¼ DIN Ramp/Soak Advanced Temperature/Process
Controller with Graphics and USB Interface

CN2300 Series

3 YEAR WARRANTY C E UL c UL RoHS

✔ **Graphical LCD Text Display (Red/Green)**
✔ **Front Mounted USB Interface Port**
✔ **64 Independent Programs**
✔ **255 Segments per Program**
✔ **Universal Inputs**
✔ **Autotune**
✔ **Modular Isolated Control Outputs**
✔ **Data Logging Models
   (Data, Alarms and Events)**
✔ **RS485 Communications (Optional)**
✔ **Software with Configuration Cable
   (Optional)**
✔ **Alarm Functions**
✔ **5 Language Options (English, French,
   German, Italian, Spanish)**

**CN2301-R1-R2-R3
shown smaller than actual size.**

Front USB port.

**Dual color, graphical LCD text display changes color
from green to red.**

The CN2300 Series ¼ DIN profile controller with
graphic/text LCD display and USB interface is an
affordable temperature and process controller with
advanced functionality including datalogging options.
Designed to improve user efficiency many features
are integrated to reduce commissioning time, simplify
operation and minimize maintenance downtime.

Features include graphic easy to read backlit LCD
display, dual color screen (green/red), multi-language
option, custom splash-screen on startup (bitmap file),
alarm status view, on screen trend view, LEDs to
indicate heat, cool, autotuning and alarm.

Easy setup wizard via front keys for quick configuration
of inputs, alarms, outputs, communications and real-
time clock. Universal input for thermocouple, RTD's
and linear DC process signals (mA, mV or V). Flexible
modular output options include mechanical relay,
dc Pulse, AC SSR triac and linear outputs. Select to
precisely match the process, digital input (2 max) for
setpoint selection, profile control, datalogging start/stop,
control output enable/disable or auto/manual control.
The CN2300 series features configurable menus (using
optional software with cable for configurating units via
RJ11 configuration socket), USB port for local upload/
download of configuration files and download logged
data to or from a USB memory stick. This allows easy
configuration of multiple instruments by copying from
one unit to another.

Profile feature includes 255 segments to allocate freely
in up to 64 programs. Programs include ramp, soak,
hold, loop or jump to other profile. User defined text
profile name, delayed or real-time day/time profile start,
and up to 5 event outputs.

The CN2300 data logging models include historic
process data for analysis or reporting, and export data
files via front USB or optional communications, and
will log process values, setpoints or alarms (including
minimum, maximum and average), with logging
intervals from 1s to 30m. Many options include analog
remote setpoint, built in 24 Vdc transmitter power
supply, and graphical software.

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SPECIFICATIONS
Process Input
Sampling Rate: 10 per second

Resolution: 16 bits, always four times better than display resolution

Impedance: >10M Ω resistive, except DC mA (5 Ω) and V (47k Ω)

Temperature Stability: Error <0.01% of span per °C change in ambient temperature

Supply Variation: Supply voltage influence negligible within supply limits

Humidity Influence: Negligible if non-condensing

Process Display: Displays up to 5% over and 5% under span limits

Process Variable Input Offset: Reading adjustable ± Controller Span. +ve values added to Process Variable, -ve values subtracted from Process Variable

Sensor Break Detection:
   Thermocouple and RTD: Control goes to pre-set power value
   High and Sensor Break: Alarms activate
   Linear (4 to 20 mA, 2 to 10V and 1 to 5V only):
   Control goes to pre-set power value
   Low and Sensor Break: Alarms activate

