NIPPON

NC series

Digital PID Controllers

NC 2438
NC 2538
NC 2638
NC 2738
NC 2838

CE

NEW — CT HBA

NEW — MODBUS

Programmable

Fuzzy

Autotuning

BEST CHOICE
FOR PROCESS AND TEMPERATURE CONTROL

Application:Control temperature , humidity , pressure , flow and PH.

NC series controllers are microprocessor based controllers.Which have been designed with high accuracy input , various ouput selection , useful options and good reliability at a competitive price.

NC series use "PID+FUZZY" algorithm to implement excellent control.
The output status is displayed on the built in "Bar-Graph" display.

NC series not only provide the basic control output selections but also plus advanced options such as "Motor Valve Control" , "SCR/TRIAC Trigger" , and "Programmable RAMP/SOAK".

NC Series support MODBUS protocol. Communication with HMI is more convenient.
New addtional HBA function with competitive price , user can upgrade system safety easily.

Available in 5 sizes , the models and sizes are as below:

NC 2438: 48X48mm (DIN 1/16) NC 2538/NC 2638: 48X96mm (DIN 1/8)
NC 2738: 72X72mm (DIN 3/16) NC 2838: 96X96mm (DIN 1/4)

NC 2438 NC 2738 NC 2538 NC 2838 NC 2638

CE approval & free power

All models get CE approval.
Operate on any voltage from AC 85~265V at 50/60Hz.
DC 24V is also available(optional function).

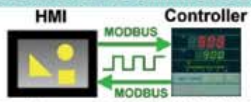
IP65 Proof

IP65 dust & water proof is available for all models(optional function).

Heater Break Alarm (HBA)

Heater current flowing through CT can be displayed on controller.
If heater current is less than HBA set value , AL1 will be activated(optional function).

MODBUS Communcation



NC series suport both MODBUS RTU and MODBUS ASCII protocol.
Communication between controller and HMI or other equipment is more conveniet(optional feature).

Autotuning (AT)

AT Function can calculate the optimize PID value for your control system,without trying and error manually.

Auto/Manual mode

Conveniently switched between auto/manual output mode by clicking "A/M" key(except "NC-2438").

Various Indication Lamps

Real time monitor the status of output (OUT1/OUT2),AT,alarm(AL1/AL2/AL3),manual output(MAN) and program(PRO).

Bar-Graph

Ouput percent displayed on the bar-graph in 10 LEDs resolution(except "NC-2438").

High Accuracy

Input with 14bit A/D resolution , 0.2% accuracy of FS.
Built in "AutoZero-AutoSpan" function keep good accuracy.

Data Lock Function

All parameters are seperated in 3 operation levels.
Each parameter can be hidden or locked to prevent unauthorized changes.

