

# ANV PID TEMPERATURE CONTROLLER

|TF100|TF400|TF410|TF700|TF900|



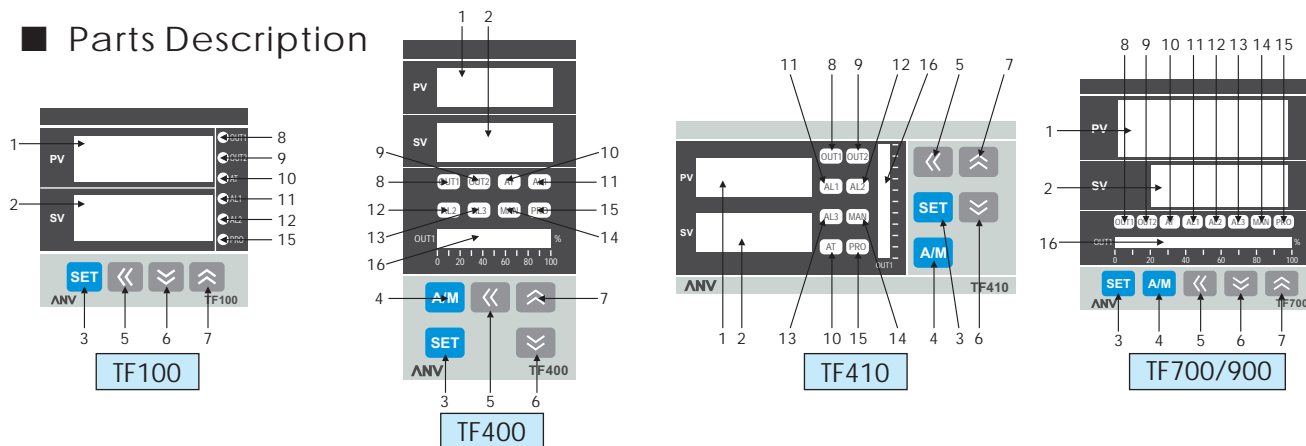
**ANV ELECTRIC CO., LTD.**



Programmable :	Ramp/Soak Program
Fuzzy :	Built-in Fuzzy Logic
AT :	Autotuning
HBA :	Heat Break Alarm
MODBUS :	Support RTU & ASCII Protocol

