COMPACT DIGITAL INDICATING CONTROLLER

MODEL DB500

The DB500 series are high-accuracy, high-speed compact controllers with digital displays and an indicating accuracy of ±0.2% and sampling frequency of approx. 0.2 sec., incorporating high-performance microprocessors with a front panel 48 mm wide and 96 mm high.
They have excellent functions including an auto-tuning PID function and overshoot suppression function us ing fuzzy logic. In addition, a communications interface can be added, enabling a system controlled by a host computer or a system using zone division control to be set up.

■ FEATURES

· **Accurate control with ease of operation**

The operation keys required for setting the SV, PID and alarms, etc. are simply arranged for accurate control with easy operation.

· **Auto-tuning PID function**

The optimum PID constants can be set automatically ,eliminating troublesome setting operations and allowing setup in a short period of time.

· **Overshoot suppression with FUZZY LOGIC**

Overshoot which tends to occur due to sudden changes such as a change of the object to be controlled or the change of a set value in a heat treating furnace, etc. can be suppressed by fuzzy logic.

· **Communications interface can to be added**

As a communications interface and transmission signal output are available as options, control using a host computer or combination with a recorder can be performed easily.

· **Zone division control**

Using the communications interface, a number of DB500s can be connected to control up to 32 zones, allowing tunnel kiln control, etc. Also, combination with a CHINO KP Seri es Digital Program Setter enables program control of a multi-zone batch furnace.

· **Indicating accuracy of ±02% and sampling cycle of approx. 0.2 sec.**

Even though its front panel is small (48 × 96mm), high accuracy and high speed are achieved through use of a high-performance microprocessor and A/D converter.

■ MODELS

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Control output
1: ON -OFF pulse type PID system
3: Current output type PID system
5: SSR driving pulse type PID system
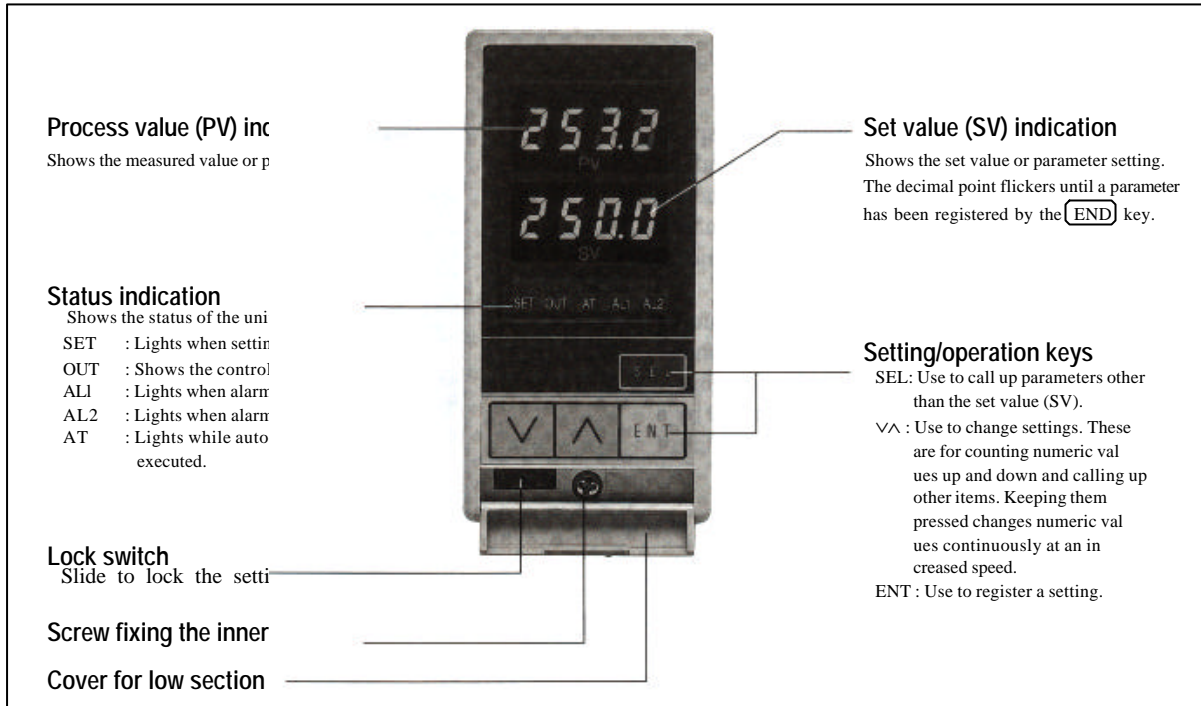
Fuzzy logic function
0: None
F: Provided

Communications/transmission output signal *Optional
0: None
A: Communications interface RS 422A
1: Transmission signal 4 to 20 mA DC