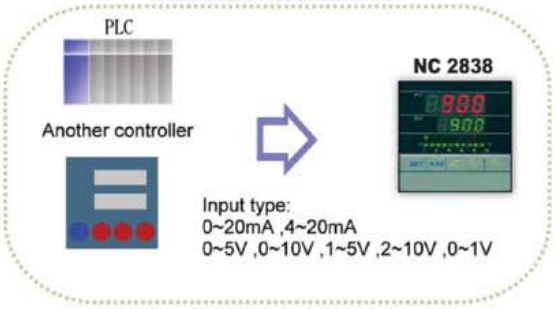
Features

NC Series — Digital PID Controller

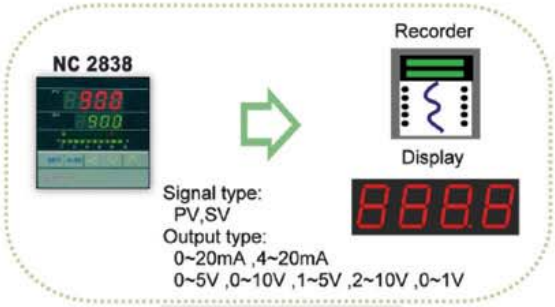
Various I/O Types

Peripheral Options

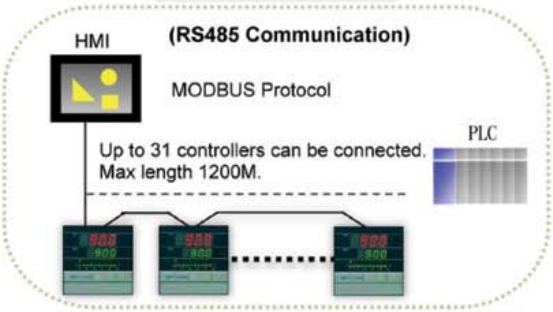
Remote SV



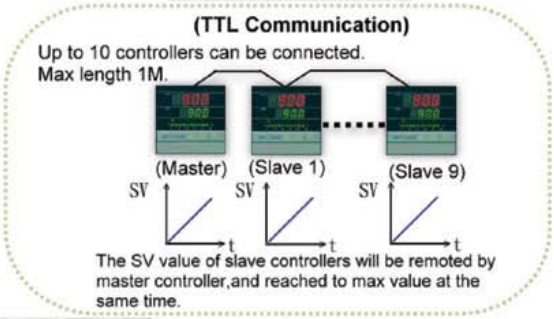
Transmission



Communication

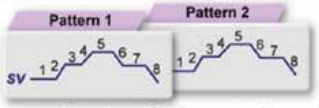


Communication



Special Application

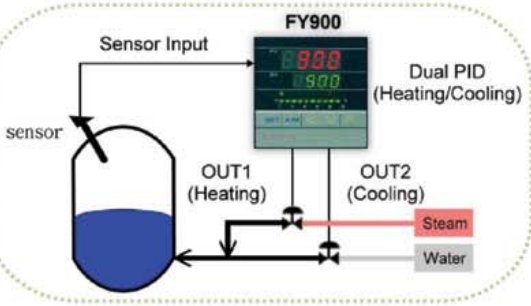
Ramp/Soak Program



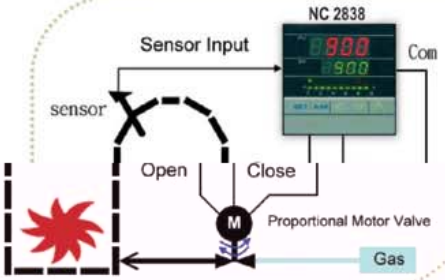
There are 2 patterns by 8 segments can be used in ramp/soak program.

There are 2 patterns can be linked together as 16 segments in ramp/soak program.

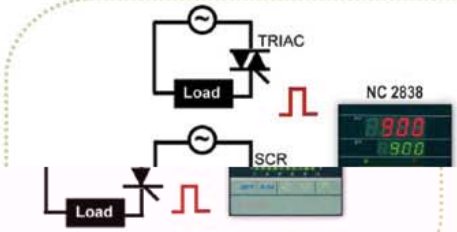
Heating and Cooling Control



Motor Valve Control



SCR/TRIAC Trigger



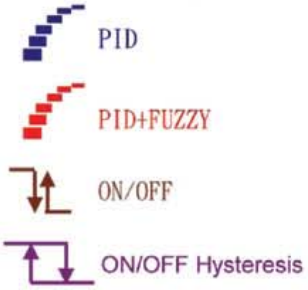
Method : 1φ / 3φ Zero Cross Control
1φ / 3φ Phase Angle Control

Features

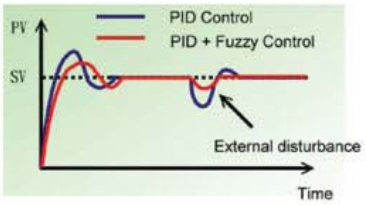
NC Series — Digital PID Controller

Excellent Control

Control Method

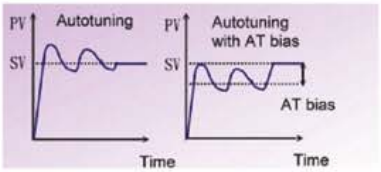


Fuzzy Logic



Built in fuzzy logic suppress the overshoot due to SV changes or external disturbance.