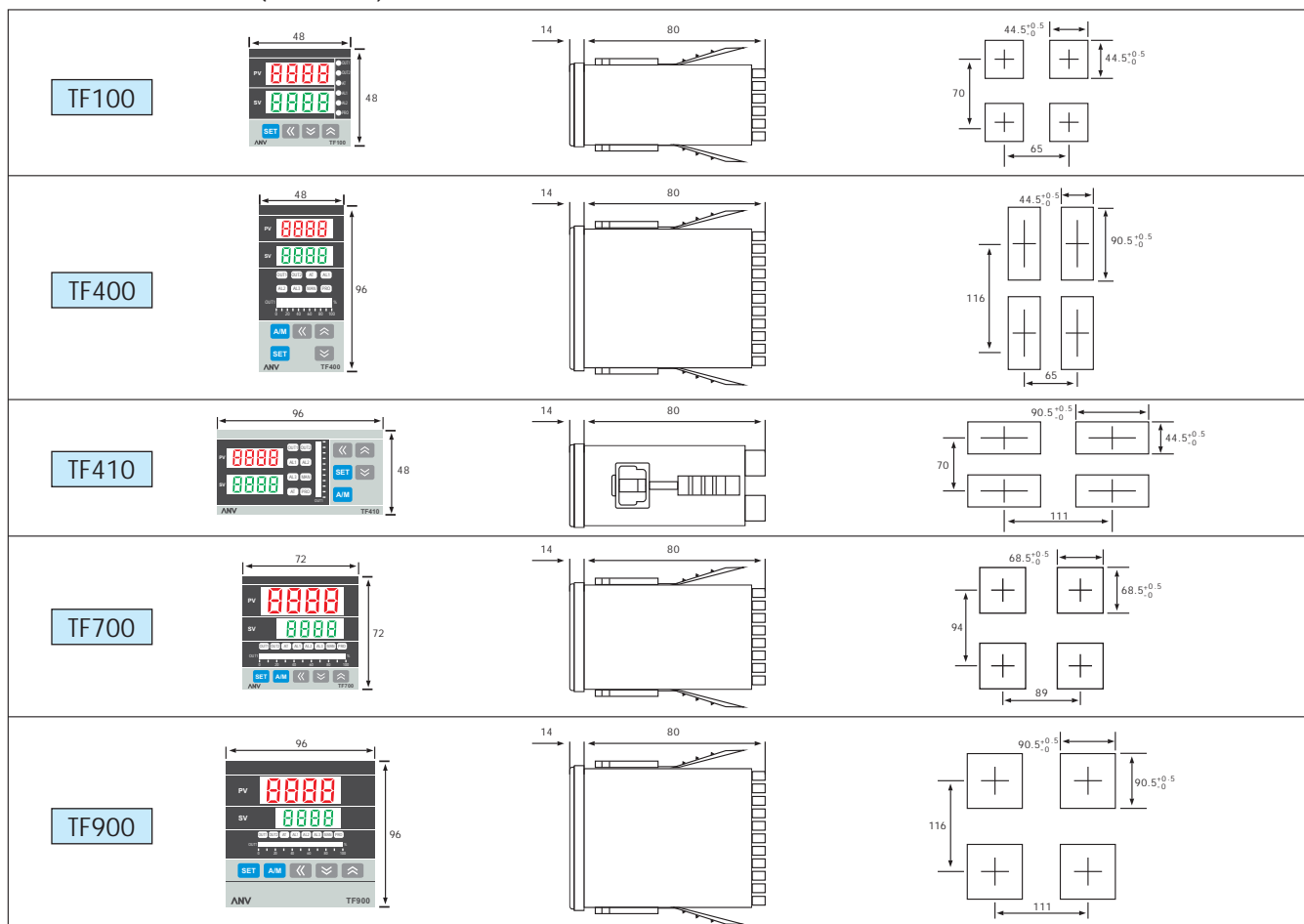
Standard Specification						
MODEL	TF100	TF400	TF410	TF700	TF900	
DIMENSION	48x48mm	96x48mm	48x96mm	72x72mm	96x96mm	
SUPPLY VOLTAGE	AC 85~265V, DC24V(Optional)					
FREQUENCY	50/60 Hz					
POWER CONSUMPTION	Approx. 3VA	Approx. 4VA	Approx. 4VA	Approx. 3VA	Approx. 4VA	
MEMORY	Non-volatile memory EEPROM					
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)				
OUTPUT1		Main control output				
	RELAY	1a Contact	1c Contact	1c Contact	1c Contact	1c Contact
		3A, 220V, electrical life: 100,000times or more(Under the rated load)				
	VOLTAGE PULSE	For SSR drive. ON: 24V, OFF: 0V, Max load current: 20mA				
	mA dc	4~20mA, 0~20mA. Max load resistance: 560Ω				
VOLTAGE dc	0~5V, 0~10V, 1~5V, 2~10V. Max load current: 20mA					
ALARM 1	1a Contact	1c Contact	1c Contact	1a Contact	1c Contact	
	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	10MΩ or more between input terminals and case(ground) at DC 500V					
	10MΩ 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℃					
OPERATING HUMIDITY RANGE	20~90%RH					
WEIGHT	Approx. 150g	Approx. 225g	Approx. 225g	Approx. 225g	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 Specification						
MODEL	TF100	TF400	TF410	TF700	TF900	
RAMP/SOCK 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	1a Contact	1a Contact	1a Contact	1a Contact	1a Contact
	VOLTAGE PULSE	For SSR drive. ON: 24V, OFF: 0V, Max load current: 20mA				
	mA dc	4~20mA, 0~20mA. Max load resistance: 560Ω				
VOLTAGE dc	0~5V, 0~10V, 1~5V, 2~10V. Max load current: 20mA					
ALARM 2	1a Contact	1c Contact	1c Contact	1c Contact	1c Contact	
ALARM 3	X	1a Contact	1a Contact	1a Contact	1a Contact	
HEAT BREAK ALARM (HBA)	Display range of heater current: 0.0~99.9A, accuracy: 1%FS					
	Include CT: SC_80_T(5.8mm dia, 0.0~80.0A) or SC_100_T(12mm dia, 0.0~99.9A)					
	Alarm relay: AL1					
TRANSMISSION		Available for PV or SV transmission				
	mA dc	4~20mA, 0~20mA. Max load resistance: 560Ω				
VOLTAGE dc	0~5V, 0~10V, 1~5V, 2~10V. Max load current: 20mA					
REMOTE SV INPUT	4~20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V are available					
COMMUNICATION	Protocol RTU, MODBUS ASCII					
	Interface: RS232, RS485, TTL					
	Baudrate: 38400, 19200, 9600, 4800, 2400 bps Data bits: 8bit, start bit: 1bit, stop bit: 1 or 2, odd or even parity					
WATER/DUST PROOF	IP65					

