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CONTENTS

MODEL CONFIGURATION

Model	Description
CN4116 (*)-(**)-(***)	1/16 DIN controller
CN4216 (*)-(**)-(***)	1/16 DIN controller, with 0.0 decimal
CN414 (*)-(**)-(***)	1/4 DIN controller
CN424 (*)-(**)-(***)	1/4 DIN controller, with 0.0 decimal
CN418V (*)-(**)-(***)	1/8 DIN Vertical controller
CN428V (*)-(**)-(***)	1/8 DIN Vertical controller, with 0.0 decimal
CN418H (*)-(**)-(***)	1/8 DIN Horizontal controller
CN428H (*)-(**)-(***)	1/8 DIN Horizontal controller, with 0.0 decimal

* *Specify controlling output code from Output Options table below*

** *Specify alarm code from Alarm Options table below*

*** *Low voltage power supply option (-LV)*

Controlling Output Options

Option Type	Code
Relay	-R1
DC SSR driver	-DC1

Alarming Output Options

Option Type	Code
Relay	-R2
DC SSR driver	-DC2

Low voltage power supply option

-LV 24V AC/DC, 50/60 Hz

SPECIFICATIONS

Input Type	Thermocouple						RTD
	K	S	R	E	J	N	PT100
Range ℃/ ℉	0 to1300 ℃ 32 to 2372 ℉	0 to1700℃ 32 to 3092 ℉	0 to1600℃ 32 to 2412 ℉	0 to1000℃ 32 to 1832 ℉	0 to1200℃ 32 to 2192 ℉	0 to 1300℃ 32 to 2372 ℉	-200 to 800℃ -328 to 1472 ℉

Accuracy: CN 4116/CN414/CN418	0.3%FS ± 1℃/1.8°F
CN4216/CN424/CN428	0.3%FS ± 0.1℃/0.18°F

Temperature Display Resolution CN 4116/CN414/CN418	1℃/1℉
CN4216/CN424/CN428	0.1℃/0.1℉

Control Method	ON / OFF Control
	AI PID Control with Auto Tuning (AT)

Output Type	Relay Output (1A/250VAC)
	Voltage Output for SSR(12V/30mA)

Alarm **(Modularization)**	Limit High / Low
	High deviation/Low deviation

Supply Voltage	100~240VAC (-15%, +10%), or 24VDC
	50 to 60Hz

Power Consumption	≦ 3W

Operating Environments	Temperature: -10 to +60℃ / 14 to 140℉ Humidity: 0~90RH%

Electromagnetic compatibility **(EMC)**	IEC61000-4-4: ± 4KV/5KHz IEC61000-4-5: 4KV

PARAMETER AND SETTING

Field parameter table (Primary parameters)

<table>
<tr><th>Code</th><th>Description</th><th>Remarks</th><th>Setting Range</th><th>Default</th></tr>
<tr><td>HIAL</td><td>High limit alarm</td><td>Alarm on when PV>HIAL
alarm off when PV<HIAL- AHYS</td><td>-999~+3000</td><td>3000</td></tr>
<tr><td>LoAL</td><td>Low limit alarm</td><td>Alarm on when PV<LoAL;
alarm off when PV>LoAL + AHYS</td><td>-999~+3000</td><td>-999</td></tr>
<tr><td>HdAL</td><td>Deviation high alarm</td><td>Alarm on when PV-SV>HdAL;
alarm off when PV-SV<HdAL - AHYS</td><td>-999~+3000</td><td>3000</td></tr>
<tr><td>LdAL</td><td>Deviation low alarm</td><td>Alarm on when PV-SV<LdAL;
alarm off when PV-SV>LdAL + AHYS</td><td>-999~+3000</td><td>-999</td></tr>
<tr><td>Loc</td><td>Parameter Lock</td><td>
<table>
<tr><th>Loc</th><th>Auto Tuning</th><th>SV</th><th>Primary Parameter</th><th>Secondary Parameter</th></tr>
<tr><td>0</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td>1</td><td>X</td><td></td><td></td><td>X</td></tr>
<tr><td>2</td><td>X</td><td>X</td><td></td><td>X</td></tr>
<tr><td>3</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>808</td><td></td><td></td><td></td><td></td></tr>
</table>
: allow to modify data or execute AT
X : not allow to modify data or execute AT
</td><td>0~255</td><td>0</td></tr>
</table>