Isolation: Isolated from all outputs (except SSR driver) at 240 Vac

Thermocouple Input	
T/C Type	**Range**
J	-200 to 1200°C (-328 to 2192°F*)
K	-240 to 1373°C (-400 to 2503°F*)
T	-240 to 400°C (-400 to 752°F*)
E	-240 to 1000°C (-400 to 1832°F)
N	0 to 1399°C (32 to 2551°F*)
L	0 to 762°C (32 to 1402°F*)
R	0 to 1759°C (32 to 3198°F)
S	0 to 1762°C (32 to 3204°F)
B	100 to 1824°C (211 to 3315°F)
C	0 to 2320°C (32 to 4208°F)
D	0 to 2315°C (0 to 4199°F)
PtRh 20%:40%	0 to 1850°C (32 to 3362°F)

±0.1% of full range, ±1LSD (±1°C for internal CJC if enabled).
*Linearization better than ±0.2 C (±0.05 typical).
Linearization for other ranges is better than 0.5 C.
Optional decimal place can be displayed up to 999.9°C/F

Supported RTD Types and Ranges: 3-wire, PT100: -199 to 800°C (-328 to 1472°F)

NI120: -80 to 240°C (-112 to 464°F)
Optional decimal place can be displayed up to 999.9°C/F

RTD Excitation: Sensor current 150μA ±10%

Lead Resistance: <0.5% of span error for max 50 Ω per lead, balanced

Linear Types and Ranges		
Type	**Range**	**Offset Range**
mA DC	0 to 20 mA DC	4 to 20 mA DC
mV DC	0 to 50 mV DC	10 to 50 mV DC
Vdc	0 to 5 Vdc	1 to 5 Vdc
Vdc	0 to 10 Vdc	2 to 10 Vdc

Scalable from -9999 to 10000. Decimal point selectable from 0 to 3 places, but limited to 5 display digits (e.g 9999.9).

CN2301-R1-R2-R3
shown smaller than actual size.

DC Calibration: ±0.1% of full range, ±1LSD

DC Input Multi-Point Linearization: Up to 15 scaling values can be defined anywhere between 0.1 and 100% of input

Auxiliary Inputs		
Supported Input Types and Ranges		
Type	**Slot A Ranges**	**Slot B Ranges**
mA DC	0 to 20, 4 to 20	0 to 20, 4 to 20
mV DC		0 to 50, 10 to 50, 0 to 100
Vdc	0 to 5, 1 to 5, 0 to 10, 2 to 10	0 to 5, 1 to 5, 0 to 10, 2 to 10
Potentiometer		>2000W

Accuracy: ±0.25% of input range 1 LSD

Sampling Rate: 4 per second

Resolution: 16 bits

Impedance: >10M resistive, except DC mA (10 Ω) and V (47k Ω)

Sensor Break Detection: 4 to 20mA, 2 to 10V and 1 to 5V ranges only. Control goes to pre-set power value if Aux input is the active setpoint source

Isolation: Reinforced safety isolation from outputs and inputs (except to digital Input B)

Auxiliary Input Scaling: Scalable as remote setpoint (RSP) input between -1999 and 9999, constrained within setpoint limits

Digital Inputs

Volt-Free Contacts (or TTL): Open contacts (>5000 or 2 to 24 Vdc signal = Logic High Closed contacts) (<50 or -0.6 to +0.8 Vdc signal = Logic Low)

Isolation: Reinforced safety isolation from inputs and other outputs

Digital Input Sensitivity: Edge sensitive; requires high-low or low-high transition to change function; response within <0.25 second

Selectable Digital Input Functions		
Function	**Logic High**	**Logic Low**
Internal Setpoint Select	Local SP1	Alternate SP
Auto/Manual Control Select	Automatic	Manual Mode
Control Outputs	Enabled	Disabled

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Outputs

Isolation: Reinforced safety isolation from inputs and other outputs (common specification for all output types)

Single Relay:

Type and Rating: Single pole single throw (SPST), 2A resistive at 120/240 Vac

Lifetime: >500,000 operations at rated voltage/current

Dual Relay:

Type and Rating: Single pole single throw (SPST), 2A resistive at 120/240 Vac (dual relay modules have shared common)