## Parts Description

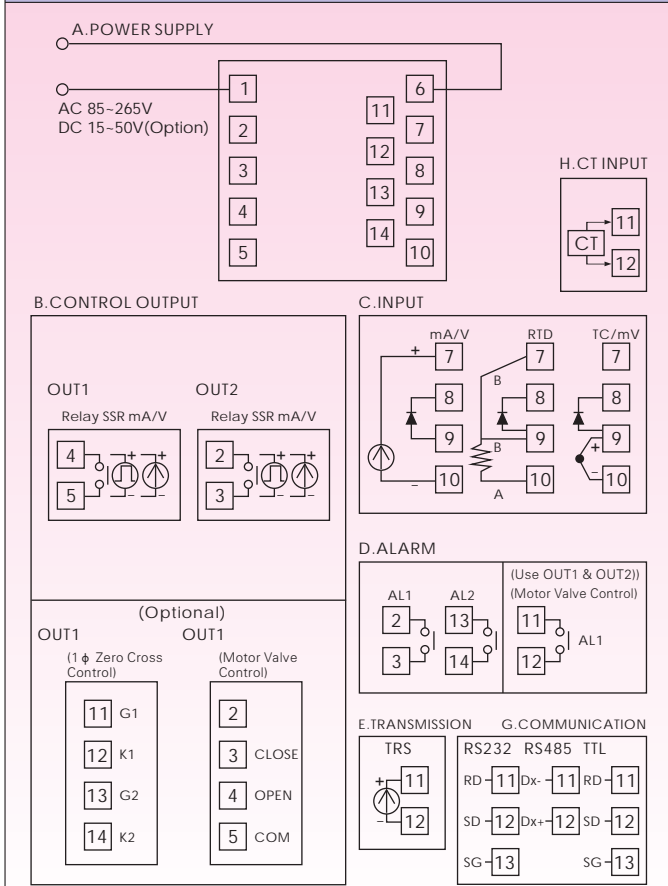


SYMBOL	NAME	FUNCTION	SYMBOL	NAME	FUNCTION
PV	1 Present Value (PV) display	Displays PV or various parameter symbols(Red)	OUT2	9 OUT2 lamp	Lights when OUT2 is on(Green)
SV	2 Setting Value (SV) display	Displays SV or various parameter set values(Green)	AT	10 Autotuning lamp	Lights when Autotuning is activated(Orange)
SET	3 Set Key	Used to parameter calling up and set value registration	AL1	11 Alarm1 lamp	Lights when Alarm1 is activated(Red)
A/M	4 Auto/Manual Key	Switches between Auto(PID) output mode and Manual output	AL2	12 Alarm2 lamp	Lights when Alarm2 is activated(Red)
⏪	5 Shift Key	Shift digits when setting are changed	AL3	13 Alarm3 lamp	Lights when Alarm3 is activated(Red)
⏩	6 Down Key *(Program Hold)	Decrease numbers *(Only for programmable control)	MAN	14 Manual output lamp	Lights when manual output is activated(Orange)
⏴	7 Up Key *(Program Hold)	Increase numbers *(Only for programmable control)	PRO	15 *Program running lamp	*Flash when program is running (only for programmable controller)
OUT1	8 OUT1 Lamp	Lights when OUT1 is on(Green)	OUT1%	16 Output% Bar-Graph display	Output% is display on 10-dot LEDs

