T Series User's Manual

TXXAE

CONTENTS

1 General

T Series Single Input Channel Intelligent Digital Indicators can be used with variety of analog output sensors and transmitters to accomplish the measurement, transfer, display, transmission, recording and control of temperature, pressure, flow, level, component, force and displacement, etc.

- The Intrinsic Error is less than 0.2%F·S. Its calibration and digital filtering functions can help reduce the errors of the sensors and transmitters so as to effectively enhance the accuracy of measurement and control of the system.
- It is adaptable to such signals as voltage, current, RTD, T/C, mV, Potentiometer, Pressure Gauges with Resistance Transmitter, etc.
- An up to 8-point alarm output is available, which offers 10 selectable alarm types. The alarm hysteresis can be set separately. It has on-delay time alarm function, which can effectively avoid false alarm caused by interference, etc.
- Re-Transmitted Output can provide other devices with the displaying value in the form of standard current or voltage output. The displaying value is measured and transformed by the instrument.
- It has full-opened, high-speed, high-efficiency network communication interface, which can actualize total digital communication and control between PC and the Ts. The unique function of Controlling Right Transfer can control the alarm output and the Re-Transmitted Output of the instrument directly. The time for reading per measurement data is less than 10ms.

  We also provide test software, and technical support on configuration and application software.

- BCD code interface support.
- It contains print interface and print unit with hardware clock, which can actualize print function by manual, timing or alarm driving. If the intelligent print unit is selected, one printer can be shared by multi-instruments.
- The Recording Unit is capable of recording 260,000 measured data and the recording interval can be set. It provides effective measures for data analysis and fault diagnosis.
- Different main dimensions and faceplate types are provided for flexible selection. The LED, LCD and light bar display are flexible choices.
- For non-linear signals, whose relationships cannot be described on order, and whose description must be done by user when calibrating, the Customer 8 Segments Linearization Function can be used.
- 1″ ~ 12″ large screen display is available

The T Series is embedded bonding designed instrument, which is Chip microprocessors-based. It has a great expending capacity for the hardware, and flexible platform for software. It has not only the standard function, but also the function of expending the ON-OFF input, timing, sequential program control, etc. They can be assembled according to the actual need to achieve the best effect. For some of the Conventional Nonstandard Functions, see Chapter 11.

2 Models Numbers

□□□/□ — □ □ □ T □ A □ B □ S □ V □ □ □ □
1 2 3 4 5 6 7 8 9 10 11 12

- 1: Dimensions (W × H × L)

  A: 160 × 80 × 125 or 80 × 160 × 125

  B: 96 × 96 × 112

  C: 96 × 48 × 112 or 48 × 96 × 112

  D: 72 × 72 × 112

  E: 48 ×48 ×112 (W ×H ×L)

- 2: Faceplate Types H: Horizontal Type
  S: Vertical Type
  F: Square Type

- 3: Display Types:

  1: Measured Value (Green)

  2: Measured Value (Green) + Set Value (Red)

  3: Measured Value (Green) + Measured Value Light Bar (Green)

  4: Measured Value (Green) + Measured Value Light Bar (Green) +Set Value Light Bar (Red)
  A-S Type only

  5: Measured Value (Green) + Measured Value Light Bar (Green) + Set Value (Red)
  A-S Type only

  Y: LCD A-H Type & B Type only

★The color of LED is selectable according to order requirements.