Autotuning (AT)



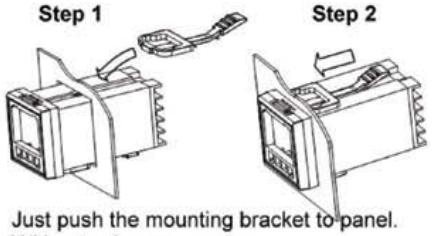
When autotuning acts ,it will make PV hunting 1~2 cycle to calculate optimize PID value. To protect user's device NC series controller can perform PV hunting below SV by setting AT bias value(ATVL) .

Limit Setting

Built in output limit function. Use this function to get different gradient output and set limit for output.

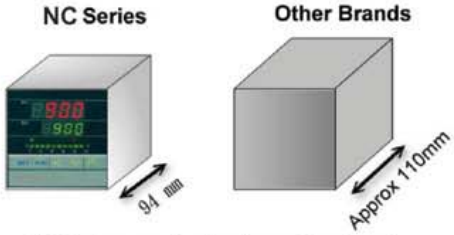
Convenient Installation

Easy Mounting



Just push the mounting bracket to panel.
Without using any screws.

Saving Space



NC Series are shorter than other brands.
But with more functions.

Alarm Function

Alarm Types

Maximun with 3 sets of alarm.

Alarm types list as below:

Deviation
- Deviation High Alarm
- Deviation Low Alarm
- Deviation High/Low Alarm
- Band Alarm

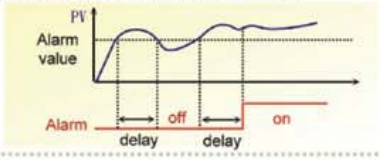
System
- System Failed Alarm
- System Normal Alarm

PV
- PV High Alarm
- PV Low Alarm

Program
- Program Run Alarm
- Program End Alarm
- Segment End Alarm

Delay Time

Use this function can avoid alarm acts fequently or acts due to external disturbance.



Hold Function

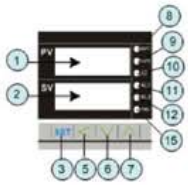
Use this function can avoid alarm acts at start-up. The alarm action is suppressed at start-up until PV enters the non-alarm range.

