

10 to 12,000mm/h (40 increments)

Dot-printing model:

10 to 1,500mm/h (28 increments)

Analog recording cycle:

Pen model: Continuous

Dot model: 6 dots/20 seconds (max.)

Print cycle time: (dot printing model)

(AUTO model) 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 1,000mm continuously and related to the grid of the chart paper).

Channel (dot model only):

Channel numbers are printed every 25mm (approx.) during analog recording.

Alarm (dot model only):

ON/OFF mark, the channel number, alarm type, and on/off time (h/m) are printed on the right side of the chart.

Periodic printout (dot model only):

The date (m/d), time (h/m), chart speed, and measured data of every channel is printed on the left side of the chart.

1. Channel number

2. Measurement printout

3. Scale printout - valutes between 0% to 100% are printed.

4. Date, time and chart speed

Messege printout (dot model only):

  up to 5 messages, 16 characters long

  Printout command available on remote control also.

Chart speed change printout (dot model only):

  Printouts of the chart speed and time when the change occurs, can be made by the user.

List printout (dot model only):

  Prints listing of range settings, alarm settings, and other parameters.

## Display

Display system:

  LED (7 segments, 7 character positions)

  Display & status indicator items

  Measured data (channel No., alarm type, measured valute, units), date, time.

  OFF (No display)

## Computing Functions

Linear scaling:

  Scaling ranges: DC V

  Scaling limits: -19,999 to 20,000

  Data display/printout range:

  -19,999 to 20,000

  Decimal point position: User-set

  Engineering units: User-set

  (6 characters MAX)

Offset function

  Range types: DCV, TV, RTD, SCL

  Compensation: 10% of recording span

Interchannel difference ($\Delta$T):

  Differential computations between each channel are possible (Reference channel number<measurement channel number)

  Range types: DCV, TV, RTD

  Engineering units: User-set (6 characters max.)

## Alarms

Number of Alarm levels:

  Four levels/channel

Types:

  High, Low, delta high, and delta low.

Alarm Indications:

  Shared alarm indicator on.

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, or 6 points; OR output.

  Energize or de-energize on alarm selectable (shared by all relays).

## Construction/Power Source

Dimensions: approx

  144 (W) x 144 (H) x 220 (D) mm

Weight: approx

  1-pen, 3.1 kg; 2-pen, 3.3 kg; 3-pen, 3.5 kg; 6-dot, 3.4 kg

Power source:

  Rated power voltage:

  100 to 240 V AC

  Usable power voltage ranges:

  90 to 132, 180 to 250 V DC

  Rated power frequency: 50/60 Hz

|  | 100 V AC | 240 V AC | Max |
|---|---|---|---|
| 3 pen | 26 VA* | 36 VA* | 70 VA |
| 6 dot | 25 VA* | 30 VA* | 50 VA |

* In balance

## General Specifications

Ambient temperature and humidity:

  0 to 50°C, 20 to 80% R.H. (at 5 to 40°C)

Mounting:

Up to 30° backward from vertical.

Insulation resistance:

  Between terminals and ground:

  20 M$\Omega$ or more (at 500 V DC)

Dielectric strength:

  Power terminals to ground:

  1500 V AC (50/60 Hz) for one minute

Contact output terminals to ground:

  1500 V AC (50/60 Hz) for one minute

Input terminals to ground:

  1000 V AC (50/60 Hz) for one minute

Between measuring channels:

  1000 V AC (50/60 Hz) for one minute

  (Except for RTD inputs since "b" terminals are interconnected)

Memory backup:

  Built-in lithium battery to preserve setup parameters.

Life:

  approx. 10 years (at 23°C ± 2°C, 55 ± 10% RH, for standard model)

Battery expiration:

  indicated by "BAT" status on display

Panel key-lock:

  Requires a password

## Optional Functions

Alarm relay contact output (/A1, /A2, /A3):

  Number of output points: 2, 4, or 6 points

  Contact capacity: 250 V DC, 0.1 A (resistive load); 250 V AC, 3 A

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, dot model only).

  The input signal pulse width must be 1 sec. or more.

  The signal can be given by contact, TTL or open collector.

# Ordering information

| DESCRIPTION | INSTRUMENT CODE |
|---|---|
| 1-pen recorder (100 mm Z fold chart paper) | RZ100-1MO |
| 2-pens recorder (100 mm Z fold chart paper) | RZ100-2MO |
| 3-pens recorder (100 mm Z fold chart paper) | RZ100-3MO |
| 6-dot recorder (100 mm Z fold chart paper) | RZ100-6MO |

Offset pen compensation

**Note: Including freely configurable inputs, display and Burnout**

| DESCRIPTION | OPTION CODE - (supplied separately) |
|---|---|
| 2 relay alarm outputs module | ARCS1. 0-AK02 |
| 4 relay alarm outputs module | ARCS1. 0-AK04 |
| 6 relay alarm outputs module | ARCS1. 0-AK06 |
| remote control | ARCS1. 0-REM |
| 2 relay alarm outputs module + remote control | ARCS1. 0-AK02/REM |
| 4 relay alarm outputs module + remote control | ARCS1. 0-AK04/REM |
| 6 relay alarm outputs module + remote control | ARCS1. 0-AK06/REM |

**Note: The above options have to be ordered separately. If specified, the recorder can anyhow be equipped in our works with the requested options.**

| DESCRIPTION | OPTION CODE - (supplied separately) |
|---|---|
| Z-fold chart (10 pac.s box) | AR. 100-B9565AW-I |
| 6 colours ribbon cassette | AR. 100-B9901AX |
| set of 3 felt red pen cartridge (1, 2 & 3 pen model) | ARS1. 0-B9930BP |
| set of 3 felt green pen cartridge (2 & 3 pen model) | ARS1. 0-B9930BQ |
| set of 3 felt blue pen cartridge (3 pen model only) | ARS1. 0-B9930BR |
| mounting bracket | ARCS100-B9900CW |
| Lubricating oil (only for dot printing model) | ARCS1. 0-B9901AZ |
| Shunt resistor 250 Ohm (0.1%) | AR-SHUNT250 |