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, includ-ing 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 responsibil-ity 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, warran-ty, 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:

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

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

M5730/0119

NOTES

1 YEAR WARRANTY

CND3 Series
Temperature Controller

OMEGA™

omega.com info@omega.com

Servicing North America:

U.S.A. Headquarters: Omega Engineering, Inc.
800 Connecticut Ave, Suite 5N01, Norwalk, CT 06854
Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378 (USA & Canada only)
Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

For Other Locations Visit omega.com/worldwide

START HERE

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.

1. Prevent dust or metallic debris from falling into the controller and cause malfunctions. DO NOT modify or uninstall the controller.
2. 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.
3. 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
OUT1/OUT2: Output LED
REMOTE: Remote control LED
EV: EVENT LED
F1 F2 : Self-defined function keys
◀◀ SET : "Select" and "set up" keys
▼ ▲ : Set value tuning keys

■ Ordering Information

CN 1 2 D3- 3 4 - 5 6 - 7 - 8

Series	Omega CND3 series temperature controller		
1 2 Panel size	04: 1/4 DIN 08: 1/8 DIN		16: 1/16 DIN
3 Output 1	R: Relay S: Voltage Pulse	M: Linear mA L: Linear voltage	
4 Output 2	R: Relay S: Voltage Pulse	M: Linear mA L: Linear voltage	blank: none
5 6 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		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
Input sensors	Thermocouple: K, J, T, E, N, R, S, B, L, U, TXK
	Platinum RTD: Pt100, JPt100
	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 Mode ⇄ (Press SET for less than 3 sec / Press SET) Operation Mode ⇄ (Press SET for more than 3 sec / Press SET) Initial Setting Mode

Regulation Mode	Operation Mode	Initial Setting Mode
AT Auto-tuning (Set in PID control and RUN mode) Press ◀◀ ▽	1234 Use ▼ ▲ to set up target temperature Press ◀◀ ▽	INPT Set up input type Press ◀◀ ▽
ST Self-tuning switch (set when in PID control and the TUNE parameter = ST)	R-S Control loop RUN or STOP	tPUN Set up temperature unit (not displayed when in analog input)

Regulation Mode	Operation Mode	Initial Setting Mode
Select the n[th] (n = 0 ~ 5) PID. When n = AUTO, PID is auto-selected.	PLRN Set up start pattern (when in PID programmable control and PSLP)	tP-H Set up upper temperature limit
Pdof Set up PID control offset	STEP Set up start step (when in programmable control)	tP-L Set up lower temperature limit
F1-A Set up Fuzzy gain value	SP Set up the position of decimal point	CtRL Select control modes
Fidb Set up Fuzzy Deadband	LoC Lock the keys	CtRS Select SV control modes
o1-S Adjust Output 1 hysteresis (when in ON/OFF control)	AL1H Set up upper limit of Alarm 1	WtSV Set up waiting temperature (when in programmable control)
o2-S Adjust Output 2 hysteresis (when in ON/OFF control)	AL1L Set up lower limit of Alarm 1	M-tM Set up waiting time (when in programmable control)
o1-H o1-C Control cycle for Output 1 (except in ON/OFF control)	AL2H Set up upper limit of Alarm 2	SLoP Set up start slope (when in programmable control)
o2-H o2-C Control cycle for Output 2 (except in ON/OFF control)	AL2L Set up lower limit of Alarm 2	PAtN Select pattern to be edited
CoEF Ratio of Output 1 against Output 2 when in dual output control (set when in PID and dual output control)	AL3H Set up upper limit of Alarm 3	tUNE Select AT or ST
dEAd Set up deadband (when in dual output)	AL3L Set up lower limit of Alarm 3	S-HC Select heating, cooling or dual output heating and cooling
Pv-F Set up input filter factor	A1HP Record highest temperature of Alarm 1	AtA1 AtA2 AtA3 Set up Alarm 1 mode
Pv-M Set up input filter range	A1LP Record lowest temperature of Alarm 1	AL1o AL2o AL3o Set up Alarm 1 options
PvoF Adjust input compensation	A2HP Record highest temperature of Alarm 2	AL1d AL2d AL3d Set up Alarm 1 delay
PvGA Adjust input gain	A2LP Record lowest temperature of Alarm 2	PVtC PV color change
SvSL Set up rising slope (when CRTS = SLOP)	A3HP Record highest temperature of Alarm 3	P2dS 2PID Switch temperature
A1HA Adjust upper limit compensation for analog Output 1*	A3LP Record lowest temperature of Alarm 3	P2rE 2PID Reset temperature
A1HL Adjust lower limit compensation for analog Output 1*	oUt1 Display and adjust Output 1 volume	AMtP Set up Remote type
A2HA Adjust upper limit compensation for analog Output 2*	oUt2 Display and adjust Output 2 volume	ExF1 Select auxiliary function 1
A2HL Adjust lower limit compensation for analog Output 2*	o1HA Set up percentage of upper limit for Output 1	ExF2 Select auxiliary function 2
rEHA Adjust upper limit compensation for Retransmission*	o1HL Set up percentage of lower limit for Output 1	LoSH Enable/disable communication write-in
rELo Adjust lower limit compensation for Retransmission*	o2HA Set up percentage of upper limit for Output 2	C-SL Select ASCII or RTU format
AM-G Adjust Remote gain	o2HL Set up percentage of lower limit for Output 2	C-Ad Set up communication address
AM-F Adjust Remote compensation	CT1 Display current measured at CT1	bPS Set up baudrate
AM-L Remote lower limit adjustment	CT2 Display current measured at CT2 Press ◀◀ to return to set up target temperature	LEn Set up data length
AM-H Remote higher limit adjustment		Stop Set up stop bit
EvT1 Set up EVENT1 function		PrtY Set up parity bit Press ◀◀ to return to set up input type
EvT2 Set up EVENT2 function		
EvT3 Set up EVENT3 function Press ◀◀ to return to auto-tuning		

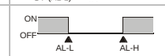
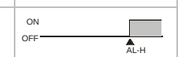
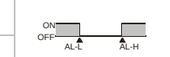
*1 scale = 2μA; 1scale = 1mV

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.

PId Select the n[th] PID (n = 0 ~ 5) Press ◀◀ ▷ 0 ~ 5[th] PID	SV0 Set up the 0[th] PID temperature value Press ◀◀ ▽	SV5 Set up the 5[th] PID temperature value Press ◀◀ ▽
	P0 Set up the 0[th] proportional band value	P5 Set up the 5[th] proportional band value
	I0 Set up the 0[th] Ti value	I5 Set up the 5[th] Ti value
	d0 Set up the 0[th] Td value	d5 Set up the 5[th] Td value
	Lof0 Set up the 0[th] PID integral deviation Press ◀◀ to return to PID deviation	Lof5 Set up the 5[th] PID integral deviation Press ◀◀ to return to PID 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.

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.	
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.	
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.	
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.	
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.	
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.	
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.	
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.	
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.	
12	CT2 alarm: The alarm will be enabled when the CT2 value falls below AL-L or exceeds AL-H.	

■ 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[st] heating/cooling control cycle	0.1 ~ 99.0 sec.
1008H	2[nd] 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