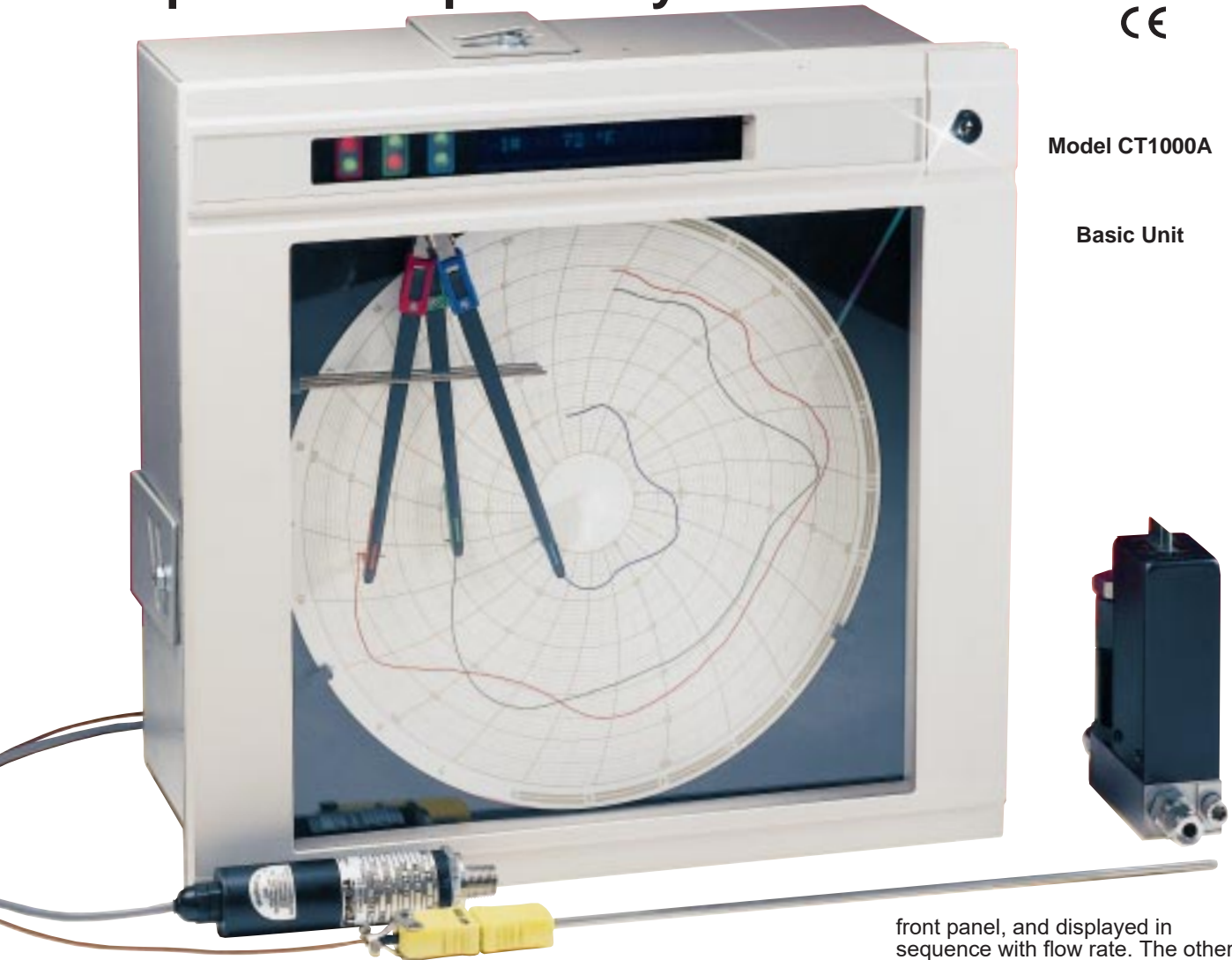


Microprocessor-Based Circular Recorders Up to 12 Output Relays



Model CT1000A

Basic Unit



- ✓ Up to Three Pens
- ✓ 254 mm (10 in) Chart
- ✓ Accepts Thermocouple, RTD, V, mV or mA Signals
- ✓ Overall Accuracy of $\pm 0.25\%$ of Span
- ✓ Up to Six I/O Modules Available, Including Input Isolation
- ✓ Retransmission Options Available on up to Three Channels
- ✓ Flow Totalization on All Three Channels
- ✓ One or Two PID Control Outputs Available