- 4：Input Signal

  E：Thermocouple or Radiation Thermometer

  R：RTD or Resistance

  I： DC Current

  V：DC Voltage

  M：mV

  W：Potentiometer

  L：Pressure Gauges with Resistance Transmitter

- 5：The Number of Alarm Outputs

  T0：No Alarm

  T1~T8：1~8 Alarm Outputs

  C type limit: 3- Alarm Outputs

  D type limit: 2- Alarm Outputs

  B type limit: 4- Alarm Outputs

  A type: when exceeding 4-points , 250mm in length

- 6：Re-Transmitted Output

  A0：No Output

  A1：DC Current Output（4 mA ~20 mA）,（0 mA ~10 mA）or（0 mA ~20 mA）

  A2：DC Voltage Output（0 V ~5 V）,（1 V ~5 V）

  A3：DC Voltage Output（0 V ~10 V）

  A4：Other Outputs

- 7：Power Supply Output

  B0：No

  B1：24V DC

B2：12V DC

B3：Precise Constant Voltage Source

B4：Precise Constant Current Source

B5：Others

- 8：Communication Interface

  S0：No

  S1：RS 232

  S2：RS 485

  S3：RS 422

  S4：BCD code（A, B type only）

- 9：Power Supply

  V0：220V AC

  V1：24V DC

  V2：12V DC

  V3：Others

- 10：Print Function：P(Print)，N/A (without P)
  （A, B type only）

- 11：Recording Unit：R(Recording Unit)，N/A (without R)
  （A, B type only）

- 12：N(Nonstandard Functions): Some parts of the instrument have been modified according to order requirements.

3 Specifications

3.1 Basic Specifications

- Power Supply: Instruments for 220V AC: 220V ± 10%, power consumption less than 7VA;
  Instruments for 24V DC: 24V ± 10%, power consumption less than 5VA;
  Instruments for 12V DC: 9V~20V, power consumption less than 5VA;
  For other power supplies, please follow the instructions provided with the instrument.
- Operating Conditions: 0℃~50℃, Humidity less than 90%R·H.
  Wider temperature-range requirement should be notified on order.
- Display range: -1999~9999, the position of the decimal point can be set.
- Color of the display: Measured Value: Green, Set Value: Red, Light bar: Red, or change according to order requirements.
- Displaying Resolution: 1/10000
- Types of the input signal: Voltage, Current, RTD, Thermocouple, mV, Potentiometer, Pressure Gauges with Resistance Transmitter, 7 kinds in all.

  Voltage: 1V~5V DC or 0V~5V DC is selectable by settings.

  Current: 4mA~20mA, 0mA~10mA or 0mA~20mA is selectable by settings.

RTD: Pt100, Cu100, Cu50, BA1, BA2 or G53 is selectable by settings.

Thermocouple: K, S, R, B, N, E, J, T is selectable by settings.

Other input signals or Graduation code should be notified on order.

- Intrinsic Error : Less than ± 0.2%F.S
- Measuring Resolution: 1/60000, 16-bit A/D Converter
- Periods of measurement and control: 0.2 seconds

3.2 Specifications on Optional Accessories Parts

- Alarm Output
  - 10 alarm types are selectable by settings. On-Delay time Alarm is available.
  - Relay Output: Contact capability 220V AC, 3A
  - OC Gate Output (Notified on order): Voltage less than 30V, current less than 50mA
- Re-Transmitted Output
  - Photo-isolation
  - 4mA~20mA, 0mA~10mA or 0mA~20mA DC current output, is selectable by settings. Load capability more than 600Ω
  - 1V~5V, 0V~5V or 0V~10V DC voltage output, remark on order.
  - Resolution of output: 1/1000, error less than ± 0.5% F.S

    Or : 1/4000, error less than ± 0.2% F S (Notified on order)

- Communication Interface
  - Photo- isolation
  - RS232, RS485 or RS422, notified on order.
  - Instrument address can be set from 0 to 99
  - Communications Baud Rates : 2400, 4800, 9600 or 19200 is selectable by settings. If the rate is less than 2400, notified on order.
  - Response time of the instrument from receipt of PC command to sending out corresponding data:
    Commands with delimiter "#": response time less than 500 μ s;
    Other commands: response time less than 100ms
  - Matched Communication test software is provided. Technical supports on configuration and application software can be offered as request.
- Print Interface & Print Unit
  - Built-in Hardware Clock: Still working when powered down, auto-adjustment of leap years and quantify days in the every month
  - 3 print modes can be selected by setting: Manual driving, Manual driving + Timing driving, Manual driving + Timing driving + Alarm driving
  - Print Contents: Time (yy-mm-dd, hh-mm), Alarm Status, Measured Value, Engineering Units
  - One Print Unit can only be used for one instrument. For multi-instruments share use, the Intelligent Print Unit should be

selected.

