



The N450D is a digital temperature controller in 1/16 DIN size with 2 outputs for control and alarm. The four digit display is used for temperature indication as well as for parameter configuration. Easy to configure, the N450D is intended for use in heating or cooling applications, delivering accurate temperature measurements with excellent immunity to electromagnetic fields. A large variety of sensor types are available (J, K, T, Pt100, etc).

SAFETY SUMMARY

The symbols below are used on the equipment and throughout this document to draw the user's attention to important operational and safety information.

 <p>CAUTION or WARNING: Read complete instructions prior to installation and operation of the unit.</p>	 <p>CAUTION or WARNING: Electrical Shock Hazard</p>
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All safety related instructions that appear in the manual must be observed to ensure personal safety and to prevent damage to either the instrument or the system. *If the instrument is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.*

SPECIFICATIONS

POWER:100 to 240 Vac/dc ($\pm 10\%$), 50/60 Hz. Transient overvoltage: ± 2 kV
 Optional: 24 Vac/dc ± 10
 Max. Consumption: < 4 VA

INPUT Keyboard selection of input type (refer to table 1)

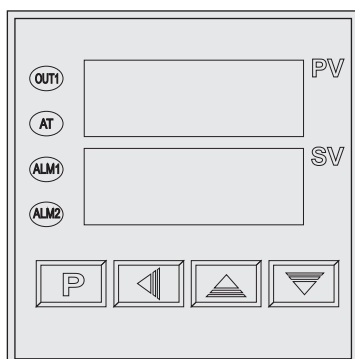
Internal resolution: 14 bits
Display resolution: 12000 levels (from -1999 to 9999)
Input sample rate: 2 per second
Accuracy: Pt100, V and thermocouples: 0.5 % of span, ± 1 °C
Input impedance: Pt100, V and thermocouples: >10 M
Pt100 measurement: standard (=0.00385)
Excitation current: 0.170 mA. 3-wire circuit, cable resistance compensation
 All input types are factory calibrated according to IEC-584 for thermocouples and IEC-751 for Pt100.

OUTPUTs: (OUT1-RR): Relays SPDT: 3 A / 250 Vac
 (OUT1-PR): Logic pulse for SSR drive :12 V max / 20 mA
 (ALM1): Relays SPST: 3 A / 250 Vac

ENVIRONMENTAL CONDITIONS: -10 to +50 °C
 Relative humidity (maximum): 80 % up to 30 °C. For temperatures above 30 °C, decrease 3 % per °C. Installation category II. Pollution degree 2. Altitude < 2000 m.

EMC : EN 61326-1:1997 and EN 61326-1/A1:1998
SAFETY: EN61010-1:1993 and EN61010-1/A2:1995
DIMENSIONS: 48 x 48 x 110 mm (1/16 DIN). Approximate weight: 150 g
PANEL CUT-OUT: 45 x 45 mm (+0.5 -0.0 mm)
TERMINAL CONNECTION: 10 screws accepting 6.3 mm fork lugs
PROGRAMMABLE PWM CYCLE FROM 0.0 SEC. TO 100 SEC.;
START UP 7.5 SEC AFTER POWER UP;

FRONT PANEL AND FUNCTIONS



PV	Measuring value / Mode display value
SV	Setting value / Mode display value
OUT1	Output 1 indicator
AT	P.I.D. auto-calculating indicator
ALM1	Alarm 1 indicator
ALM2	Alarm 2 indicator
▲	Increase key
▼	Decrease key
◀	Shift key
P	Setting and mode key

INSTALLATION

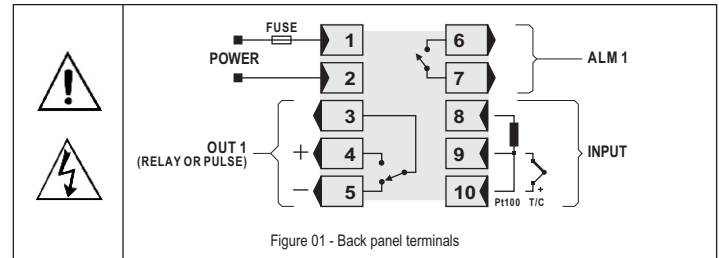
The controller should be installed in a panel cut out as specified. First, remove the mounting clamp and insert the controller into the panel cut out. Place the unit into the panel cut-out and slide the mounting clamps from the rear to a firm grip at the panel. The internal circuitry can be fully removed from the housing without disconnecting any wiring. Grab firmly the front panel and pull out the circuitry from the housing.

ELECTRICAL CONNECTIONS

All electrical connections are made to the screw terminals at the rear of the controller. They accept wire sizes from 0.5 to 1.5 mm² (16 to 22 AWG). The terminals should be tightened to a torque of 0.4 Nm (3.5 lb in).

The installation must include a power isolating switch or circuit breaker that disconnects all current carrying conductors. The device should be mounted close to the controller, within easy reach of the operator and marked as the disconnecting device for the instrument.