Appearance

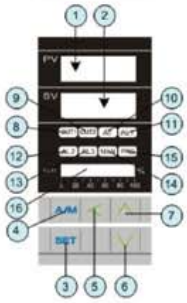
NC Series — Digital PID Controller

Parts Description

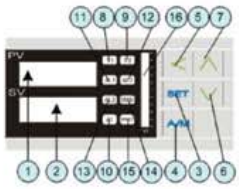
NC 2438



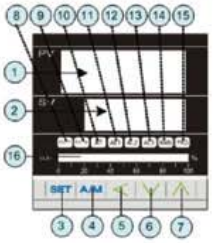
NC 2538



NC 2638



NC 2738/NC 2838

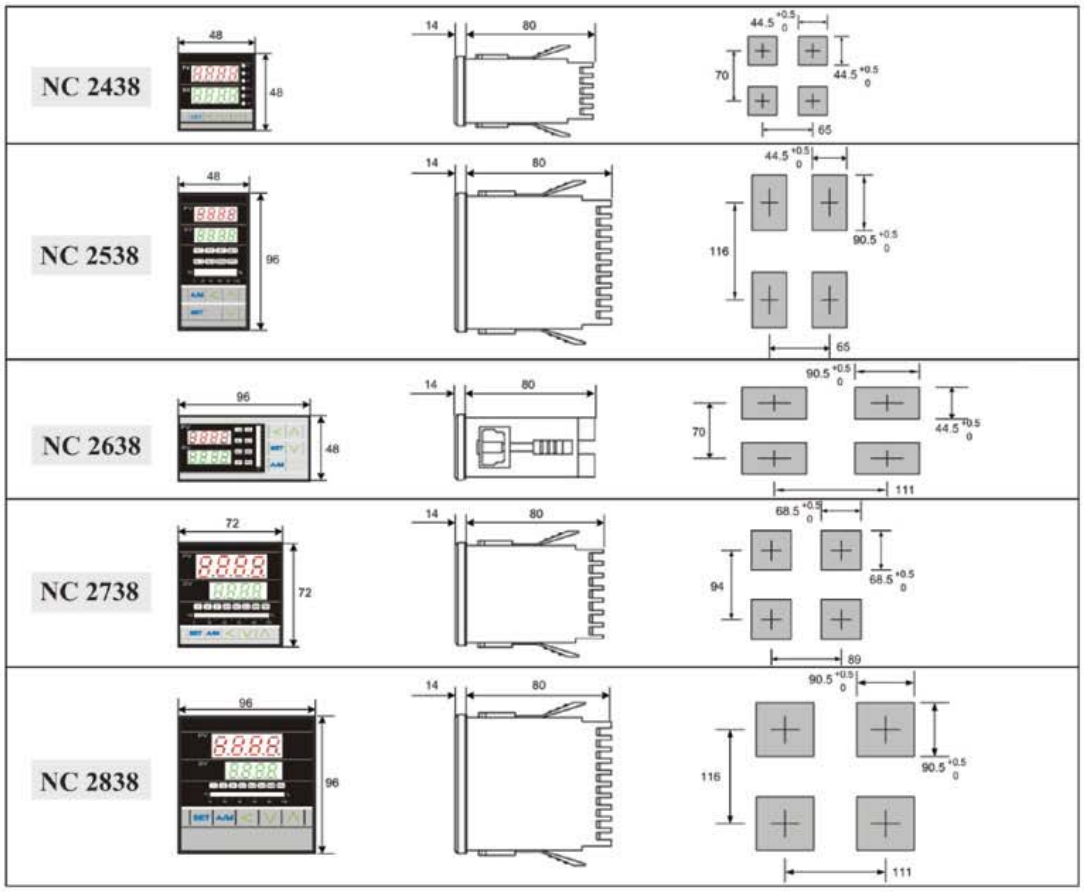


SYMBOL		NAME	FUNCTION
PV	1	Measured value (PV)display	Displays PV or various parameter symbols (Red)
SV	2	Setting value (SV)display	Displays SV or various parameter set values (Green)
SET	3	Set key	Used for parameter calling up and set value registration
A/M	4	Auto/Manual key	Switches between Auto(PID) output mode and Manual output
<	5	Shift key	Shift digits when settings are changed
V	6	Down key *(*Program Hold)*	Decrease numbers *(*Only for programmable controller)*
Λ	7	Up key *(*Program Run)*	Increase numbers *(*Only for programmable controller)*

SYMBOL		NAME	FUNCTION
OUT1	8	OUT1 lamp	Lights when OUT1 is on (Green)
OUT2	9	OUT2 lamp	Lights when OUT2 is on (Green)
AT	10	Autotuning lamp	Lights when Autotuning is activated (Orange)
AL1	11	Alarm 1 lamp	Lights when Alarm 1 is activated (Red)
AL2	12	Alarm 2 lamp	Lights when Alarm 2 is activated (Red)
AL3	13	Alarm 3 lamp	Lights when Alarm 3 is activated (Red)
MAN	14	Manual output lamp	Lights when manual output is activated (Orange)
PRO	15	*Program Running lamp*	*Flashes when program running (Only for programmable controller)*
OUT1 %	16	Output% Bar-Graph display	Output% is displayed on 10-dot LEDs

