

# Temperature, Process and Strain Controllers

CNi Series



**iSeries**  
MONOGRAM®



CNi32, shown smaller than actual size.



CNi16, shown smaller than actual size.



CNi8, shown smaller than actual size.



CNi8DV, shown smaller than actual size.

- ✓ **Universal Inputs**
- ✓ **High Accuracy: 0.5°C (±0.9°F), 0.03% Reading**
- ✓ **Totally Programmable Color Displays (Visual Alarms)**
- ✓ **User-Friendly, Simple to Configure**
- ✓ **Free Software**
- ✓ **Full Autotune PID Control**
- ✓ **Embedded Internet Connectivity Optional**
- ✓ **RS232 and RS485 Serial Communications Optional**
- ✓ **Built-In Excitation**
- ✓ **2 Control/Alarm Outputs; Choice of DC, Pulse, Solid State Relays, Mechanical Relays, Analog Voltage and Current**
- ✓ **Output 3 Retransmission: Isolated Analog Voltage and Current Optional**
- ✓ **NEMA 4 (IP65) Front Bezel**
- ✓ **Temperature Stability ±0.04°C/°C RTD and ±0.05°C/°C Thermocouple @ 25°C (77°F)**
- ✓ **Front Removable and Plug Connectors**
- ✓ **AC or DC Powered Units**
- ✓ **Ratiometric Mode for Strain Gages**
- ✓ **Programmable Digital Filter**

The OMEGA® iSeries is a family of microprocessor-based instruments offered in three true DIN sizes. All of the instruments share the same set-up and configuration menu and method of operation, a tremendous time saver for integration of a large system. The iSeries family includes extremely accurate digital panel meters “DPI” and single loop PID controllers “CNI” that are simple to configure and use, while providing tremendous versatility and a wealth of powerful features.

The CNI Series covers a broad selection of transducer and transmitter inputs with 2 input models.

The Universal temperature and process instrument (CNI models) handles 10 common types of thermocouples, multiple RTDs and several process (DC) voltage and current ranges. This model also features built-in excitation, 24 Vdc @ 25 mA. With its wide choice of signal inputs, this model is an excellent choice for measuring or controlling temperature with a thermocouple, RTD, or 4 to 20 mA transmitter.

The strain and process instruments (CNI S models) measure inputs from load cells, pressure transducers, and most any strain gage sensor as well as process voltage and current ranges. The CNI S has built-in 5 or 10 Vdc excitation for bridge transducers, 5 Vdc @ 40 mA or 10 Vdc @ 60 mA (any excitation voltage between 5 and 24 Vdc is available by special order). This CNI S model supports 4- and 6-wire bridge communications, ratiometric measurements. The CNI S features fast and easy “in process” calibration/ scaling of the signal inputs to any engineering units. This model also features 10-point linearization which

allows the user to linearize the signal input from extremely nonlinear transducers of all kinds.

## Control Functions

The iSeries can control simple manual operation to ON-OFF and full Autotune PID control. (Selectable preset tune, adaptive tune, PID, PI, PD control modes.) The dual control outputs can be configured for a variety of independent control and alarm applications such as heat/heat, heat/cool, heat/alarm, cool/cool, cool/alarm or alarm/alarm. The ramp to setpoint feature allows the user to define the rate of rise to setpoint, minimizing thermal shock to the load during start-up. For applications that do not require PID control, just simplified programming, there are 2 options available: -AL Limit Alarm and -SM Simplified Menu ON-OFF control.

## Programmable Color Display

The iSeries are 1/8, 1/16 and 1/32 DIN controllers featuring the big iSeries color-changing display. The digits are twice the size of typical 1/8 DIN panel meters. The iSeries feature the only LED displays that can be programmed to change color between **GREEN**, **AMBER**, and **RED**.

## Embedded Internet and Serial Communications

Featuring optional “embedded Internet” the iSeries connect directly to an Ethernet network and transmit data in standard TCP/IP packets, or serve Web pages over a LAN or the Internet. The iSeries are also available with serial communications. The user can select from the pushbutton menu between RS232, RS422, and RS485, with straightforward ASCII commands or MODBUS.