System parameter table (Secondary parameters)

Set the parameter 'Loc'=808 to enter:

<table>
<tr><td>AHYS</td><td>Alarm Hysteresis</td><td>Avoid frequent alarm on-off action because of the fluctuation of PV</td><td>0~200</td><td>2</td></tr>
<tr><td>AOP</td><td>Alarm output assignment</td><td>
<table>
<tr><td>Alarm / Output to</td><td>LdAL (x 1000)</td><td>HdAL (x100)</td><td>LoAL (x10)</td><td>HIAL (x1)</td></tr>
<tr><td>None</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>AL1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>
eg: AOP=1101 means LdAL, HdAL and HIAL alarm action output from AL1;LoAL, no alarm action.</td><td>0~1111</td><td>1111 or according to fixed module</td></tr>
<tr><td>CtrL</td><td>Control mode</td><td>onoF : On-off control
APId : AI PID control, high precision and no-overshot</td><td>onoF, APId</td><td>APId</td></tr>
<tr><td>Act</td><td>NA</td><td>No any function on this model.</td><td>rE/dr/ rEbA/drbA</td><td>rE</td></tr>
<tr><td>P</td><td>Proportion band</td><td>Proportion band in PID with unit ℃ or ℉</td><td>1~999</td><td>30</td></tr>
<tr><td>I</td><td>Time of Integral</td><td>No integral effect when I=0</td><td>0~9999 Sec</td><td>100 s</td></tr>
<tr><td>d</td><td>Time of derivative</td><td>No derivative effect when d=0</td><td>0~999.9 Sec</td><td>50.0s</td></tr>
<tr><td>Ctl</td><td>Control period</td><td>Small value can improve control accuracy. For SSR output, generally 0.5 to 3 seconds.
Large value can increase using life of relay. For Relay output, generally 15 to 40 seconds.</td><td>0.5~120 Sec</td><td>2 s Or 20 s</td></tr>
<tr><td>CHYS</td><td>Control hysteresis</td><td>CHYS is used for ON-OFF Control.
PV > SV, Output turns OFF;
PV<SV-CHYS, Output turns ON.</td><td>0~200</td><td>2</td></tr>
<tr><td>InP</td><td>Input specification</td><td>
<table>
<tr><th>InP</th><th>Input spec.</th><th>InP</th><th>Input spec.</th></tr>
<tr><td>0</td><td>K</td><td>1</td><td>S</td></tr>
<tr><td>2</td><td>R</td><td>3</td><td>Spare</td></tr>
<tr><td>4</td><td>E</td><td>5</td><td>J</td></tr>
<tr><td>6</td><td>Spare</td><td>7</td><td>N</td></tr>
<tr><td>8-20</td><td>Spare</td><td>21</td><td>Pt100</td></tr>
</table>
</td><td>1~21</td><td>0</td></tr>
<tr><td>dPt</td><td>Resolution (only for CN42 series)</td><td>0 : 1 ℃/℉
0.0 : 0.1 ℃/℉</td><td></td><td>0.0</td></tr>
</table>

Scb	Input Shift	Parameter Scb is used to make input shift to compensate the error produced by sensor or input signal itself. PV-after-compensation= PV-before-compensation + Scb.	-199~ +400	0
FILt	PV input filter	The value of FILt will determine the ability of filtering noise. When a large value is set, the measurement input is stabilized but the response speed is slow. Generally, if great interference exists, then you can increase parameter “FILt” gradually to make momentary fluctuation of measured value less than 2 to 5. When the meter of the instrument is being examined at laboratory, “FILt” should be set to 0 or 1 to short the response time.	0~40	1
Fru	Selection of power frequency and temperature scale	50C: 50Hz, ℃ 50F: 50Hz, ℉ 60C: 60Hz, ℃ 60F: 60Hz, ℉	50C, 50F, 60C, 60F	50C
SPL	Low limit of SV		-999~ 3000	0
SPH	Upper limit of SV		-999~ 3000	400