External Dimension

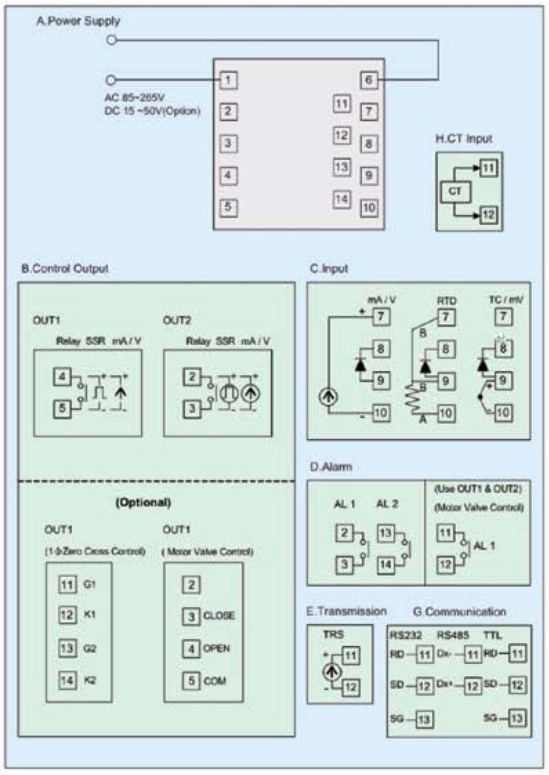
Unit : mm



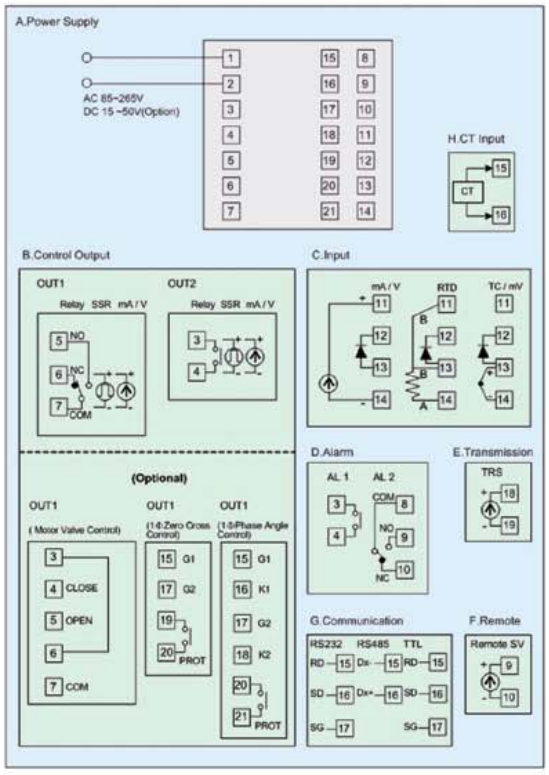
Terminal Arrangement

NC Series — Digital PID Controller

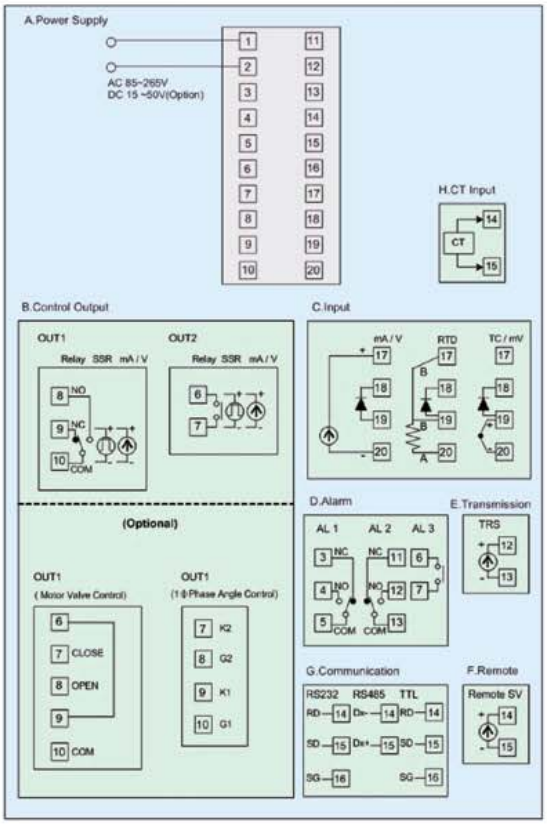
NC 2438



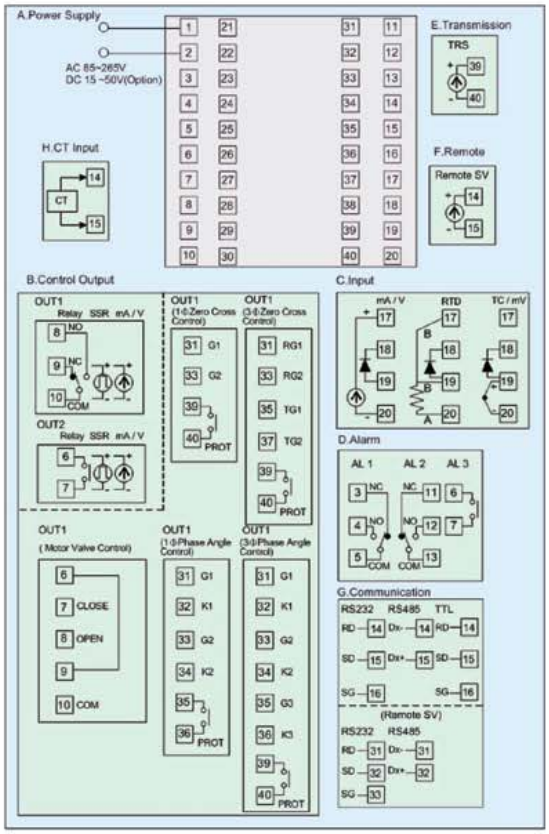
NC 2738



NC 2538/NC 2638



NC 2838



Specifications

NC Series — Digital PID Controller

Standard Spec.

Model	NC 2438	NC 2538	NC 2638	NC 2738	NC 2838
Dimension	48X48mm	48X96mm	96X48mm	72X72mm	96X96mm
Supply voltage	AC 85~265V , DC24V (Optional)				
Frequency	50 / 60 HZ				
Power Consumption	approx 3VA	approx 4VA	approx 4VA	approx 3VA	approx 4VA
Memory	Non-volatile memory E^2PROM				
Input	Accuracy :0.2%FS , Sample time : 250ms				
TC	K , J , R , S , B , E , N , T , W5Re/W26Re , PL2 , U , L				
RTD	PT100 , JPT100 , JPT50				
mA dc	4~20mA , 0~20mA				
Voltage dc	0~1V , 0~5V , 0~10V , 1~5V , 2~10V -10~10mV , 0~10mV , 0~20mV , 0~50mV , 10~50mV				
DP Position	0000 , 000.0 , 00.00 , 0.000 (available for mA or Voltage dc input)				
Output 1	Main control output				
Relay	SPST type	SPDT type	SPDT type	SPDT type	SPDT type
	3A , 220V , electrical life : 100,000 times or more(under the rated load).				
