#### WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evalua-tion. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modifica-tion. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its vari-ous products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use if its products in accordance with information provided by OMEGA, either verbal or writ-ten. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical appli-cations or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

#### RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

- 1. Purchase Order number under which the
- product was PURCHASED,

  2. Model and serial number of the
- product under warranty, and Repair 3. instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

- . Purchase Order number to cover the COST of the repair or calibration.
- Model and serial number of the product, and Repair instructions and/or specific problems
- 3. relative to the product.

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NOTES





# **CND3 Series Temperature Controller**

# **OE OMEGA**

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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.



# **CND3 Series Temperature Controller**

# ■ Warning

DANGER! Caution! Electric Shock! When the power is on, DO NOT touch the AC terminals in case an electric shock may occur. Make sure the power is disconnected when you check the input power supply.

- Prevent dust or metallic debris from falling into the controller and cause malfunctions. DO NOT modify or uninstall
  the controller.
- CND3 controller is an open-type device. Make sure it is installed in an enclosure free of dust and humidity in case of an electric shock.
- Wait for one minute after the power is switched off to allow the capacitor to discharge. DO NOT touch the internal wiring within this period of time.

## ■ Display, LED & Keys



PV: Present value
SV: Set value
"C/F: Celsius or Fahrenheit LED
ALM1-ALM3: Alarm output LED
AT Auto-tuning LED
MAN: Manual mode LED
OUT 1/OUT2: Output LED
REMOTE: Remote control LED
EV: EVENT LED
IF IS 1: Self-defined function keys
IM IM 1'Select'and'setup' keys

# ■ Ordering Information



Series	Omega CND3 series temperature controller		
12 Panel size	04: 1/4 DIN 08: 1/8 DIN	16: 1/16 DIN	
3 Output 1		ear mA ear voltage	
4 Output 2		ear mA blank: none ear voltage	
56 Option 1	1U: 1 User input 2U: 2 User inputs 1C: 1 CT input 2C: 2 CT inputs RT: Retransmission output RS: Remote Setup Input UC: User input + CT input	RR: Retrainsmission + Remote Setup input UR: User input + Retransmission output US: User input + Remote Setup input CR: CT input + Retrainsmission output CS: CT input + Remote Setup input blank: none	
7 Option 2	CM: RS-485 Communication b	CM: RS-485 Communication blank: none	
8 Power	AC: AC 100 to 240V DC:	DC 24V	

### ■ Specifications

Input power supply	AC 100 to 240 V, 50/60Hz, DC 24 V ±10%	
Display method	LCD. Present temperature: yellow, Set temperature: green	
	Thermocouple: K, J, T, E, N, R, S, B, L, U, TXK	
Input concore	Platinum RTD: Pt100, JPt100	
Input sensors	Resistance: Cu50, Ni120	
	Analog input: 0 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA, 0 to 50 mV	
Control modes	PID, PID programmable, Fuzzy, Self-tuning, manual, ON/OFF	
Display accuracy	0 or 1 digit to the right of the decimal point	
Sampling rate	Analog input: 0.1s, Thermocouple or platinum RTD: 0.1s	
Ambient temperature	0 to +50°C	
Ambient humidity	35 to 80% RH (non-condensing)	

### ■ Parameters Operation

Regulation +	for less than 3 sec Operation Mode	Fress Press of	
Regulation Mode	Operation Mode	Initial Setting Mode	
Auto-tuning (Set in PID control and RUN mode) Press		target Set up input type ss ♥ Press ♥ ▽	
Self-tuning switch (set when in PID control and the TUNE parameter = ST)	Control loop RUN or STOP	Set up temperature uni (not displayed when in analog input)	t I