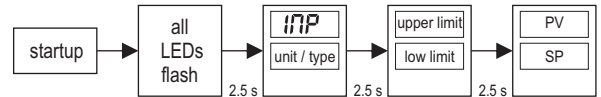
Figure 1 shows the electrical terminals of the controller.



Notes:

- Pt100 sensors are connected to terminals 8, 9 and 10. For full compensation of cable resistance, only cables with equal wire electrical resistance should be used. For 2 wire Pt100, short circuit terminals 9 and 10.

STARTUP PROCEDURE



BASIC OPERATION

This instrument has three modes: LEVEL 1, LEVEL 2 & LEVEL 3. LEVEL 2 & LEVEL 3 can only be changed during system setting and parameter change. The operation of changing mode is listed below according to the LCK selected in parameter setting.

1. Press **[P]** key once to enter LEVEL 1 mode;
2. Press and hold **[P]** key for more than 2.5 s to enter or exit from LEVEL 2 mode;
3. Press and hold **[P]** and **[◀]** keys for more than 2.5 s to enter or exit from LEVEL 3 mode.

This instrument has a display auto-recovery function. It will automatically change back to main display mode whenever the display setting is inactive for about 20 seconds.

(Except for LEVEL 3 mode.)

When changing parameter, press **[▲]** or **[▼]** key to change the value while the SV digit is flashing. Press **[◀]** key to shift the digit being changed. After changing, press **[P]** key to validate the new value (the original value will be retained if the **[P]** key is not pressed after changing any parameter).

Parameter setting for data lock LCK:

1. When LCK=0000, all parameters in all levels can be accessed and changed.
2. When LCK=0001, parameters in LEVEL 1 & LEVEL 2 can be changed, yet the operator cannot enter LEVEL 3 mode;
3. When LCK=0002, parameters in LEVEL 1 can be changed, and the operator can enter LEVEL 2 mode, yet its parameters cannot be changed. The value of LCK can be changed.

Note: 1. Read contents below carefully before using the instrument or during parameter changing.

2. The instrument will not display a certain parameter and value if this respective function is not available.

LEVEL 1 procedure (main setting):

MAIN DISPLAY	TEMPERATURE measured by the sensor (INPUT).
OU 1	Temperature SETPOINT (SP) associated to the OUT1 output. Full range.
AL 1	SETPOINT for Alarm 1: Tripping point for alarm 1. Full range. Ex-factory setting: 10
AL 2	SETPOINT for Alarm 2: Tripping point for alarm 2. Full range. Ex-factory setting: 10 (This alarm is not available in all models)
AT	AUTO-TUNE: Activates the PID auto-tuning parameters 0: Auto-tune is off (Ex-factory) 1: SV self-setting 2: 90 % SP self-setting

LEVEL 2 procedure (control parameter setting):

PI	Proportional band (%). 0.0 to 100.0 (%). Where 0.0 is ON/OFF control. Ex-factory setting: 3.0 %
II	Integration time (s). 0 to 3600 s. 0= no integration. Ex-factory setting: 240 s
dI	Derivative time (s). 0 to 900 s. 0= no derivative. Ex-factory setting: 60 s
dbI	Manual Reset. Offset added the PID control output. Range: 0 to 100 %. Ex-factory setting: 50 %. When in doubt, leave the present setting.
FI	Cycle time or PWM time. Time proportional period: 0 to 100 s. <i>0</i> : current / voltage (not available) <i>I</i> : Pulse output for Solid State Relays <i>2</i> to <i>i00</i> : Relay output This setting should be compatible with the type of output available. The value should not be 0 or 1 for relay output, and should not be 0 for SSR output. The lower the value the faster will be the output actuation. For contactors select 10 s or more.
HYI	Main control hysteresis width. Setting range: 0 to 1000, unit same as that of PV. Ex-factory setting: 2 / 2.0
OLI	Main control output lower limit. Setting range: 0 to 100 %. Ex-factory setting: 0
OH2	Main control output upper limit. Setting range: 0 to 100 %. Ex-factory setting: 100
MAN	Manual control. <i>0</i> : manual allowed (Ex-factory setting). <i>1</i> : manual prohibited
LCY	Data lock (refer to BASIC OPERATION paragraph). Setting range: 0 to 3. Ex-factory setting: 0000

LEVEL 3 procedure (system setting):