Voltage Pulse	For SSR drive. ON:24V , OFF:0V , maximum load current:20mA.				
mA dc	4~20mA , 0~20mA .Maximum load resistance:560 Ω				
Voltage dc	0~5V , 0~10V ,1~5V ,2~10V. Maximum load current:20mA.				
Alarm 1	SPST type	SPDT type	SPDT type	SPST type	SPDT type
	3A , 220V , electrical life : 100,000 times or more(under the rated load).				
Control algorithms	PID , P , PI , PD , ON/OFF(P=0) , FUZZY				
PID range	P:0~200% , I:0~3600 Secs , D:0~900 Secs				
Isolation	Output terminals (control output , alarm ,transmission) and Input terminals are isolated separately.				
Isolated resistance	10M Ω or more between input terminals and case(ground) at DC 500V 10M Ω or more between output terminals and case(ground) at DC 500V				
Dielectric strength	1000V AC for 1 minute between input terminals and case(ground) 1500V AC for 1 minute between output terminals and case(ground)				
Operating temperature	0~50℃				
Humidity range	20~90% RH				
Weight	NC 2438 approx 150g, NC 2538/NC 2738 approx 225g, NC 2838 approx 300g.				
Display Height	PV:7mm SV:7mm	PV:7mm SV:7mm	PV:7mm SV:7mm	PV:14mm SV:10mm	PV:14mm SV:10mm

Optional Spec.