The new OMEGA® CT1000A microprocessor-based circular recorder offers a wide range of measurement and control capabilities. The recorder is available as a one-, two-, or three-channel recorder offering up to 12 output relays allocated to six setpoints which in turn can be allocated to any channel or channels.

The unit can be supplied for flow indication and recording with totalization on up to three channels. Flow indication and recording with totalization on all channels is also available. Each channel has two totalizers, one of which can be used for a batch total resettable from the

front panel, and displayed in sequence with flow rate. The other is used for display of a secure total accessible only by operating the appropriate channel select buttons.

Specifications

Inputs

No. of Inputs: 1, 2, or 3

Input Impedance:

Millivolt inputs $> 10 \Omega$

Voltage inputs 500Ω

Current inputs 10Ω

Temperature: Thermocouple 1700°C (3090°F) max.

Minimum span 100°C (180°F)

Resistance thermometer

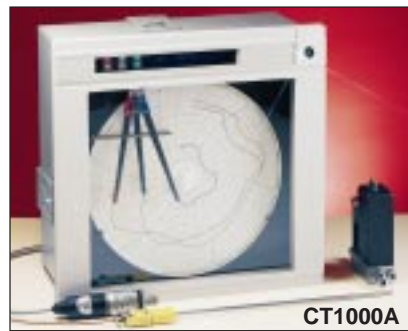
600°C (1000°F) max.

Minimum span 50°C (90°F)

Cold Junction: Automatic cold junction compensation (ACJC) fitted

Circular Recorders

Wide Range of Measurement and Control Capabilities



CT1000A

Linearization: Programmable for all inputs. State whether linear, square root, power $\frac{3}{2}$, $\frac{5}{2}$ law, or type of thermocouple or RTD

Broken Sensor Protection:

Programmable, upscale or downscale drive or none (not available on mA and V inputs)

Filter Time: Programmable from 0 to 60 sec in 1-sec steps

Event Marker: Voltage free contacts or 0-5 V logic level

Change of Input Mode: By repositioning plug-in link

Change of Input Range/Scan: Programmable

Program Modification:

By user-operated membrane switches above chart

Floating Inputs-Isolation:

2.5 Vdc max between channels upon removal of terminal block links

Insulation, Inputs to Ground:

500 Vdc

Interference Suppression (based on 0-1000 mV range input): Radiated (r.f.):

F.S. $<\pm 2\%$ over range 20 MHz to 1000 MHz at field strength of 5 V

Line Interruption:

<100 msec loss, no effect, >110 ms loss instrument returns to operation after automatic reset

Line Interference: <500 V input, pulse width up to $125 \mu\text{s}$, no effect

Common Mode: $<1\%$ span error max for 250 V rms 50 Hz

Series Mode: $<1\%$ span error for 200% span, 50 Hz

Outputs and Setpoints

No. of Setpoints:

Up to two setpoints per channel

Setpoint Adjustment: Programmable

No. of Relays: Up to two per channel

Relay Contacts:

Single pole changeover

Voltage: 250 Vac, 250 Vdc max

Current: 5 Aac, 5 Adc max

Loading (non-inductive):

1250 VA, 50 W max

Insulation, Contacts to Ground: 2 kV rms

Relay Action (programmable):

Energized above (EA) setpoint or energized below (EB) setpoint,

3 state or latching; external counter drive option (module 5) 50 msec

pulse 24 V max current 150 mA

Analog Outputs

Output module (module 8)

is isolated and includes a relay.