Lifetime: >200,000 operations at rated voltage/current

Quad Relay:

Type and Rating: Single pole single throw (SPST), 2A resistive at 120/240 Vac (dual relay modules have shared common)

Lifetime: >500,000 operations at rated voltage/current

DC Pulse:

Drive Capability: SSR driver voltage >10V into 500 Ω minimum

Triac:

Operating Voltage: 20 to 280Vrms (47 to 63Hz)

Current Rating: 0.01 to 1A (full cycle rms on-state @ 25°C); de-rates linearly above 40°C to 0.5A @ 80°C

Linear DC:

Ranges: 0 to 5V, 0 to 10V, 1 to 5V, 2 to 10V and 0 to 20 mA, 4 to 20 mA (selectable) with 2% over/under-drive whenused for control outputs

Resolution: 8 bits in 250 mS (10 bits in 1s typical, >10 bits in >1s typical)

Accuracy: ±0.25% of range, (mA @ 250, V @ 2k) Degrades linearly to ±0.5% for increasing burden (to specification limits)

Transmitter PSU

Power Rating: 24 V nominal (19 to 28 Vdc) into 910 Ω minimum resistance (option to use DC Linear output as 0 to 10V stabilised PSU)

Isolation: Reinforced safety isolation from inputs and other outputs

Communications

PC Configuration

Connection: RS232 via PC configurator cable to RJ11 socket under case

Isolation: Not isolated from input or SSR driver outputs; for bench configuration only

RS485

Connection: Locates in option alot A; connection via rear terminals

Protocol: MODBUS RTU

Slave/Master Mode: Slave address range 1 to 255 or setpoint master mode

Supported Speeds: 4800, 9600, 19200, 38400, 57600 or 115200 bps

Data Type: 8 data bits and 1 stop bit; odd, even or no parity

Isolation: 240V reinforced safety isolation from all inputs and outputs

Ethernet

Connection: Locates in option slot A, connection via RJ45 connector on top of case

Protocol: MODBUS TCP (slave only)

Supported Speed: 10BaseT or 100BaseT

Isolation: 240V reinforced safety isolation from the supply, inputs and outputs (except SSR drivers)

Loop Control

Tuning Types: Pre-tune, auto pre-tune, self-tune or manual tuning

Proportional Bands: Primary and secondary (e.g. heat and cool) 0.5% to 999.9% of input span in 0.1% increments, or on/off control

Automatic Reset: Integral time constant, 1 second to 99 minutes 59 seconds and off

Rate: Derivative time constant, 1 second to 99 minutes 59 seconds and off

Manual Reset: Bias 0 to 100% (-100% to +100% primary and secondary)

Deadband/ Overlap: -20% to +20% of primary + secondary proportional band

ON/OFF Differential: 0.1% to 10.0% of input span

Auto/Manual Control: Selectable with "bumpless" transfer when switching between automatic and manual control

Cycle Times: Selectable from 0.5s to 512s

Setpoint Ramp: Ramp rate selectable 1 to 9999 LSDs per hour and infinite

Easy programming via graphical menu display.

Alarms

Alarm Types: Up to 5 alarms selectable as process high, process low, band, deviation, rate of signal change (per minute), sensor/input break, loop alarm; band and deviation (high or low) alarm values are relative to the current setpoint value

Alarm Hysteresis: A deadband from 1 LSD to full span (in display units) for process, band or deviation alarms; rate of change alarm hysteresis is the shortest time (1 to 9999 seconds) the rate of change must be above the threshold for the alarm activate, or fall below the threshold to deactivate
Note: If the duration is less than this time, the alarm will not activate no matter how fast the rate of rise.

Combination Alarm

Outputs: Logical OR of alarms 1 and 2, 1 to 3, 1 to 4 or 1 to 5. Logical AND of alarms 1 to 5 with Profiler Events 1 to 5

Operating Conditions (for Indoor Use)

Temperature:
  Operating: 0 to 55°C (0 to 131°F)
  Storage: -20 to 80°C (-4 to 176°F)

Relative Humidity: 20 to 95% non-condensing

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Easy ramp and soak programming via graphical menu.