Model	NC 2438	NC 2538	NC 2638	NC 2738	NC 2838
RAMP/SOAK Program	2 Patterns with 8 segments each . The 2 patterns can be linked together as 16 segments use.				
Output 2	For heating and cooling control use				
Relay	SPST type	SPST type	SPST type	SPST type	SPST type
Voltage Pulse	For SSR drive. ON:20V , OFF:0V , maximum load current:20mA.				
mA dc	4~20mA , 0~20mA .Maximum load resistance:560 Ω				
Voltage dc	0~5V , 0~10V ,1~5V ,2~10V. Maximum load current:20mA.				
Alarm 2	SPST type	SPDT type	SPDT type	SPDT type	SPDT type
Alarm 3	X	SPST type	SPST type	SPST type	SPST type
Heater Break Alarm (HBA)	Display Range of Heater Current : 0.0~99.9 A , Accuracy : 1%FS Included CT : SC_80_T (0.0~80.0A) Alarm Relay : AL1				
Transmission	Available for PV or SV transmission				
mA dc	4~20mA , 0~20mA. Maximum load resistance:560 Ω				
Voltage dc	0~5V,0~10V,1~5V,2~10V. Maximum load current:20mA.				
Remote SV Input	4~20mA , 0~20mA , 0~5V , 0~10V , 1~5V , 2~10V are available				
Communication	Protocol : MODBUS RTU , MODBUS ASCII , ASCII Interface : RS232 , RS485 , TTL Baudrate : 38400 , 19200 , 9600 , 4800 , 2400 bps. Data bits : 8 , Start bit : 1 , Stop bit : 1 or 2 , Odd or Even parity				
WaterProof/DustProof	IP65				

Order Information

NC Series — Digital PID Controller

Model & Suffix codes

Model	Output1	Output2	Alarm	TRS	Remote SV	Commu-nication	Input Type	Power	Water/Dust Proof
NC-2X38 —	1	0	1	0	0	0 —	02 —	A	N

Model

- NC 2438 48x48mm
- NC 2638 96x48mm
- NC 2738 72x72mm
- NC 2538 48x96mm
- NC 2838 96x96mm

(STANDARD)

- NC 2438P 48x48mm
- NC 2638P 96x48mm
- NC 2738P 72x72mm
- NC 2538P 48x96mm
- NC 2838P 96x96mm

(RAMP/SOAK Programmable)

Output1

- 0 None
- 1 Relay
- 2 Voltage Pulse (SSR Drive)
- 3 4~20mA
- 4 0~20mA
- A 0~5V
- B 0~10V
- C 1~5V
- D 2~10V
- 5 1φSCR zero cross control
- 6 3φSCR zero cross control
- 7 Motor valve control
- 8 1φSCR phase angle control
- 9 3φSCR phase angle control

Output2

- 0 None
- 1 Relay
- 2 Voltage Pulse (SSR Drive)
- 3 4~20mA
- 4 0~20mA
- A 0~5V
- B 0~10V
- C 1~5V
- D 2~10V

Alarm

NEW

- 0 None
- 1 1 Set
- 2 2 Sets
- 3 3 Sets
- A HBA *
- B HBA+AL2
- C HBA+AL2+AL3

TRS

- 0 None
- 1 4~20mA
- 2 0~20mA
- A 0~5V
- B 0~10V
- C 1~5V
- D 2~10V

Remote SV

- 0 None
- 1 4~20mA
- 2 0~20mA
- A 0~5V
- B 0~10V
- C 1~5V
- D 2~10V

Commu-nication

- 0 None
- 1 RS232
- 2 RS485
- 3 TTL
- A RS232_MODBUS
- B RS485_MODBUS

Input Type

See Input Codes

Power

NEW

- A AC 85~265V
- D DC24V

Water/Dust Proof

- N None
- W IP65

* HBA : Heater Break Alarm (HBA must use AL1 as alarm relay)