**To Order Visit [omega.com/cni\\_series](http://omega.com/cni_series) for Pricing and Details**

| Model No. | Size/Cutout | Input Type          | Output 1  | Output 2  | Other Features |
|-----------|-------------|---------------------|-----------|-----------|----------------|
| CNi3222   | 1/32 DIN    | Temperature/process | 0.5 A SSR | 0.5 A SSR | —              |
| CNi3223   | 1/32 DIN    | Temperature/process | 0.5 A SSR | Relay     | —              |
| CNi3224   | 1/32 DIN    | Temperature/process | 0.5 A SSR | DC pulse  | —              |
| CNi3233   | 1/32 DIN    | Temperature/process | Relay     | Relay     | —              |
| CNi3242   | 1/32 DIN    | Temperature/process | DC pulse  | 0.5 A SSR | —              |
| CNi3243   | 1/32 DIN    | Temperature/process | DC pulse  | Relay     | —              |
| CNi3244   | 1/32 DIN    | Temperature/process | DC pulse  | DC pulse  | —              |
| CNi3252   | 1/32 DIN    | Temperature/process | Analog    | 0.5 A SSR | —              |
| CNi3253   | 1/32 DIN    | Temperature/process | Analog    | Relay     | —              |
| CNi3254   | 1/32 DIN    | Temperature/process | Analog    | DC pulse  | —              |
| CNi833    | 1/8 DIN     | Temperature/process | Relay     | Relay     | —              |
| CNiS833   | 1/8 DIN     | Strain/process      | Relay     | Relay     | —              |
| CNi8A33   | 1/8 DIN     | Temperature/process | Relay     | Relay     | Analog Output  |
| CNi8C33   | 1/8 DIN     | Temperature/process | Relay     | Relay     | Compact Depth  |
| CNiS8C33  | 1/8 DIN     | Strain/process      | Relay     | Relay     | Compact Depth  |
| CNi8DH33  | 1/8 DIN     | Temperature/process | Relay     | Relay     | Dual Display   |
| CNiS8DH33 | 1/8 DIN     | Strain/process      | Relay     | Relay     | Dual Display   |
| CNi8DV33  | 1/8 DIN     | Temperature/process | Relay     | Relay     | Dual Display   |
| CNiS8DV33 | 1/8 DIN     | Strain/process      | Relay     | Relay     | Dual Display   |
| CNi1633   | 1/16 DIN    | Temperature/process | Relay     | Relay     | —              |
| CNi16A33  | 1/16 DIN    | Temperature/process | Relay     | Relay     | Analog Output  |
| CNi16D33  | 1/16 DIN    | Temperature/process | Relay     | Relay     | Dual Display   |
| CNiS1633  | 1/16 DIN    | Strain/process      | Relay     | Relay     | —              |
| CNiS16D33 | 1/16 DIN    | Strain/process      | Relay     | Relay     | Dual Display   |

Comes with complete operator's manual.

**Ordering Examples:** **CNi3233-C24-DC**, 1/32 DIN temperature/process meter with two relay outputs plus RS232 and RS485 and 12 to 36 Vdc power supply.

**CNi16D22-EIT**, 1/16 DIN dual display temperature/process meter with two SSR outputs plus ethernet with embedded web server.

| Ordering Suffix                           | Description  |
|---|--|
| -AL                                       | Limit alarm version (alarms only, no PID control) <sup>3,4</sup>   |
| -SM                                       | Simplified menu (on/off control or alarms, no PID) <sup>5</sup>  |
| <b>Networks Options</b>                   |  |
| -EIT                                      | Ethernet with embedded Web server  |
| -C24                                      | Isolated RS232 and RS485/422, 300 to 19.2 Kb <sup>2</sup>  |
| -C4EIT                                    | Ethernet with embedded Web server + isolated RS485/422 hub for up to 31 devices <sup>1</sup>                 |
| <b>Power Supply</b>                       |  |
| -DC                                       | 12 to 36 Vdc, 24 Vac; 20 to 36 Vdc for dual display, ethernet, or isolated analog output option <sup>2</sup> |
| <b>Factory Setup</b>                      |  |
| -FS                                       | Factory setup and configuration  |
| -FS(RTD-1N)                               | Customized "CNiS" model for MIL-T-7990B nickel RTD input, 0 to 200°C (32 to 392°F)                           |
| -FS(RTD-2N)                               | Customized "CNiS" model for MIL-T-7990B nickel RTD input, -40 to 300°C (-40 to 572°F)                        |
| <b>Software (Requires Network Option)</b> |  |
| OPC-SERVER LICENSE                        | OPC server/driver software license   |

\*1 Ethernet options are not available for the **CNi8A**, **CNi8C**, **CNi16**, **CNi16A** or **CNi32** controller.

\*2 "-DC", "-C24", and "-C4EIT" not available with excitation.

\*3 Analog output is not available with "-AL" units.