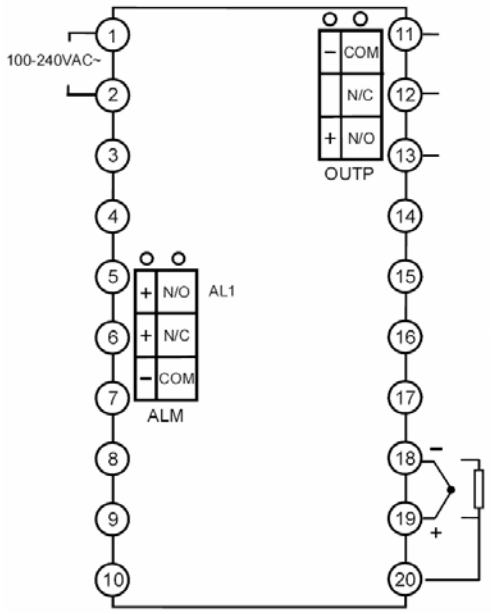
SYMBOL DESCRIPTIONS

Symbol	Description
orAL	Input specification setting is incorrect Or Input wiring is disconnected/ thermocouple problem Or Short circuited
HIAL	High limit alarm
LoAL	Low limit alarm
HdAL	Deviation high alarm
LdAL	Deviation low alarm
EErr	IC Software error
8888	IC Software error

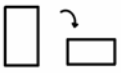
INSTRUMENT INSTALLATION AND WIRING

Wiring graph for instruments with dimension 1/4 DIN; 1/8 DIN Vertical and Horizontal

Note: The compensation wires for different kinds of thermocouple are different, and should be directly connect to the terminals. Connecting the common wire between the compensation wire and the terminals will cause measurement error.

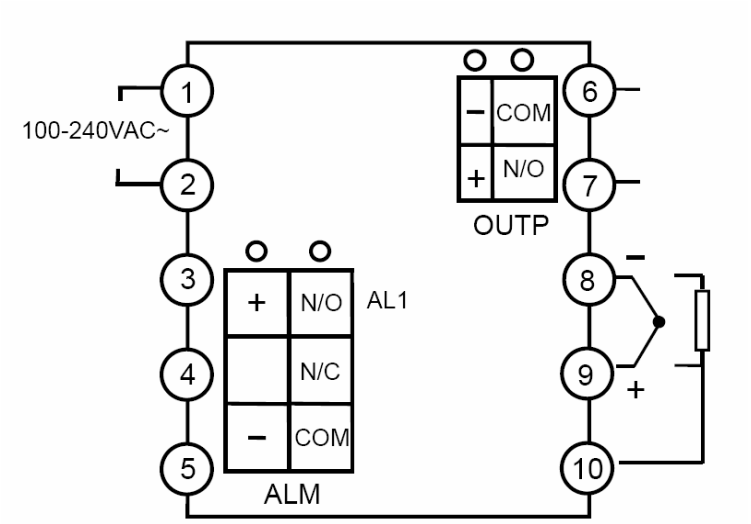


Note: The graph suits for upright instruments with 1/4DIN or 1/16DIN Vertical



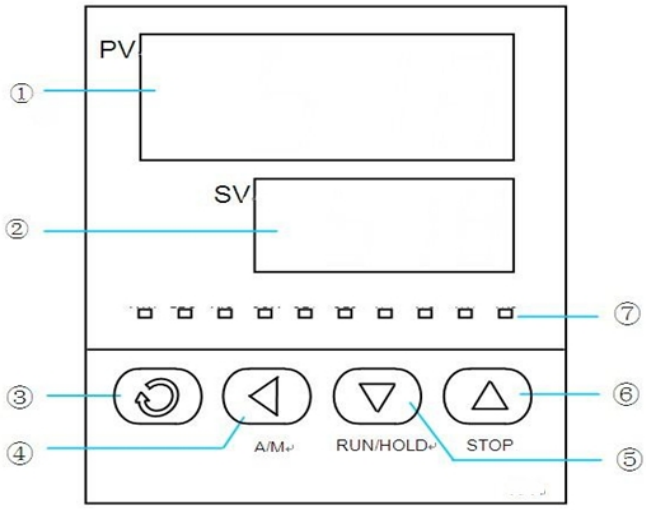
For instruments with horizontal, just clockwise rotate the graph 90 degree.