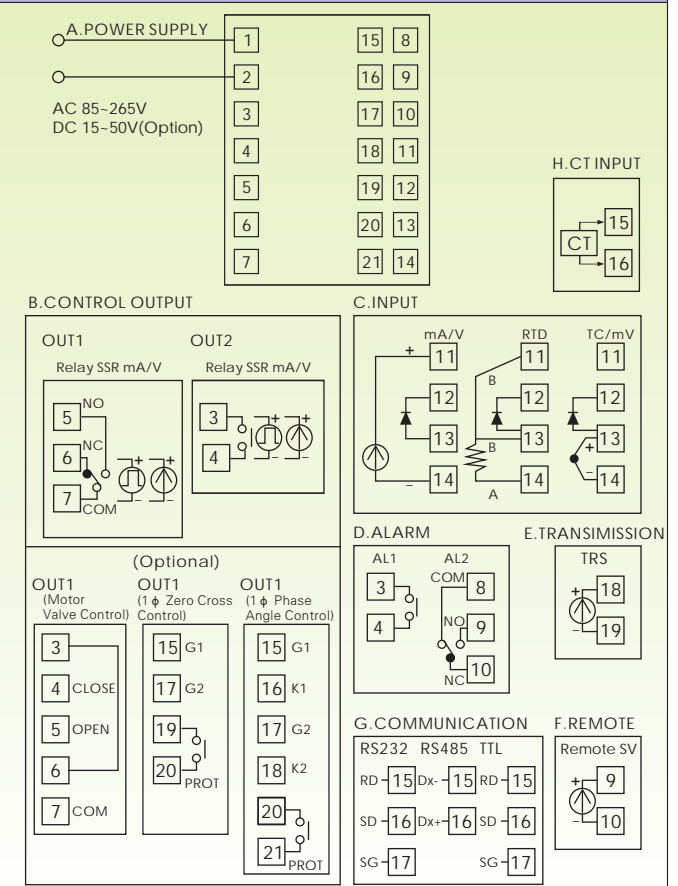
## Dimension (Unit:mm)