- The print unit is a 16-row CHAR type micro-printer, whose power supply is the same as the instrument. For special print requirements, special notification is needed on order.

➢ Recording Unit

- Capacity of 4Mbit for recording 260,000 values, Recording interval: 1s~59min 59s(Can be reset); the recorded data will not lose when powered down.
- Circular or non-circular mode can be selected by settings.
- Reading data through Communication Interface.

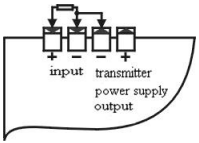
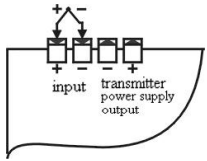
➢ Power Supply output

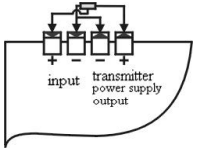
- Universal Power Supply：Used for supplying power to Transmitter, the error of output value from nominal value is less than ±5%, load capacity is more than 50mA.
- Precise Power Supply：Used for supplying power to sensors of pressure, load, etc., the error of output value from nominal value is less than 0.2%, load capacity is more than 40mA.
- For 24V DC, 12V DC, 5V DC or other specifications, notification is needed on order.

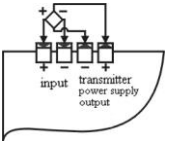
4 Mounting & Wiring

- For the sake of safety, turn off the power supply before wiring.
- For AC power-supply instruments, the ⏚ is a common terminal of power filter, with high voltage, which can only be connected to the earth and connecting with other terminals are **FORBIDDEN**.

The diagram in this manual is just a wiring abbreviated drawing. Because of the limit in the number of terminal ports, the instructions of the corresponding manual should be followed when the instrument's I/O is different from this wiring diagram.

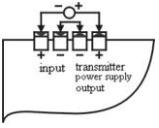
(1) Connection with RTD or Pressure Gauges with Resistance Transmitter	(2) Connection with Thermocouples and Current, Voltage Inputs
	
(3) Connection with Valve Opening Potentiometer	(4) Connection with strain Bridge or diffused silicon sensor mV signal

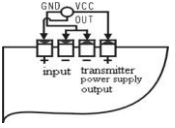




（5）Connection with Current signal of 2-wire Transmitter

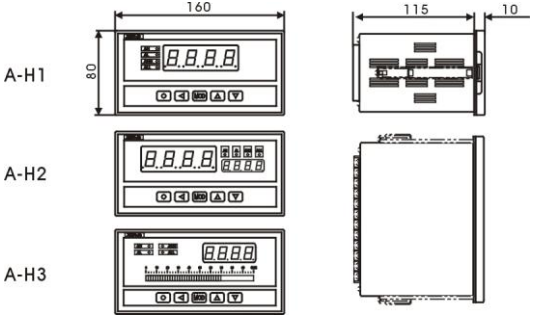
（6）Connection with 3-wire, 4-wire Voltage, Current Transmitter





➢ A-H Model Dimensions of 160×80（mm）

Dimensions



Cut-out Dimensions

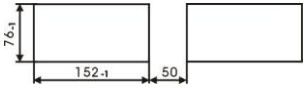
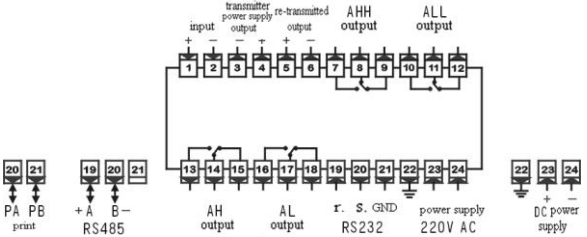
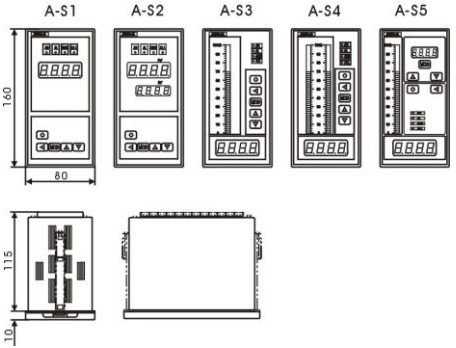