Data Recorder

Recording Memory: 1Mb non-volatile flash memory; data retained when power is turned off

Recording Interval: 1; 2; 5; 10; 15; 30 seconds or 1; 2; 5; 10; 15; 30 minutes

Recording Capacity: Dependant on sample rate and number of values recorded; two values can be recorded for up to 7 days at 10s intervals; more values or faster sample rates reduce the maximum duration

RTC Battery Type: CR 1616 3V lithium; clock runs for >1 year without power

RTC Accuracy: Real time clock error <1second per day

Profiler

Profile Limits:
   Number of profiles: 64 maximum
   Total Number of Segments (All Programs): 255 maximum

Loop Back: 1 to 9999 loops back to specified segment

Profile Cycling: 1 to 9999 or Infinite repeats per profile

Sequence Repeats: 1 to 9999 or Infinite repeats of joined profile sequences

Segment Types: Ramp up/down over time, ramp rate up/down, step, dwell, hold, join a profile, end or repeat sequence then end

Timebase: hh:mm:ss (hours, minutes and seconds)

Segment Time: Maximum segment time 99:59:59 hh:mm:ss; Use loop-back for longer segments (e.g. 24:00:00 x 100 loops = 100 days)

Ramp Rate: 0.001 to 9999.9 display units per hour

Hold Segment Release: Release with key press, at time of day or digital input

Start From: First segment starts from current setpoint or current input value

Delayed Start: After 0 to 99:59 (hh:mm) delay, or at specified day(s) and time

Abort Action: Keep last profile setpoint, use controller setpoint or control outputs off

Power/Signal Loss Recovery: Continue profile, restart profile, keep last profile setpoint, use controller setpoint or control outputs off

Auto-Hold: Hold if input >band above and/or below SP for each segment

Profile Control: Run, manual hold/release, abort or jump to next segment

Segment Events: Events turn on for the duration of the segment; for end segments, the event state persists until another profile starts, the user exits from profiler mode, or the unit is powered down

Dimensions

Front Bezel Size: ¼ DIN; 96 x 96 mm (3.78 x 3.78")

Mounting: Plug-in with panel mounting fixing strap

Panel Cut-Out Size: 92 x 92 mm (3.62 x 3.62") (maximum panel thickness 6.0 mm [0.236"])

Depth Behind Panel: 117 mm (4.61")

Ventilation: 20 mm (0.787") gap required above, below and behind

Weight: 0.65 kg (1.43 lb) maximum

Terminals: Screw type (combination head)

Supply Voltage and Power:
   Mains Versions: 100 to 240 Vac ±10%, 50/60 Hz, 20VA
   Low Voltage Versions: 20 to 48VC 50/60 Hz 15VA or 22 to 65 Vdc 12 W

Environmental

Front Panel Sealing: To IP66 (IP65 front USB connector) IP20 behind the panel

Display

Display Type: 160 x 80 pixel, monochrome graphic LCD with a dual colour (red/green) backlight

Display Area: 66.54 W x 37.42 mm H (2.62 x 1.65")

Display Characters: 0 to 9, a to z, A to Z, plus ( ) - and _

Trend View: 120 of 240 data points shown in a scrollable window; data is not retained when power turned off or if time base is changed

Trend Data: Any active alarm plus PV (solid) and SP (dotted) at sample time or maximum/minimum PV between samples (candle-stick graph)

Trend Sample Rate: 1; 2; 5; 10; 15; 30 seconds or 1; 2; 5; 10; 15; 30 minutes

Additional Communications Options–USB*

Connection: Locates in option slot C; connection via front mounted connector

Protocol: USB 1.1 or 2.0 compatible; mass storage class

Supply Current: Up to 250 mA

Targeted Peripheral: USB memory stick

Isolation: Reinforced safety isolation from all inputs and outputs

Not used for PC configuration.