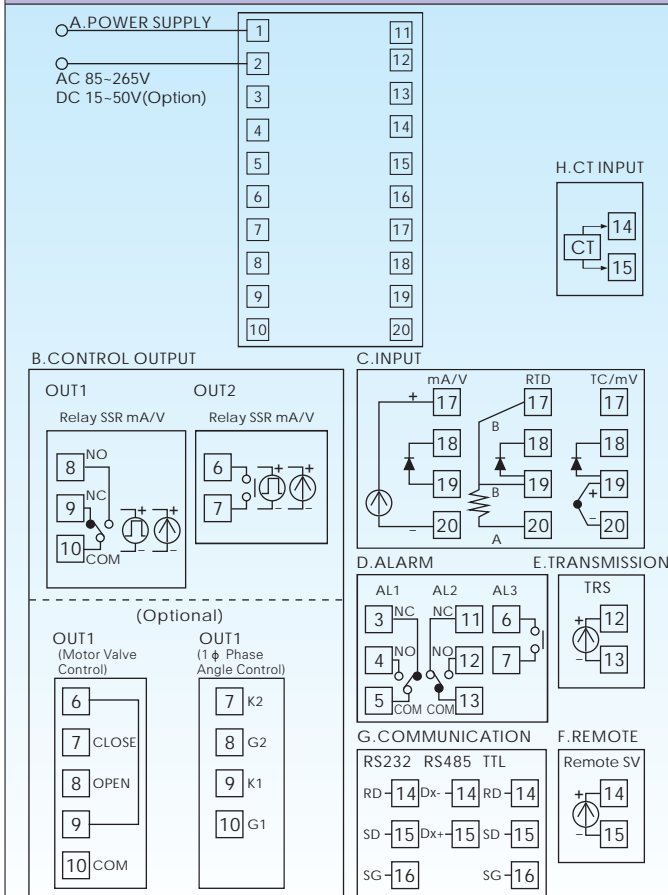
## TF100



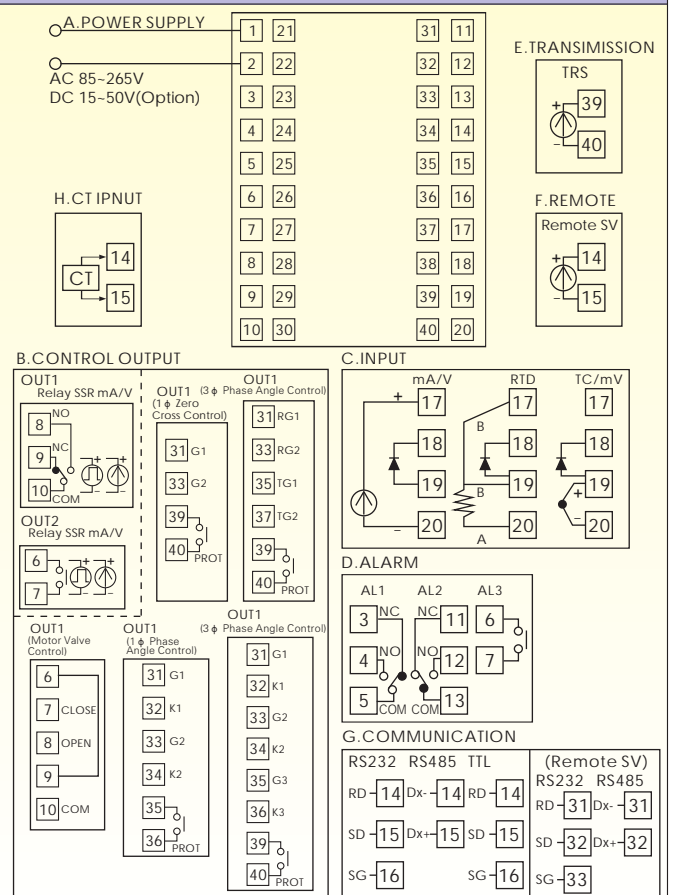
## TF700



## TF400/410



## TF900



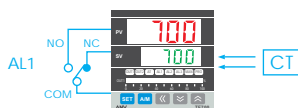
## Application: Control temperature, humidity, pressure, flow and PH.

- TF series controllers are microprocessor based controllers. Which have been designed with high accuracy input, various output selection, useful options and good reliability at a competitive price.
- TF series use "PID + FUZZY" algorithm to implement excellent control. The output status is displayed on the built in "Bar-Graph" display.
- TF series not only provide the basic control output selection but also plus advanced options such as "Motor Valve Control", "SCR/TRIAC Trigger", and "Programmable RAMP/SOAK"
- TF series support MODBUS protocol. Communication with HMI is more convenient.
- New additional HBA function with competitive price, user can upgrade system safety easy.

### UL US CE approval & free power

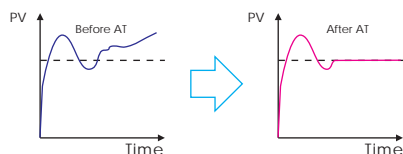
All model get CE and UL approval.  
Operate on any voltage from AC 85~265V at 50/60Hz.  
DC 24V is available(optional function)

### Heater Break Alarm(HBA)



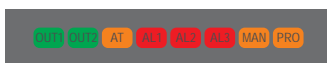
Heater current flowing through CT can be displayed on controller.  
If heater current is less than HBA set value, AL1 will be activated(optional function)

### Autotuning(AT)



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

### Various Indication Lamps



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

### High Accuracy

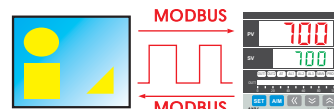
Input with 14bit A/D resolution, 0.2% accuracy of FS.  
Built in "AutoZero-Autospan" function keep good accuracy.