Diagram of Connecting Terminals



➢ A-S Model Dimensions of 80 × 160（mm）

Dimensions



Cut-out Dimensions

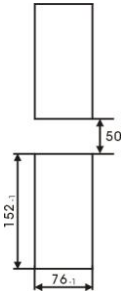
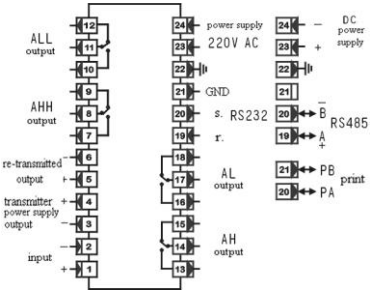
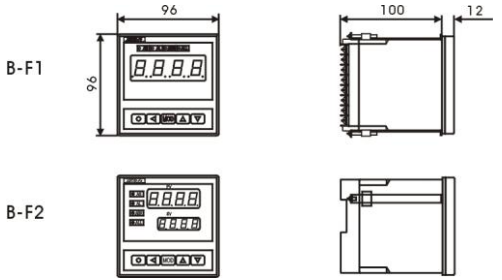


Diagram of Connecting Terminals



➢ B-F Model Dimensions of 96×96（mm）

Dimensions



Cut-out Dimensions

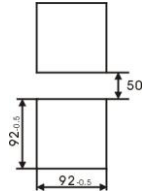
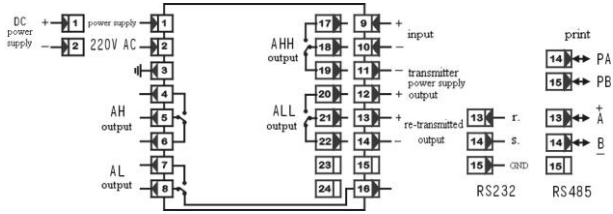
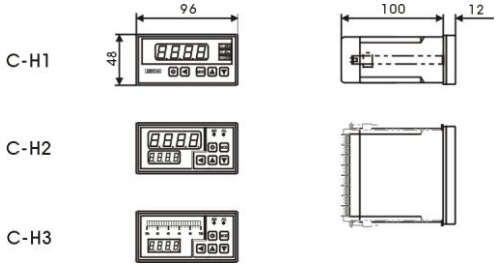


Diagram of Connecting Terminals



➢ C-H Model Dimensions of 96×48（mm）

Dimensions



Cut-out Dimensions

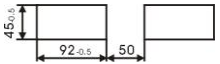
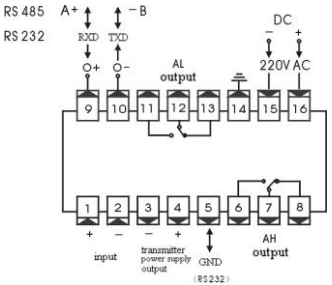
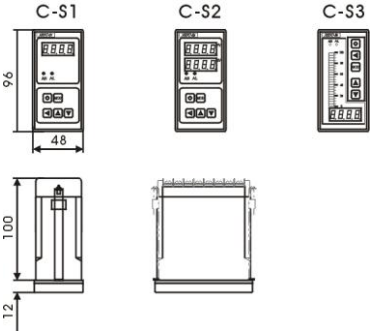