The maximum isolation voltage is

1000 V between input and output

Retransmission:

Programmable min (zero) and max

(full scale) values from 0-20 mA in

0.1 mA steps, up to 20 mA into

1 k Ω max

Control: P, PI or PID

Analog Output: Up to 20 mA at

15 V; channel 1 reverse or direct

Analog Controller Output: Up to

20 mA 1 k Ω max (reverse or direct)

Time Proportioning Controller

Action: Time proportioning, reverse

or direct programmable

Time Proportioning Cycle Time:

5 to 60 sec, programmable

in 1 sec steps

Proportional Band: 2 to 500%,

programmable in 1% steps

Integral Action Time:

1 to 1800 sec, programmable in

1 sec steps and OFF

Derivative Action Time:

0 to 600 sec, programmable

in 1 sec steps and OFF

Approach Band:

0.1 to 3.0 proportional bands,

programmable in 0.1 steps

Setpoint Change: No erroneous

generation of derivative response

Accuracy

$\pm 0.25\%$ span max for all zero-based

ranges within permitted limits. Ref.

conditions 20°C (68°F) and

115 V or 230 V apply

Linearizer Accuracy:

$\pm 0.1^\circ\text{C}$ typical

Resolution

Measurement: mV, V, mA, TC

$\geq 0.1\%$ span, for all zero-based ranges within permitted limits

R/T: 0.06 Ω

Pen: $\leq 0.13\%$ full scale travel

Display: ± 1 digit

Pens Response Time:

6 sec for 10% to 90% typical. Input signals can be averaged over a 0 to

60 sec (filter) time, programmable in 1 sec steps

Ramp/Soak Option:

Allows four "menus"; each menu can contain up to 30 segments that

can be split into 1 to 9 profiles

Solid State Relay Option

(Module J): Provides two solid state switching 24 Vdc at 30 mA drive

outputs used to drive externally

mounted solid state relays

Isolated Input Option (Module K):

Provides up to 2 kV isolation

channel-to-channel and channel-to-

ground. Up to two allowed, position

2 for channel 2 and/or position 3 for

channel 3

Displays and Records

Display: 20 character, dot matrix

vacuum fluorescent with blue filter

Process variable 4 digit

Programming: Up, down scroll

switches above chart

Chart:

Circular with linear graduations

Chart Speed:

1 rev per hour up to

1 rev per week (168 hr),

programmable in 1-hour steps

Pens: Red: channel 1; Green:

channel 2; Blue: channel 3,

disposable

Event Pen: Pen 3, 3 positions:

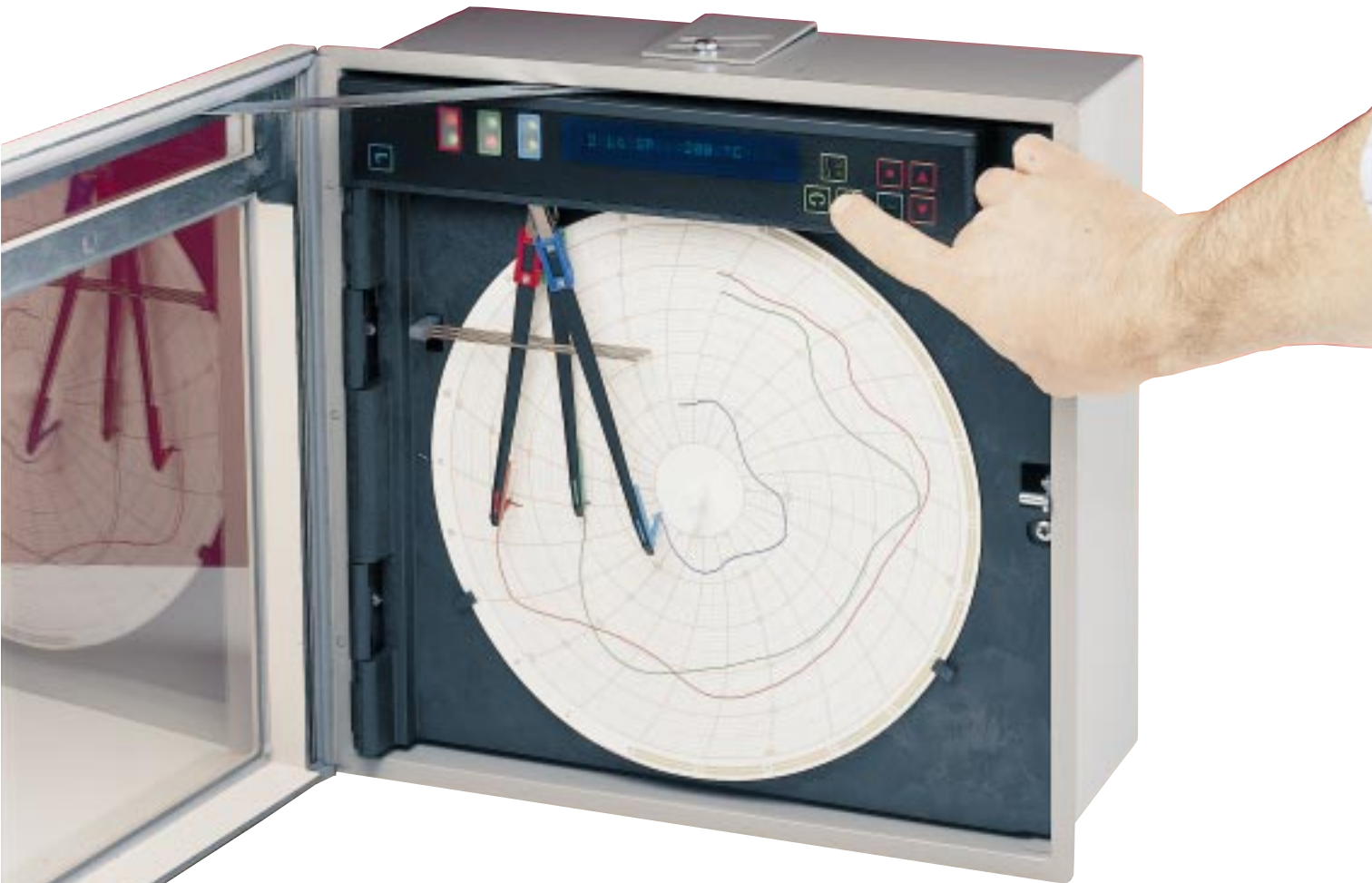
center, off, at chart rim. Time line

coincident with pen 1; contact

closure or 0-5 V logic



Microprocessor-Based Circular Recorders



Flow Input Version

General

Flow Total:

Programmable ON or OFF

Count Rate Zero: Programmable from 0 to 0.999 in 0.001 pps steps then 1.0 to 9.99 in 0.01 steps

Count Rate Cut Off:

Totalization can be stopped if flow rate falls below preset value. Preset value adjustable over full span

Count Rate Full Scale:

Programmable from 0.001 to 0.999 then 1.00 to 10.00 pps

Analog Inputs

Mathematical Function Accuracy

x $\frac{1}{2}$ - 0 to 100% 0.1% of reading

x $\frac{3}{2}$ - 7 to 100% 0.2% of reading

x $\frac{5}{2}$ - 18 to 100% 0.3% of reading

Below these values, the error increases asymptotically as input approaches zero

Frequency Inputs:

Module C accuracy $\pm 0.1\%$ or 1 digit, whichever is greater for zero-based ranges

High Level Input:

Frequency Range:

Between 0-0.1 Hz and 0-4 kHz

- TTL level square wave
- Open collector to accept current level 2 mA at 5 V
- Volt free contacts to accept current level 2 mA at 5 V
- Voltage square wave. When the peak value lies between 2 V and +50 and the trough value lies between -50 V and 1 V