Regulation Mode	Operation Mode	Initial Setting Mode
Select the n <sup>th</sup> (n = 0 ~ 5) PID. When n = AUTO, PID is auto-selected.	Set up start pattern (when in PID programmable control and	Set up upper temperature limit
Set up PID control offset	Set up start step (when in programmable control)	Set up lower temperature limit
Set up Fuzzy gain value	Set up the position of decimal point	Select control modes
Set up Fuzzy Deadband	LoL Lock the keys	Select SV control modes
Adjust Output 1 hysteresis (when in ON/OFF control)	医 Set up upper limit of Alarm 1	Set up waiting temperature (when in programmable control)
Adjust Output 2 hysteresis (when in ON/OFF control)	Set up lower limit of Alarm 1	Set up waiting time (when in programmable control)
Output 1 (except in ON/OFF control)	Set up upper limit of Alarm 2	Set up start slope (when in programmable control)
Output 2 (except in ON/OFF control)	Set up lower limit of Alarm 2	Select pattern to be edited
Ratio of Output 1 against Output 2 when in dual output control (set when in PID and dual output control)	Set up upper limit of Alarm 3	Select AT or ST
Set up deadband (when in dual output)	Set up lower limit of Alarm 3	Select heating, cooling or dual output heating and cooling
Set up input filter factor	Record highest temperature of Alarm 1	1 mode
Set up input filter range	Record lowest temperature of Alarm 1	ಗೆ ದಿರಂ ಗೆರು Set up Alarm 1 options
Adjust input compensation	Record highest temperature of Alarm 2	1 delay
Adjust input gain	Record lowest temperature of Alarm 2	PV color change
Set up rising slope (when CRTS = SLOP)	Record highest temperature of Alarm 3	2PID Switch temperature
Adjust upper limit compensation for analog Output 1*	Record lowest temperature of Alarm 3	2PID Reset temperature
Adjust lower limit compensation for analog Output 1*	Display and adjust Output 1 volume	Set up Remote type
Adjust upper limit compensation for analog Output 2*	Display and adjust Output 2 volume	Select auxiliary function 1
Adjust lower limit compensation for analog Output 2*	Set up percentage of upper limit for Output 1	Select auxiliary function 2
Adjust upper limit compensation for Retransmission*	Set up percentage of lower limit for Output 1	communication write-in
Adjust lower limit compensation for Retransmission*	Set up percentage of upper limit for Output 2	Select ASCII or RTU format
Adjust Remote gain	Set up percentage of lower limit for Output 2	Set up communication address
Adjust Remote compensation	Display current measured at CT1	Set up baudrate
Remote lower limit adjustment	Display current measured at CT2	Set up data length
Remote higher limit adjustment	Press de to return to set up target	Set up stop bit
		CHINATER
Set up EVENT1 function	temperature	Set up parity bit
<u> </u>	temperature	Set up parity bit Press to return to set up input type

<sup>\*1</sup> scale = 2µA; 1scale = 1mV

PID mode: Any of the 6 PID groups can be selected. When n = AUTO, the program will automatically select the PID group that is the closest to the target temperature.

Select the n <sup>th</sup> PID (n = 0 ~ 5)  Set up the 0 <sup>th</sup> PID temperature value Press   ∇		Set up the 5 <sup>th</sup> PID temperature value Press ♥ ▽
	Set up the 0 <sup>th</sup> proportional band value	Set up the 5 <sup>th</sup> proportional band value
	Set up the 0th Ti value	Set up the 5th Ti value
	Set up the 0th Td value	Set up the 5th Td value
	Set up the 0 <sup>th</sup> PID integral deviation	Set up the 5th PID integral deviation
Press ■ ▷ 0 ~ 5 <sup>th</sup> PID	Press to return to PID deviation	Press deviation

### ■ Alarm Outputs

CND3 offers 3 alarm outputs, and each alarm output has 20 alarm modes to choose from in the initial setting mode. When the target temperature exceeds or falls below the set point, the alarm output will be enabled.