Combination of options and models

○ Available ✕ Not available

Options / Model	RAMP/SOAK PROGRAM	Output 1					Output2	Alarm2	Alarm3	HBA	TRS	Remote SV	Communication	Power DC 24V
		1φSCR_Z	3φSCR_Z	Motor valve control	1φSCR_P	3φSCR_P								
NC 2438	○	○	✕	○	✕	✕	○	○	✕	○	○	○	○	○
NC 2538	○	✕	✕	○	○	✕	○	○	○	○	○	○	○	○
NC 2638	○	✕	✕	○	○	✕	○	○	○	○	○	○	○	○
NC 2738	○	○	✕	○	○	✕	○	○	○	○	○	○	○	○
NC 2838	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Input type table

		TYPE	CODE	RANGE	TYPE	CODE	RANGE	TYPE	CODE	RANGE
TC	K	K1	01	0.0~200.0°C (392.0°F)	K2	02	0.0~400.0°C (752.0°F)	K3	03	0~600°C (1112°F)
		K4	04	0~800°C (1472°F)	K5	05	0~1000°C (1832°F)	K6	06	0~1200°C (2192°F)
	J	J1	07	0.0~200.0°C (392.0°F)	J2	08	0.0~400.0°C (752.0°F)	J3	09	0~600°C (1112°F)
		J4	10	0~800°C (1472°F)	J5	11	0~1000°C (1832°F)	J6	12	0~1200°C (2192°F)
	R	R1	13	0~1600°C (2912°F)	R2	14	0~1769°C (3216°F)			
	S	S1	15	0~1600°C (2912°F)	S2	16	0~1769°C (3216°F)			
	B	B1	17	0~1820°C (3308°F)						
	E	E1	18	0~800°C (1472°F)	E2	19	0~900°C (1652°F)			
	N	N1	20	0~1200°C (2192°F)	N2	21	0~1300°C (2372°F)			
	T	T1	22	-199.9~400.0°C (752.0°F)	T2	23	-199.9~200.0°C (392.0°F)	T3	24	0.0~350.0°C (662.0°F)
	W	W1	25	0~2000°C (3632°F)	W2	26	0~2320°C (4208°F)			
	PLII	PL1	27	0~1300°C (2372°F)	PL2	28	0~1390°C (2534°F)			
	U	U1	29	-199.9~600.0°C (999.9°F)	U2	30	-199.9~200.0°C (392.0°F)	U3	31	0.0~400.0°C (752.0°F)
	L	L1	32	0~400°C (752°F)	L2	33	0~800°C (1472°F)			
RTD	JPT	JP1	41	-199.9~600.0°C (999.9°F)	JP2	42	-199.9~400.0°C (752.0°F)	JP3	43	-199.9~200.0°C (392.0°F)
	100	JP4	44	0~200°C (392°F)	JP5	45	0~400°C (752°F)	JP6	46	0~600°C (1112°F)
	PT	DP1	47	-199.9~600.0°C (999.9°F)	DP2	48	-199.9~400.0°C (752.0°F)	DP3	49	-199.9~200.0°C (392.0°F)
	100	DP4	50	0~200°C (392°F)	DP5	51	0~400°C (752°F)	DP6	52	0~600°C (1112°F)
	JPT	JP.1	53	-199.9~600.0°C (999.9°F)	JP.2	54	-199.9~400.0°C (752.0°F)	JP.3	55	-199.9~200.0°C (392.0°F)
	50	JP.4	56	0~200°C (392°F)	JP.5	57	0~400°C (752°F)	JP.6	58	0~600°C (1112°F)

	TYPE	CODE	RANGE	
LINEAR	AN1	61	-10 ~ 10mV	-1999 ~ 9999 or -199.9 ~ 999.9 or -19.99 ~ 99.99 or -1.999 ~ 9.999
		62	-2 ~ 2V	
		63	-5 ~ 5V	
		64	-10 ~ 10V	
	AN2	71	0 ~ 10mV	
	AN3	76	0 ~ 20mV	
	AN4	81	0 ~ 50mV	
		82	0 ~ 20mA	
		83	0 ~ 1V	
		84	0 ~ 5V	
		85	0 ~ 10V	
		86	0 ~ 5K ohm	
		87	0 ~ 2V	
	AN5	91	10 ~ 50mV	
		92	4 ~ 20mA	
		93	1 ~ 5V	
		94	2 ~ 10V	

NIPPON