### IP65 Proof



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

### MODBUS Communication



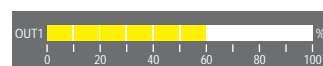
TF series support both MODBUS RTU and MODBUS ASCII protocol.  
Communication between controller and HMI or other equipment is more convenient(optional function).

### Auto/Manual mode



Conveniently switched between auto/manual output mode by clicking "A/M" key(except "TF100").

### Bar-Graph



Output present displayed on the bar-graph in 10 LEDs resolution(except "TF100").

### Data Lock Function

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

## Excellent Control

### Control Method

- PID
- PID + FUZZY
- ON/OFF
- ON/OFF Hysteresis

### FUZZY Logic

PV  
SV  
Time

— PID Control  
— PID+FUZZY Control

External disturbance

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

### Autotuning(AT)

PV SV Time

PV SV Time

AT bias

### Limit Setting

OUT%

110%  
80%  
30%

OUTL=110%  
OUTL=80%  
OUTL=30%

Error%

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

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

## Convenient Installation

### Easy Mounting

Step1 Step2

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

### Saving Space

TF Series Other Brands

94mm 110mm

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

## Alarm Function

### Alarm Types

Maximum with 3 sets of alarm.

Alarm types list as below

<b>Deviation</b> Deviation High Alarm Deviation Low Alarm Deviation High/Low Alarm Brand Alarm	<b>System</b> System Failed Alarm System Normal Alarm
<b>PV</b> PV High Alarm PV Low Alarm	<b>Program</b> Program Run Alarm Program End Alarm Segment End Alarm