■ MEASURING RANGE

Type of input		Scale(℃)	Scale(℉)	Type of input		Scale(℃)	Scale(℉)
Thermocouple	B	0 to 1820	32 to 3300	Resistance thermometer	JPt 100	-200 to 649	-300 to 1200
	R	0 to 1760	32 to 3200			-200 to 150	-300 to 300
	S	0 to 1760	32 to 3200		Pt 100	-200 to 649	.300 to 1200
	K	-200 to 1370	-300 to 2450			-200 to 150	-300 to 300
		-200 to 300	-300 to 550		Old Pt50	-200 to 649	-300 to 1200
	E	-200 to 700	-300 to 1250	DC voltage/current	10mV	-10 to 10mV	—
	J	-200 to 900	-300 to 1650		5V	-5 to 5V	—
	T	-200 to 400	32 to 700		20mA	-20 to 20mA	—
	NiCr	0 to 1300	32 to 2350				
	U	-200 to 400	-300 to 700				
	L	-200 to 900	-300 to 1650				

■ FUNCTIONS OF COMPONENT PARTS

Process value (PV) ind
Shows the measured value or p

Status indication
Shows the status of the uni
SET : Lights when settin
OUT : Shows the control
AL1 : Lights when alarm
AL2 : Lights when alarm
AT : Lights while auto
executed.

Lock switch
Slide to lock the setti

Screw fixing the inner

Cover for low section

Set value (SV) indication
Shows the set value or parameter setting. The decimal point flickers until a parameter has been registered by the (END) key.

Setting/operation keys
SEL: Use to call up parameters other than the set value (SV).
∨∧ : Use to change settings. These are for counting numeric val ues up and down and calling up other items. Keeping them pressed changes numeric val ues continuously at an in creased speed.
ENT : Use to register a setting.

■ GENERAL SPECIFICATIONS

Input signal : Thermocouple B, R, S. K, E, J, T, NiCr, U, L
DC voltage/current — ±10 mV, ±5 V. ±20 mA
Resistance thermometer — PtIOO, JPtIOO, old Pt50

Measuring range: Refer to the table for the measuring ranges (with direct current input, setting within the range is possible.),
multi -range for II types of thermocouple, 2 DC voltages, 1DC current and 5 types of resistance thermometer (switch-able with a internal switch)

Measuring accuracy : ±0.2% of input span ±1 digit
The thermocouple input does not include the reference point compensation accuracy.

Reference point compensation accuracy :±0.8°C

Sampling cycle: Approx. 0.2 sec.

Burnout : Provided with thermocouple input, resistance thermometer input and mV input.
With burnout, output 0% and high limit alarm output

Measuring input shift (sensor correction)
SV (set value), -200 to 1000 times the resolution

Digital filter : 0.0to99.9 sec.

Scaling : -

Scale decimal point : Oto3

Display method:4 figures x 2 columns with 7-segment LED 5 individual LEDs for status indication

Display contents
: Upper value — Color; green
In control mode, the process value (PY) is displayed.
In the setting mode, the setting parameter code is displayed.
Lower value —Color; orange
In control mode, the set value (SV) is displayed.
In the setting mode, the set content is displayed. Status
SET— Lights in the setting mode.
OUT— Lights according to output conditions.
AT—Lights during auto-tuning.
AL1— Lights when alarm 1 occurs.
AL2 — Lights when alarm 2 occurs.

Automatic return: When no key is operated for more than 1 minute in the setting mode, the unit automatically returns to the control mode.

Unit : 'C, 'F switchable by internal.switch
Power supply : 85 to 264 V AC, 50/60 Hz (switchable with an internal switch)
Working temperature range: (—) IOtoSO°C
Working humidity range: 20 to 90% RH (non-condensing)
Power failure protection: Parameters maintained in EEPROM
Allowable signal source resistance
Thermocouple/mV input — 100 ~ or less
V input — 300 f~ or less
Resistance thermometer input— 5 ~ or less for one line
Input resistance
Thermocouple/mV/V input —I MI~ or more
mA input — Approx. 250 f~
Measuring current
Resistance thermometer input— Approx. 2 mA
Maximum common mode input: 250 V AC
Common mode rejection ratio: 130 dB or more
Series mode rejection ratio: 50 dB or more
Insulation resistance
Between measurement terminal and ground terminal; 500 V DC, 20 M~2 or more
Between power supply terminal and ground terminal; 500 V DC, 20 Mf~ or more
Between measurement terminal and power supply terminals;
500 V DC, 20 M~ or more
Withstand voltage
Between measurement terminals and ground terminal; 500 V AC, 1 minute
Between power supply terminals and ground terminal; 1500 V AC, 1 minute
Between measurement terminal and power supply terminals; 1500 V AC, 1 minute
Power consumption: Approx. 8VA
Case : ABS plastic
Color : Gray
Installation method : Panel mounted
Weight : Approx. 400g

■ CONTROL SPECIFICATIONS

Control switching cycle: Approx. 0.2 sec.