\*4 **CNi8A0x-AL** or **CNi16A0x-AL** contains 1 alarm and 1 analog retransmission.

\*5 "-SM" option not available on **CNiS** strain models.

# iSeries Common Specifications (All i/8, i/16, i/32 DIN)

## Universal Temperature and Process Input (DPi/CNi Models)

**Accuracy:**  $\pm 0.5^{\circ}\text{C}$  temp; 0.03% rdg

**Resolution:**  $1^{\circ}/0.1^{\circ}$ ; 10  $\mu\text{V}$  process

### Temperature Stability:

**RTD:**  $0.04^{\circ}\text{C}/^{\circ}\text{C}$

**TC @ 25°C (77°F):**  $0.05^{\circ}\text{C}/^{\circ}\text{C}$

**Cold Junction Compensation**

**Process:** 50 ppm/ $^{\circ}\text{C}$

**NMRR:** 60 dB

**CMRR:** 120 dB

**A/D Conversion:** Dual slope

**Reading Rate:** 3 samples/s

**Digital Filter:** Programmable

**Display:** 4-digit 9-segment LED  
10.2 mm (0.40"); i32, i16, i16D, i8DV  
21 mm (0.83"); i8 10.2 mm (0.40") and  
21 mm (0.83"); i8DH **RED, GREEN,**  
and **AMBER** programmable colors  
for process variable, setpoint and  
temperature units

**Input Types:** Thermocouple, RTD,  
analog voltage, analog current

**Thermocouple Lead Resistance:**  
100  $\Omega$  max

### Thermocouple Types (ITS 90):

J, K, T, E, R, S, B, C, N, L (J DIN)

**RTD Input (ITS 68):** 100/500/1000  $\Omega$   
Pt sensor, 2-, 3- or 4-wire; 0.00385 or  
0.00392 curve

**Voltage Input:** 0 to 100 mV, 0 to 1V,  
0 to 10 Vdc

**Input Impedance:** 10 M $\Omega$  for 100 mV  
1 M $\Omega$  for 1 or 10 Vdc

**Current Input:** 0 to 20 mA (5  $\Omega$  load)

**Configuration:** Single-ended

**Polarity:** Unipolar

**Step Response:** 0.7 sec for 99.9%

### Decimal Selection:

**Temperature:** None, 0.1

**Process:** None, 0.1, 0.01 or 0.001

### Setpoint Adjustment:

-1999 to 9999 counts

### Span Adjustment:

0.001 to 9999 counts

### Offset Adjustment:

-1999 to 9999

**Excitation (Not Included with  
Communication):** 24 Vdc @ 25 mA  
(not available for low-power option)

## Universal Strain and Process Input (DPiS/CNiS Models)

**Accuracy:** 0.03% reading

**Resolution:** 10/1 $\mu\text{V}$

**Temperature Stability:** 50 ppm/ $^{\circ}\text{C}$

**NMRR:** 60 dB

**CMRR:** 120 dB

**A/D Conversion:** Dual slope

**Reading Rate:** 3 samples/s

**Digital Filter:** Programmable

**Input Types:** Analog voltage and current

**Voltage Input:** 0 to 100 mVdc,  
-100 mVdc to 1 Vdc, 0 to 10 Vdc

**Input Impedance:** 10 M $\Omega$  for 100 mV;  
1 M $\Omega$  for 1V or 10 Vdc

**Current Input:** 0 to 20 mA (5  $\Omega$  load)

**Linearization Points:** Up to 10

**Configuration:** Single-ended

**Polarity:** Unipolar

**Step Response:** 0.7 sec for 99.9%

**Decimal Selection:** None, 0.1, 0.01  
or 0.001

### Setpoint Adjustment:

-1999 to 9999 counts

**Span Adjustment:** 0.001 to 9999 counts

**Offset Adjustment:** -1999 to 9999

**Excitation (Optional In Place Of  
Communication):** 5 Vdc @ 40 mA;  
10 Vdc @ 60 mA

## Control

**Action:** Reverse (heat) or direct (cool)

**Modes:** Time and amplitude proportional  
control; selectable manual or auto PID,  
proportional, proportional with integral,  
proportional with derivative and anti-reset  
Windup, and on/off