INP	INPUT. Selects the input sensor type to be connected to the controller. <i>This is the first parameter to be set.</i> Setting range: 0 to 13. Ex-factory value: as per order.
ANL	INPUT LOW LIMIT: Available for input types from 10 to 13. Input zero adjust. Setting range: 0-2200. Ex-factory value: as per order.
ANH	INPUT HIGH LIMIT: Available for input types from 10 to 13. Input full-scale adjust. Setting range: 0-2200. Ex-factory value: as per order.
dP	DECIMAL POINT adjustment for display value. Setting range: 0-3. Ex-factory value: as per order.
P_{LL}	RANGE LOWER LIMIT. Setting range: full scale. Ex-factory value: maximum range
P_{UH}	RANGE UPPER LIMIT. Setting range: full scale. Ex-factory value: maximum range
OdI	CONTROL ACTION. <i>0</i> : Reverse action. Generally used for heating. <i>I</i> : Direct action. Generally used for cooling.
OP I	CONTROL MODE: Control mode selection for main control. <i>0</i> : PID Control (Ex-factory setting)
AdI	ALARM 1 FUNCTION: Refer to Table 2 for function description and respective codes to set at this prompt. Setting range: 0 to 11. Ex-factory value: 2.
AH I	ALARM 1 HYSTERESIS: Defines the differential range between the PV value at which the alarm is turned on and the value at which it is turned off. Setting range 0-1000. Ex-factory value: 2 / 2.0.
Ad2	ALARM 2 FUNCTION. Not available in this model
AH2	ALARM 2 HYSTERESIS. Not available in this model
P_{IS}	SENSOR OFFSET: Offset value to be added to the PV to compensate sensor error. Setting range: -200 to +200 / 20.0 to 120.0. Ex-factory value: 0 / 0.0
FCU	COLD JUNCTION OFFSET CALIBRATION: Sets the cold junction offset calibration. A good thermometer or a temperature simulator should be used to properly adjust this parameter. Setting range: 0.0 to 50.0.
CF	TEMPERATURE UNIT: Selects display indication for degrees Celsius or Fahrenheit. <i>0</i> : °C (Ex-factory value) <i>I</i> : °F
dF	FILTER: Filter factor of main input. Setting range: 0 to 99. Ex-factory value: 1

Table 1: Input mode selection:

T/C K	<i>0</i>	0.0 to 400.0 °C / 0 to 1372 °C (0.0 to 752.0 °F / 0 to 2501 °F)
T/C J	<i>I</i>	0.0 to 400.0 °C / 0 to 1200 °C (0.0 to 752.0 °F / 0 to 2192 °F)
T/C R	<i>2</i>	0 to 1768 °C (0 to 3214 °F)
T/C S	<i>3</i>	0 to 1768 °C (0 to 3214 °F)
T/C B	<i>4</i>	0 to 1800 °C (0 to 3272 °F)
T/C E	<i>5</i>	0 to 800 °C (0 to 1472 °F)
T/C N	<i>6</i>	0 to 1200 °C (0 to 2192 °F)
T/C T	<i>7</i>	-199.9 to 400.0 °C / -200 to 400 °C (-328.0 to 752.0 °F / 328 to 752 °F)
Pt100	<i>8</i>	-199.9 to 400.0 °C / -200 to 600 °C (-328.0 to 752.0 °F / 328 to 1112 °F)
Cu50	<i>9</i>	Not valid for this model.
0-500 R	<i>i0</i>	Not valid for this model.
0-50 mV	<i>II</i>	-1999 to 9999 (input and display range can be set arbitrarily by software)
0-20 mA	<i>i2</i>	Not valid for this model.
0-5 V	<i>i3</i>	-1999 to 9999 (input and display range can be set arbitrarily by software)

Table 2: Alarm mode selection:

<i>00</i>	No alarm.
<i>0I</i>	High deviation alarm.
<i>02</i>	High deviation alarm. No alarm first time.
<i>03</i>	Low deviation alarm.
<i>04</i>	Low deviation alarm. No alarm first time.
<i>05</i>	High/Low deviation alarm.
<i>06</i>	High/Low deviation alarm. No alarm first time.
<i>07</i>	In-range alarm.
<i>08</i>	High absolute value alarm.
<i>09</i>	High absolute value alarm, no alarm first time.
<i>i0</i>	Low absolute value alarm.
<i>II</i>	Low absolute value alarm, no alarm first time.

MALFUNCTION DISPLAY

When the instrument fails, it will automatically display malfunction messages after self-diagnosis.

in IE	Input wire broken, wrong polarity or out of range. Solution: Check input signal.
uuu I	Input signal is above the input range. Solution: Check input signal.
nnn I	Input signal is below the input range. Solution: Check input signal.
AdCF	A/D conversion fail. Solution: Send to repair.
CuCF	Cold junction compensation fail. Solution: Check ambient temperature or send to repair.
ARCF	Self-setting calculation fail. Solution: Change to manual PID setting.
rRCF	Memory fail. Solution: Send to repair.

WARRANTY

This product is covered by a 12-month warranty provided the purchaser presents the sales invoice and the following conditions are met:

- Products are covered for one year from the original date of purchase. Please retain the dated sales receipt as evidence of the date of purchase. You will need it for any warranty service
- Within this period, warranty against defects in material and workmanship under normal use is free of charge.
- For repair, send the product and the sales receipt to our address. Expenses and transportation risks are under the purchaser's responsibility.
- This warranty does not cover any damage due to accident, misuse, abuse, or negligence.

PRODUCT IDENTIFICATION

The label attached to the controller case identifies the model and the included options as described below:

MODEL: **N450D -A-B**, where:

A: Outputs: **RR** (OUT 1 = Relay, ALM1 = Pulse);

PR (OUT 1 = Pulse, ALM1 = Relay);

B. Voltage rating: **blank** (100-240 Vac/dc) or **24V** (24 Vac/dc);