Control systems

: Current output type PID system
ON-OFF pulse type PID system
SSR driving pulse type PID system
(2-position output possible with a switch inside)

Control set value range

: Within the measured value range

Control set accuracy rating

: Error relative to indicated value within ±1 digit

PID constant : Automatic setting by auto-tuning or manual setting

P —0.1 to 999.9%
I —0 to 9999 sec. (with 0, no integration)
D —0 to 9999 sec. (with 0, no differentiation)

Output limitter: High limit limitter — 0.0 to 105.0%
Low limit limitter — 5.0 to 100.0%

Output variation limit

0.1 to 100%

Deadband : 0.1 to 9.9% (when used at 2 positions)

Control operation

Provided with the switch inside for normal or reverse operation

Types of outputs

: Current output type:

Output signal: 4 DC to 20 mA
Load resistance: 500Ω or less

ON-OFF pulse type

Output signal; 3-point output of H, C and L using relay contact
Contact capacity;

resistance load of 100 V AC, 2 A/200 V AC, 1 A inductive load
of 100 V AC, 1 A/200 V AC, 0.5 A ON-OFF pulse cycle;
only PID system, 1 to100 sec. variable

SSR drive pulse type

Output signal; DC voltage pulse signal
With ON, 12 V DC ±20%

With OFF, 0.5 V DC or less
Load capacity; 20 mA or less
ON-OFF pulse cycle; only PID system, 1 to 100 sec.
variable

Fuzzy logic function

: Overshoot suppression function using fuzzy logic
ON/OFF switchable

(Note) This may not be effective for an object with which
response is very fast such as flow rate or
pressure control or heating control using a lamp,
etc.

■ ALARM SPECIFICATIONS

Number of alarm points: 2

Output form : Relay make contact; common
Contact capacity;
resistance load of 100 V AC, I A/200 V AC, 0.5 A
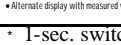inductive load of 100 V AC, 0.5 A/200 V AC, 0.2 A

Alarm mode : 6 modes of absolute value high limit, absolute value low limit,
deviation high limit, deviation low limit, deviation high limit
with standby and deviation low limit with standby can be set
arbitrarily at each output point.

Alarm dead band

: 1000 times the maximum indicating resolution

## ■ OUTPUT AND DISPLAY WHEN THERE IS AN ABNORMALITY

Display	Cause	Operation of controller		
		Alarm output	Control output	Auto-tuning
Lighting	• The input value is higher than the scale range of the controller. • Burnout (with thermocouple, resistance thermometer, mV input)	High limit alarm output	0%	Stop
Lighting	• The input value is lower than the scale range ot the controller.	Low limit alarm output	0%	Stop
Er 0 1 •Alternate display with measured value	• A/D, zero cancel data error	——	0%	Stop
Er 0 2 •Alternate display with measured value	• A/D, CJ data error	——	Control continuation (in the conditions without CJ)	Stop
Er 0 3 •Alternate display with measured value	• A/D, EOC error	——	0%	Stop
Er 0 4 •Alternate display with measured value	• Calibration data error	——	Control continuation (in the conditions not controlled)	Stop

* 1-sec. switching

In case of Er , turn the power OFF then ON again. If the conditions are
not changed after that, consult your nearest dealer.

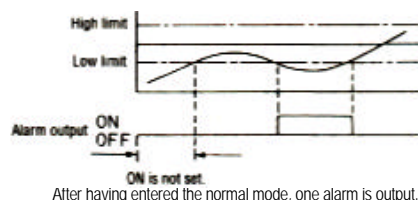## ■ RELATION BETWEEN THE TYPE OF ALARM MODES AND OUTPUT

Note) As for the absolute value high or low limit, the set value Corresponds to an alarm high or
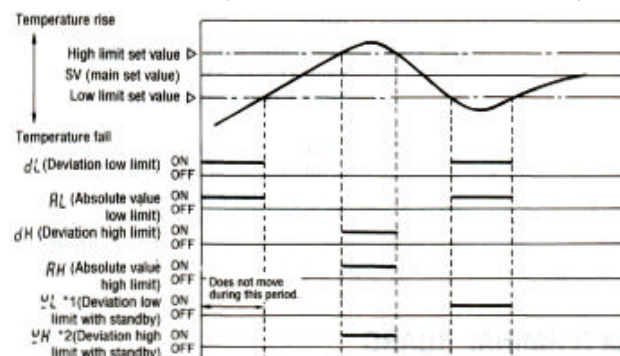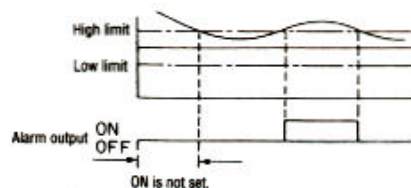

low limit set value.
As for the deviation high or low limit, the value to which the SV is added corresponds to
the alarm high or low limit set value.