### Delay Time

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

PV  
Alarm Value  
Alarm

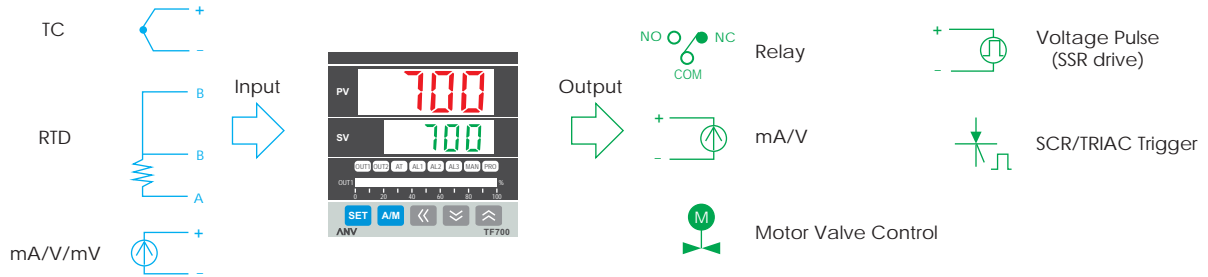
Delay Delay

OFF ON

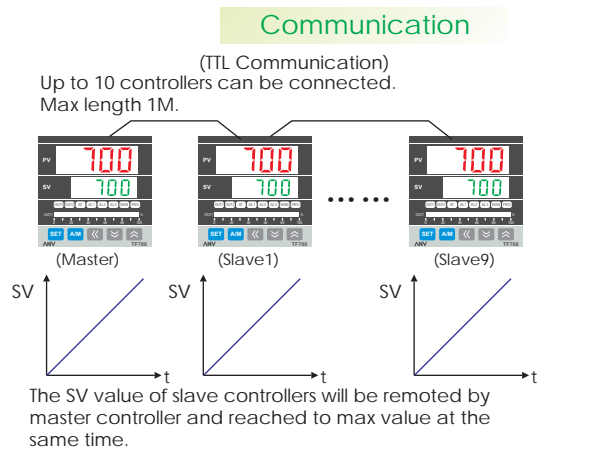
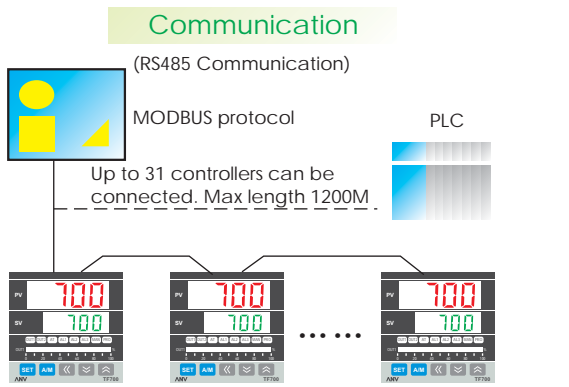
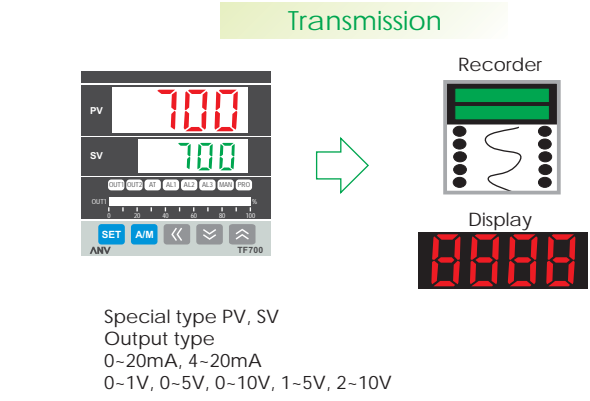
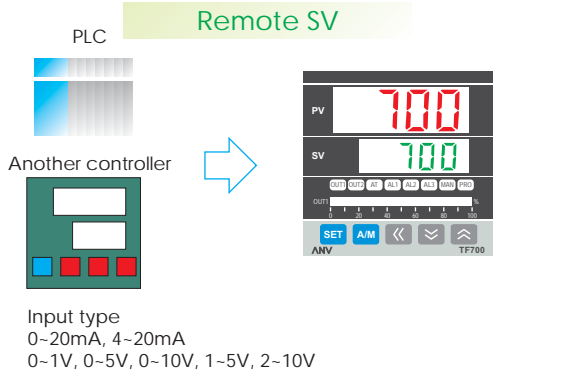
### Hold Function

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

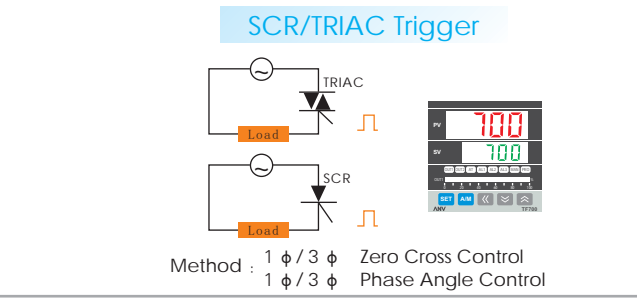
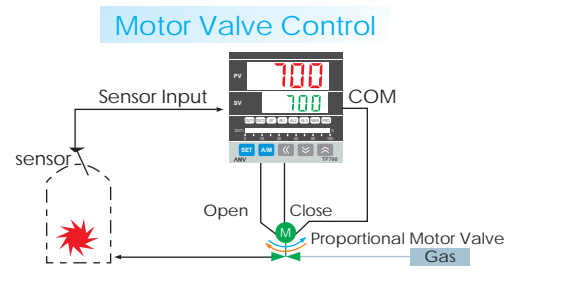
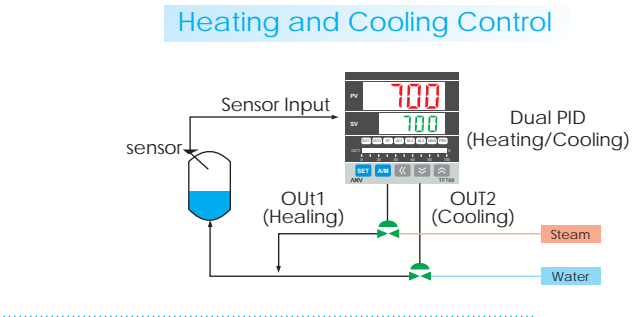
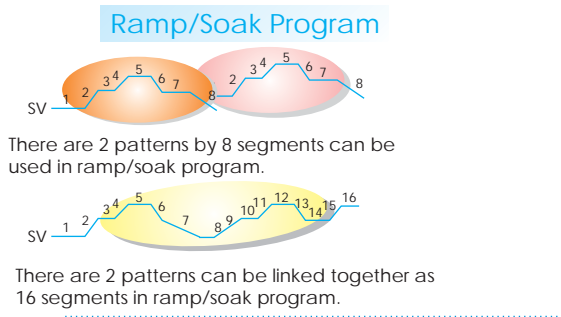
## Various I/O Types