Low Level Inputs:

a. Vortex and Electromagnetic

Flowmeters:

Amplitude:

4 mA or greater square wave, with an offset up to 20 mA, 0-4 mA, 16-20 mA or 4-20 mA

Volt drop:

Maximum 2 V at 20 mA

Frequency Range: 0.1 Hz to 4 kHz

b. Turbine and Rotary Shunt Meters

Amplitude:

1 mV/Hz

Frequency Range: 3 Hz to 4 kHz

c. General Purpose ac Coupled Amplitude:

Fixed or variable between the limits of 5 mV peak to peak to 50 V peak to peak

Frequency Range:

3 Hz to 4 kHz on inputs where the amplitude is proportional to frequency, automatic variable gain (maximum sensitivity 1 mV/Hz) can be achieved by link positioning

d. General Purpose dc Coupled Frequency Range:

0.1 Hz to 4 kHz

Physical Specifications Power

Voltage Requirements:

110 V (min 93 V, max 127 V), or 230 V (min 195 V, max 265 V), 50 or 60 Hz Alternatively 10 to 30 Vdc

Power Requirements: <28 VA

Warm-up Time: approx. 10 s

Error Due to Power Supply

Voltage Fluctuation:

$\pm 0.1\%$ span for $\pm 15\%$ fluctuation

Insulation:

Mains to ground 2 kV rms

Transmitter Power Supply

Output Voltage: 25 V \pm 0.5 V at 0 or 60 mA (loaded with 3 transmitters)

Output Ripple: 100 mV peak to peak max.

Load Regulation: \pm 0.1 V for output change 4-20 mA

Output Voltage Variation with Supply Voltage: \leq 1 V for \pm 15% supply voltage

Environmental Data

Operating Temperature Limits:

0 to 55°C (32 to 130°F)

Operating Humidity Limits:

0 to 80% RH (paper and ink system, 0 to 95% RH electronics)

Error Due to Ambient Temperature Variation (unsuppressed ranges): \pm 0.02% span/°C typical

Mechanical Data

Mounting: Wall or panel by 3 brackets (supplied)

Dimensions:

360 H x 370 W x 170 mm D (14.18 x 14.58 x 6.7")

Panel Cutout:

342 H x 348 mm W (13.5 H x 13.7" W)

Panel Space Requirement:

410 W x 400 H x 150 mm D (16.15 x 15.76 x 5.9")

Case and Door:

Sheet steel case with hinged chart plate.

Foam-molded door with glass window (polycarbonate available as special order)

Weight: 10.5 kg (23.2 lb) approx.



CT1100A

Accessories

Remember to Purchase Extra Pens and Paper!

Model No.	Description
CT-1000-RED	5 red pens, channel 1
CT-1000-GREEN	5 green pens, channel 2
CT-1000-BLUE	5 blue pens, channel 3
CT-1000C-100/7	500 charts, 0-100 range, 7 day
CT-1000C-100/24	500 charts, 0-100 range, 24 hr
CT-1000C-0-100/8HRS	500 charts, 0-100 range, 8 hr
CT-1000C-0-14PH/24HRS	500 charts, 0-14 range, 24 hr
CT-1000C-0-50/7	500 charts, 0-50 range, 7 day
CT-1000C-0-200/24	500 charts, 0-200 range, 24 hr
CT-1000C-0-200/7	500 charts, 0-200 range, 7 day
CT-1000C-0-300/24	500 charts, 0-300 range, 24 hr
CT-1000C-0-800F/1	500 charts, 0-800 range, 24 hr
CT-1000C-200-400F/1	500 charts, 200-400 range, 24 hr
CT-1000C--100C-100/24	500 charts, -100-100 range, 24 hr

Custom charts available by special order. Consult Sales.