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To Order *Visit omega.com/cn2300 for Pricing and Details*

Model No.	Description
Profile Controller with Front USB Interface	
CN2301-R1-R2-R3	Profile controller with 3 relay outputs
CN2301-DC1-DC2-DC3	Profile controller with 3 DC pulse outputs
CN2301-F1-R2-R3	Profile controller with 1 analog and 2 relay outputs
CN2301-T1-T2-T3	Profile controller with 3 AC SSR (triac) outputs
Profile Controller with Front USB Interface and Recorder	
CN2302-R1-R2-R3	Profile/recorder controller with 3 relay outputs
CN2302-DC1-DC2-DC3	Profile/recorder controller with 3 DC pulse outputs
CN2302-F1-R2-R3	Profile/recorder controller with 1 analog and 2 relay outputs
CN2302-T1-T2-T3	Profile/recorder controller with 3 AC SSR (triac) outputs
Profile Controller with Front USB Interface, Low Voltage	
CN2301-R1-R2-R3-LV	Profile controller with 3 relay outputs, low voltage
CN2301-DC1-DC2-DC3-LV	Profile controller with 3 DC pulse outputs, low voltage
CN2301-F1-R2-R3-LV	Profile controller with 1 analog and 2 relay outputs, low voltage
CN2301-T1-T2-T3-LV	Profile controller with 3 AC SSR (triac) outputs, low voltage
Profile Controller with Front USB Interface and Recorder, Low Voltage	
CN2302-R1-R2-R3-LV	Profile/recorder controller with 3 relay outputs, low voltage
CN2302-DC1-DC2-DC3-LV	Profile/recorder controller with 3 DC pulse outputs, low voltage
CN2302-F1-R2-R3-LV	Profile/recorder controller with 1 analog and 2 relay outputs, low voltage
CN2302-T1-T2-T3-LV	Profile/recorder controller with 3 AC SSR (triac) outputs, low voltage

**Output and Communications Options
(Field Installable Modules)**

Output 1 Slot	Description
2300X-R1	Relay module
2300X-DC1	DC pulse module
2300X-F1	Linear DC module
2300X-T1	Triac module
Output 2 and 3 Slot	**Description**
2300X-R2	Relay module
2300X-DC2	DC pulse module
2300X-F2	Linear DC module
2300X-T2	Triac module
2300X-R23	Dual relay module
2300X-DC23	Dual DC pulse module
2300X-TPS	Transmitter power supply
Output 4 Slot	**Description**
2300X-R4	Quad relay module
Option A Slot	**Description**
2300X-485	RS485 communications
2300X-DI	Digital input
2300X-RSP1	Basic remote setpoint
2300X-EI	Ethernet
Option B Slot	**Description**
2300X-RSPDI	Full remote setpoint with digital input

Options (Language)

Model No. Suffix	Description
-FRENCH	French display language
-GERMAN	German display language
-ITALIAN	Italian display language
-SPANISH	Spanish display language

Accessories

Model No.	Description
CN2300-SOFT	Configuration software and cable
CN2300-CABLE	Spare configuration cable
CNQUENCHARC	Noise suppression RC snubber (2 leads), 110 to 230 Vac

Comes complete with mounting bracket and operator's manual.

Ordering Examples: CN2301-R1-R2-R3, *profile controller with 3 relay outputs, front USB interface, and operator's manual.*

OCW-2, *OMEGACARE^SM extends standard 3-year warranty to a total of 5 years.*

CN2301-F1-R2-R3-LV, *profile controller with 1 analog and 2 relay outputs, low voltage, front USB interface, and operator's manual.*

OCW-2, *OMEGACARE^SM extends standard 3-year warranty to a total of 5 years.*

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