**Rate:** 0 to 399.9 s

**Reset:** 0 to 3999 s

**Cycle Time:** 1 to 199 s; set to 0 for on/off

**Gain:** 0.5 to 100% of span; setpoints 1 or 2

**Damping:** 0000 to 0008

**Soak:** 00.00 to 99.59 (HH:MM), or OFF

**Ramp to Setpoint:**  
00.00 to 99.59 (HH:MM), or OFF

**Auto Tune:** Operator initiated from  
front panel

## Control Output 1 and 2

**Relay:** 250 Vac or 30 Vdc @ 3 A (resistive  
load); configurable for on/off, PID and ramp  
and soak

**Output 1:** SPDT, can be configured as  
alarm 1 output

**Output 2:** SPDT, can be configured as  
alarm 2 output

**SSR:** 20 to 265 Vac @ 0.05 to 0.5 A  
(resistive load); continuous

**DC Pulse:** Non-isolated; 10 Vdc @ 20 mA

## Analog Output (Output 1 Only):

Non-isolated, proportional 0 to 10 Vdc or  
0 to 20 mA; 500  $\Omega$  max

## Output 3 Retransmission

**Isolated Analog Voltage and Current**

**Current:** 10 V max @ 20 mA output

**Voltage:** 20 mA max for 0 to 10 V output

## Network and Communications

**Ethernet:** Standards compliance  
IEEE 802.3 10 Base-T

**Supported Protocols:**  
TCP/IP, ARP, HTTPGET

**RS232/RS422/RS485:** Selectable from  
menu; both ASCII and MODBUS protocol  
selectable from menu; programmable  
300 to 19.2 Kb; complete programmable  
setup capability; program to transmit  
current display, alarm status, min/max,  
actual measured input value and status

**RS485:** Addressable from 0 to 199

**Connection:** Screw terminals

## Alarm 1 and 2 (Programmable)

**Type:** Same as output 1 and 2

**Operation:** High/low, above/below,  
band, latch/unlatch, normally open/  
normally closed and process/deviation;  
front panel configurations

## Analog Output (Programmable):

Non-isolated, retransmission 0 to 10 Vdc  
or 0 to 20 mA, 500  $\Omega$  max (output 1 only);  
accuracy is  $\pm 1\%$  of FS when following  
conditions are satisfied: input is not scaled  
below 1% of input FS, analog output is not  
scaled below 3% of output FS

## General

**Power:** 90 to 240 Vac  $\pm 10\%$ , 50 to 400  
Hz\*, 110 to 375 Vdc, equivalent voltage

**Low Voltage Power Option:** 24 Vac\*\*,  
12 to 36 Vdc for DPi/CNi/DPiS/CNiS;  
20 to 36 Vdc for dual display, ethernet  
and isolated analog output from qualified  
safety approved source

## Isolation

**Power to Input/Output:** 2300 Vac  
per 1 minute test

**For Low Voltage Power Option:**

1500 Vac per 1 minute test

**Power to Relay/SSR Output:**

2300 Vac per 1 minute test

**Relay/SSR to Relay/SSR Output:**

2300 Vac per 1 minute test

**RS232/485 to Input/Output:**

500 Vac per 1 minute test

## Environmental Conditions:

**All Models:** 0 to 55 $^{\circ}\text{C}$  (32 to 131 $^{\circ}\text{F}$ )

90% RH non-condensing

## Dual Display Models:

0 to 50 $^{\circ}\text{C}$  (32 to 122 $^{\circ}\text{F}$ ), 90% RH

non-condensing (for UL only)

## Protection:

**DPi/CNi/DPiS/CNiS32, i16, i16D, i8C:**

NEMA 4X/Type 4 (IP65) front bezel

**DPi/CNi8, CNI8DH, i8DV:**

NEMA 1/Type 1 front bezel

**Approvals:** UL, C-UL, CE per

EN61010- 1:2001

## Dimensions

**i/8 Series:** 48 H x 96 W x 127 mm D

(1.89 x 3.78 x 5")

**i/16 Series:** 48 H x 48 W x 127 mm D

(1.89 x 1.89 x 5")

**i/32 Series:** 25.4 H x 48 W x 127 mm D

(1.0 x 1.89 x 5")

## Panel Cutout

**i/8 Series:** 45 H x 92 mm W

(1.772 x 3.622"),  $\frac{1}{8}$  DIN

**i/16 Series:** 45 mm (1.772") square,

$\frac{1}{16}$  DIN

**i/32 Series:** 22.5 H x 45 mm W

(0.886 x 1.772"),  $\frac{1}{32}$  DIN

## Weight

**i/8 Series:** 295 g (0.65 lb)

**i/16 Series:** 159 g (0.35 lb)

**i/32 Series:** 127 g (0.28 lb)

\* No CE compliance above 60 Hz.

\*\* Units can be powered safely with 24 Vac  
power, but no certification for CE/UL are claimed.