Range Limits

Electrical Input Type	Min. Start Value	Min. Span	Max. Span & Range Value
mV	-999	5.00	1000
V	-20.0	0.50	20.0
mA	-99.9	0.50	100.0
J T/C*	-100°C (-148°F)	100°C (180°F)	900°C (1620°F)
K T/C*	-100°C (-148°F)	150°C (270°F)	1300°C (2340°F)
R, S T/C*	-15°C (5°F)	600°C (1080°F)	1700°C (3060°F)
T T/C	-250°C (-418°F)	170°C (306°F)	300°C (540°F)
E T/C*	-100°C (-148°F)	100°C (180°F)	900°C (1620°F)
B T/C*	-18°C (0°F)	1100°C (1980°F)	1800°C (3240°F)
N T/C*	-200°C (-328°F)	180°C (324°F)	1300°C (2340°F)
RTD*	-200°C (-328°F)	50°C (90°F)	600°C (1080°F)

*Temperature inputs are °C/°F switchable

To Order (Specify Model Number)

Model No.	Description
CT1100A	1-pen recorder, base unit
CT1200A	2-pen recorder, base unit
CT1300A	3-pen recorder, base unit
CT1205A-MB	2-pen recorder, 1 analog, 1 event
CT1305A-MB	3-pen recorder, 2 analog, 1 event

Each unit comes complete with one package of chart paper, pen(s), and complete operator's manual.

For options, see table at right.

Ordering Example: CT1140A-M8 is a one-pen recorder with control option, analog output and relay, + CT1000-RED, extra pens for channel 1 and CT-1000C-100/7, pkg. of 500 charts,

OMEGACARESM extended warranty program is available for models shown on this page. Ask your sales representative for full details when placing an order.

OCW-1 OMEGACARESM extends standard 2-year warranty to a total of 3 years

Modules

Ordering Suffix	Description
-M8	Isolated analog output with relay
-MB	Event pen input
-ME	Ramp/soak digital input

Note: Up to six I/O modules can be installed. The -M1, -M2 and -MA modules can be field installed and ordered as CT1000A-M1, etc. Other modules may require options added to base recorder.

Options for Base Units

Options can be added to the base units by changing the third and/or fourth (i.e.: last two) digits in the part number and adding the appropriate modules and prices.

1) Flow option: change the third digit in the model number to a "5" and add to base price. No modules required. **Example:** CT1150A is a 1-pen unit with flow option,

2) Control option (supports control on channel 1 and/or 2): change the third digit in the model number to a "4" and add to base price. This option also requires you to purchase additional module(s) for the required output(s). **Example:** CT1240A-M8-M8 is a two-pen recorder with control option on both channels and two isolated analog outputs,

3) Ramp/soak control option (supports control on channel 1 and/or 2): change the third and fourth digits to "44" and add to base price. This option also requires you to purchase additional modules for the required output(s). **Example:** CT1244A-M8-ME is a two-pen recorder with ramp/soak control option and one isolated analog output (control on 1 channel),

Model No.	Description
CT1000A-M1	Single relay modules
CT1000A-M2	Dual relay modules
CT1000A-MA	Transmitter power supply module



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• Flow and Level

Air Velocity Indicators, Doppler Flowmeters, Level Measurement, Magnetic Flowmeters, Mass Flowmeters, Pitot Tubes, Pumps, Rotameters, Turbine and Paddle Wheel Flowmeters, Ultrasonic Flowmeters, Valves, Variable Area Flowmeters, Vortex Shedding Flowmeters

• pH and Conductivity

Conductivity Instrumentation, Dissolved Oxygen Instrumentation, Environmental Instrumentation, pH Electrodes and Instruments, Water and Soil Analysis Instrumentation

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• Pressure, Strain and Force

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• Heaters

Band Heaters, Cartridge Heaters, Circulation Heaters, Comfort Heaters, Controllers, Meters and Switching Devices, Flexible Heaters, General Test and Measurement Instruments, Heater Hook-up Wire, Heating Cable Systems, Immersion Heaters, Process Air and Duct, Heaters, Radiant Heaters, Strip Heaters, Tubular Heaters