nen tn	e target temperature exceeds or falls below the set point, the alarm output	t Will be enabled.
SV	Alarm mode	Alarm output operation
0	No alarm	
1	Alarm output will be enabled when the temperature reaches upper or lower limit: The alarm will be enable when the PV exceeds SV + AL-H or falls below SV – AL-L.	OFF SV-(AL-L) SV SV+(AL-H)
2	Alarm output will be enabled when the temperature reaches the upper limit: The alarm will be enabled when the PV exceeds SV + AL-H.	OFF A A SV-(AL-H)
3	Alarm output will be enabled when the temperature reaches the lower limit: The alarm will be enabled when the PV falls below SV – AL-L.	OFF SV-(AL-Ĉ) ŜV
4	Alarm output will be enabled when the temperature reaches the absolute value of the upper or lower limit: The alarm will be enabled when the PV exceeds AL-H or falls below AL-L.	OFF AL-L AL-H
5	Alarm output will be enabled when the temperature reaches the absolute value of the upper limit: The alarm will be enabled when the PV exceeds AL-H.	OFF AL-H
6	Alarm output will be enabled when the temperature reaches the absolute value of the lower limit. The alarm will be enabled when the PV falls below AL-L.	OFF AL-L
7	Upper limit hysteresis alarm: The alarm will be enabled when the PV exceeds SV + AL-H. The alarm will be disabled when the PV falls below SV + AL-L.	OFF SV SV-(ALL) SV-(ALH)
8	Lower limit hysteresis alarm: The alarm will be enabled when the PV falls below SV – AL-H. The alarm will be disabled when the PV exceeds SV – AL-L.	OFF SV(ALH) SV(ALL) SV
9	Offline alarm: The alarm will be enabled when the input sensor is not correct or offline.	
10	Timing alarm	
11	CT1 alarm: The alarm will be enabled when the CT1 value falls below AL-L or exceeds AL-H.	ON OFF
12	CT2 alarm: The alarm will be enabled when the CT2 value falls below AL-L or exceeds AL-H.	ALT ALH

#### ■ RS485 Communication

CND3 supports baudrate 2,400 to 38,400 bps, Modbus ASCII/RTU protocol, function code 03H and reads maximum 8 words from the register.

Address	Content	Definition
1000H	Present value (PV)	Measuring unit: 0.1 scale. The following values read mean error occurs.  8002H: Temperature not yet acquired  8003H: Not connected to sensor  8004H: Incorrect sensor
1001H	Set value (SV)	Measuring unit: 0.1 scale.
1002H	Upper limit of temp. range	Cannot exceed the default value
1003H	Lower limit of temp. range	Cannot fall below the default value
1005H	Control mode	0: PID, 1: ON/OFF, 2: Manual, 3: FUZZY
1006H	Heating/cooling control	0: Heating/ Heating, 1: Cooling/ Heating, 2: Heating/cooling, 3: Cooling/ Cooling
1007H	1# heating/cooling control cycle	0.1 ~ 99.0 sec.
1008H	2 <sup>nd</sup> heating/cooling control cycle	0.1 ~ 99.0 sec.
1009H	Proportional band (PB)	0.1 ~ 999.9
100AH	Ti value	0 ~ 9,999
100BH	Td value	0 ~ 9,999
1012H	Read/write Output 1 volume	Unit: 0.1%, only valid in manual control mode
1013H	Read/write Output 2 volume	Unit: 0.1%, only valid in manual control mode
1016H	Regulated temp. value	-99.9 ~ +99.9, Unit: 0.1
102AH	Read/write LED status	b0: ALM3, b1: ALM2, b2: °F, b3: °C, b4: ALM1, b5: OUT2, b6: OUT1, b7: AT
102BH	Read/write key status	b0: Set, b1: Select, b2: Up, b3: Down, 0: Press it
102CH	Panel lockup status	0: Normal, 1: Fully locked, 2: SV adjustable
102DH	CT value	Unit: 0.1A
103BH	AT setting	0 : OFF(default), 1 : ON
103CH	Control RUN/STOP setting	0 : STOP, 1 : RUN (default), 2 : END (program), 3 : HOLD (program)

### ■ Panel Cutout

Model Panel cutout ( W × H )		
1/16 DIN	45mm × 45mm	
1/8 DIN	44.5mm × 91.5mm	
1/4 DIN	91mm × 91mm	