*1 UL (Deviation low limit with standby)

*2 UH (Deviation high limit with standby)

After having entered the normal mode, one alarm is output.

■ OPTIONS

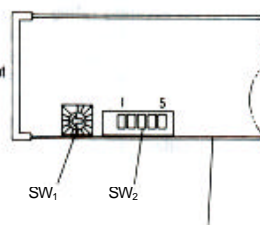| Name of option	Specifications
Transmission signal output	Transmission details — PV or SV transmission is set. Output value — 4 — 20 mA DC Load resistance — 500 Ω or less Output accuracy rating — ± 0.5% to the indicated value Output resolution — 1/3000 Isolation — Not isolated from control output (current, SSR); isolated from other input and output terminals 500 V DC, 20 MΩ or more 250 V AC, for 1 minute
Communication	Types of communication— RS 442A Baud rate — One can be selected from 9600, 4800, 2400, 1200. • COM: Communications with host computer Control conditions and settings can be transmitted to a host computer and settings can be received from the host computer. • TRS: Transmission of the indicated value (PV or SV) Transmission cycle of approx. 1sec. • REM: Controls value received via communication as a controlled set value (remote set value) Zone division control possible
DC power	24VDC power drive

■ TERMINAL BOARD

■ SWITCHING OF MEASURING RANGE

• Input switch SW1
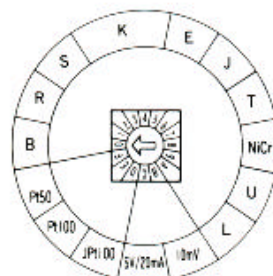
• Input switch SW2

The measuring range of Pt 100 can be switched by SW2. Also, the switching of 5 V/20 mA can be performed.
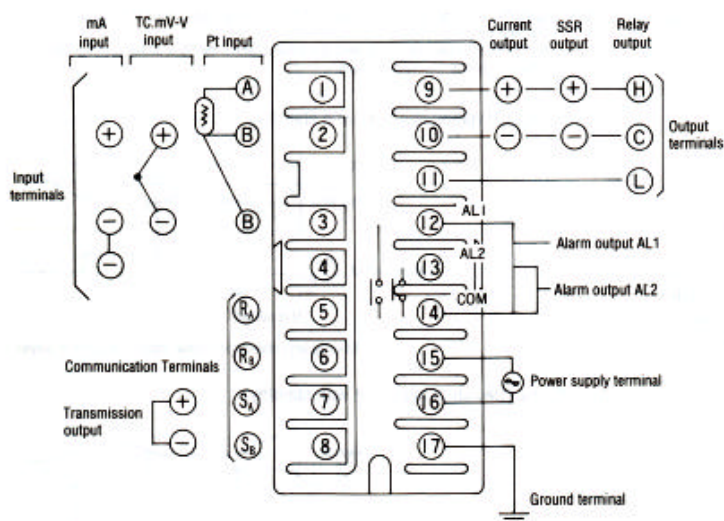

• Switch for other functions (SW2)

Number	Switching mode	Selected contents	Switch status	Switch position
1.	Auxiliary switching of the measuring range	Refer to the item of the measuring range		
2.	Power source frequency	50 Hz	OFF	
		60 Hz	ON	
3.	Measuring unit	°C	OFF	
		°F	ON	
4.	Control system	PID	OFF	
		2-positions	ON	
5.	Control mode	Reverse mode	OFF	
		Normal mode	ON	

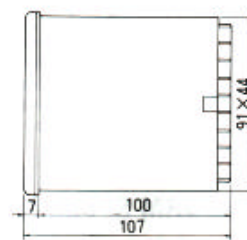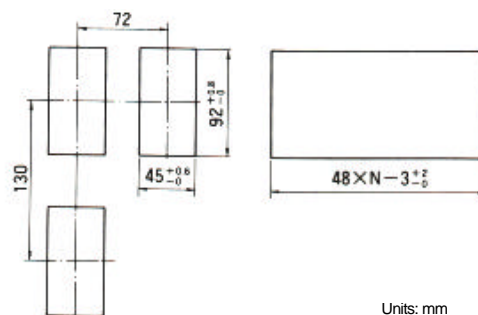## ■ EXTERNAL DIMENSIONS AND PANEL CUT-OUT
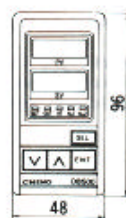
Panel cut-out diagram

Panel cutout for side-by-side installation

Units: mm

Specifications subject to change without notice.   Original