## Peripheral Options



## Special Application



## Order information

Model	Output1	Output2	Alarm	TRS	Remote SV	Communication	Input Power Type	Water/Dust Proof
TF700	1	0	1	0	0	0	02-A	N
TF100	0 None	0 None	0 None	0 None	0 None	0 None	See Input Codes	N None
TF400	1 RELAY	1 RELAY	1 1Set	1 4-20mA	1 4-20mA	1 RS232	A AC 85-265V	W IP65
TF410	2 Voltage Pulse (SSR Drive)	2 Voltage Pulse (SSR Drive)	2 2 Sets	2 0-20mA	2 0-20mA	2 RS485	D DC 24V	
TF700	3 4-20mA	3 4-20mA	3 3 Sets	A 0-5V	A 0-5V	3 TTL		
TF900	4 0-20mA	4 0-20mA	A HBA*	B 0-10V	B 0-10V	A RS232_MODBUS		
PF100	A 0-5V	A 0-5V	B HBA+AL2	C 1-5V	C 1-5V	B RS485_MODBUS		
PF400	B 0-10V	B 0-10V	C HBA+AL2+AL3	D 2-10V	D 2-10V			
PF410	C 1-5V	C 1-5V						
PF700	D 2-10V	D 2-10V						
PF900	5 1 φ SCR_Z Zero Cross Control							
RAMP/SOAK (Programmable)	6 3 φ SCR_Z Zero Cross Control							
	7 Motor Valve Control							
	8 1 φ SCR_P Phase Angle Control							
	9 3 φ SCR_P Phase Angle Control							

\* Block means optional functions with additional charge  
\* HBA: Heater Break Alarm (HBA must use AL1 as alarm relay)

## Combination of Options and Models

\* Remote SV functions is not available, if HBA function has been specified

Options	RAMP/SOAK PROGRAM	Output1						Output2	Alarm2	Alarm3	HBA	TRS	Remote SV	Communication	Power DC 24V
		1 φ SCR_Z	3 φ SCR_Z	Motor Valve Control	1 φ SCR_P	3 φ SCR_P									
Model															
TF100															
TF400															
TF410															
TF700															
TF900															

## Input Type Table

	TYPE	CODE	RANGE	TYPE	CODE	RANGE	TYPE	CODE	RANGE	
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)		
	TC	S	S1	0-1600°C(2912°F)	S2	16	0-1769°C(3216°F)			
B		B1	0-1820°C(3308°F)							
E		E1	0-800°C(1472°F)	E2	19	0-900°C(1652°F)				
N		N1	0-1200°C(2192°F)	N2	21	0-1300°C(2372°F)				
T		T1	-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	0-2000°C(3632°F)	W2	26	0-2320°C(4208°F)				
PLII		PL1	0-1300°C(2372°F)	PL2	28	0-1390°C(2534°F)				
U		U1	-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	0-400°C(752.0°F)	L2	33	0-800°C(1472°F)				
RTD		JPT	JP1	-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	0-200°C(392°F)	JP5	45	0-400°C(752°F)	JP6	46	0-600°C(1112°F)	
	PT	DP1	-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	0-200°C(392°F)	DP5	51	0-400°C(752°F)	DP6	52	0-600°C(1112°F)
	JPT	JP.1	-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	0-200°C(392°F)	JP.5	57	0-400°C(752°F)	JP.6	58	0-600°C(1112°F)

	TYPE	CODE	RANGE	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	
AN5		86	0-5K ohm	
		87	0-2V	
		91	10-50mV	
		92	4-20mA	
		93	1-5V	
		94	2-10mV	