Wiring graph for 1/16 DIN dimension instruments：



DISPLAY AND OPERATIONS

① Upper display window, displays PV, parameter code, etc.
② Lower display window, displays SV, parameter value, or alarm
③ Setup key, for accessing parameter table and conforming parameter modification.
④ Data shift key, and auto tuning.
⑤ Data decrease key
⑥ Data increase key
⑦ LED indicator. MAN, PRG, MIO, COM, OP2, AL2, AU1 and AU2 Com indicators is non-applicable.



OP1 and AL1 will indicate I/O operation of the corresponding module.

Basic display status:

When power on, the upper display window of the instrument shows the process value (PV), and the lower window shows the set-point (SV). This status is called basic display status.

When the input signal is out of the measurable range (for example, the thermocouple or RTD circuit is break, or input specification sets wrong), the upper display window will alternately display “orAL” and the high limit or the low limit of PV, and the instrument will automatically stop output. If the lower display window alternately display “HIAL”, “LoAL”, “HdAL” or “LdAL”, it means high limit alarm, low limit alarm, deviation high alarm, and deviation low alarm happening.

OPERATION DESCRIPTION

- **Set Value Setting:**
  In basal display status, if the parameter lock “Loc” isn't locked, we can set setpoint (SV) by pressing <, >, or ^. Press > key to decrease the value, ^ key to increase the value, and < key to move to the digit expected to modify. Keep pressing > or ^, the speed of decreasing or inscreasing value get quick. The range of setpoint is between the parameter SPL and SPH. The default range is 0~400.

- **Parameter Setting:**
  In basal display status, press ⟲ and hold for about 2 seconds can access Field Parameter Table. Pressing ⟲ can go to the next parameter; pressing <, > or ^ can modify a parameter. Press and hold < can return to the preceding parameter. Press < (don't release) and then press ⟲ key simultaneously can escape from the parameter table. The instrument will escape auomatically from the parameter table if no key is pressed within 30 seconds. Setting Loc=808 and then press ⟲ can access System Parameter Table.

- **AI artificial intelligence control and auto tuning**
  When AI artificial intelligence control method is chosen (CtrL=APId), the PID parameters can be obtained by running auto-tuning. In basal display status, press < for 2 seconds, the “At” parameter will appear. Press ^ to change the value of At from “oFF” to “on”, then press ⟲ to active the auto-tuning process. During auto tuning, the instrument executes on-off control. After 2-3 times of on-off action, the instrument will obtain the optimal control parameter value. If you want to escape from auto tuning status, press and hold the < key for about 2 seconds until the "At" parameter appear again. Change “At” from “on” to “oFF”, press ⟲ to confirm, then the auto tuning process will be cancelled.

Note 1: If the setpoint is different, the parameters obtained from auto-tuning are possible different. So you’d better set setpoint to an often-used value or middle value first, and then start auto-tuning. For the ovens with good heat preservation, the setpoint can be set at the highest applicable temperature. Depending on the system, the auto-tuning time can be from several seconds to several hours.

Note 2: Parameter Ctl (on-off differential, control hysteresis) has influence on the accuracy of auto-tuning. Generally, the smaller the value of Ctl, the higher the precision of auto tuning. But Ctl parameter value should be large enough to prevent the instrument from error action around setpoint due to the oscillation of input. Ctl is recommended to be 2.0.

Note 3: The instrument has the function of self-learning. It is able to learn the process while working. The control effect at the first run after auto tuning is probably not perfect, but excellent control result will be obtained after a period of time because of self-learning.

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

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