Diagram of Connecting Terminals



➢ C-S Model Dimensions of 48×96（mm）

Dimensions



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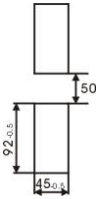
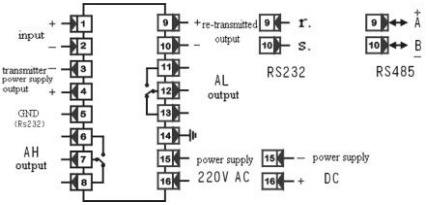
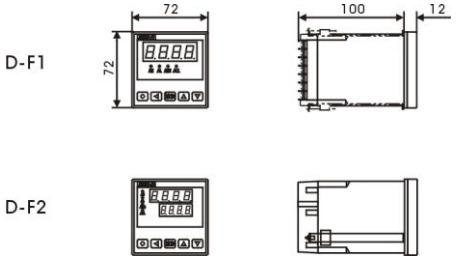


Diagram of Connecting Terminals



➢ D-F Model Dimensions of 72 × 72（mm）

Dimensions



Cut-out Dimensions

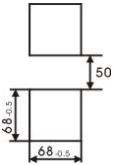
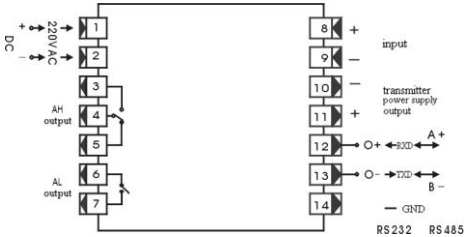
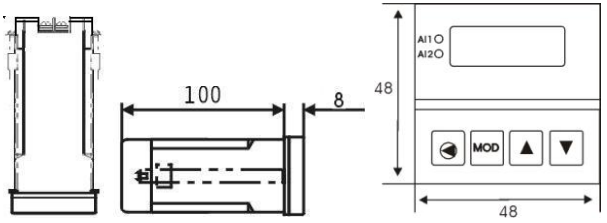


Diagram of Connecting Terminals



➢ D-F Model Dimensions of 48×48（mm）

Dimensions



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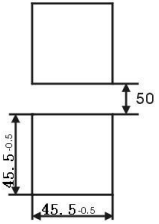
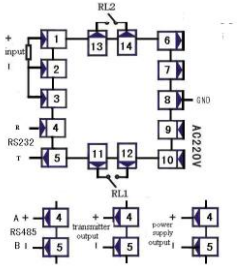


Diagram of Connecting Terminals



5 Parameter Tables

The basic parameters and the Optional-Accessories-related parameters are listed in those tables. The Optional-Accessories-related parameters will appear only if the corresponding Optional Accessory Parts of the instrument were selected.

"Remarks" column is the chapter number of the parameter in the manual.

"Addr." column is the address where the PC reads or sets the parameter. If the instrument doesn't have the communication function, this column can be neglected.

"Setting Range" column is the range in which the parameter is set. The Set Value of the parameters should not exceed this range when setting parameters with PC.

➢ 1st Group of parameter Alarm Set Value

Signs	Name	Item	Addr.	Setting Range	Remarks
Av	Av	Comparison Value of Deviation Alarm Type	00H	-1999~9999	7.3
AH	AH	The 1st Alarm Point Set Value	01H	-1999~9999	7.3
AL	AL	The 2nd Alarm Point Set Value	02H	-1999~9999	7.3
AHH	AHH	The 3rd Alarm Point Set Value	03H	-1999~9999	7.3
ALL	ALL	The 4th Alarm Point Set Value	04H	-1999~9999	7.3
bH	bH	The 5th Alarm Point Set Value	05H	-1999~9999	7.3

bL	bL	The 6th Alarm Point Set Value	06H	-1999~9999	7.3
bHH	bHH	The 7th Alarm Point Set Value	07H	-1999~9999	7.3
bLL	bLL	The 8th Alarm Point Set Value	08H	-1999~9999	7.3

➢ 2nd Group of Parameters Alarm Configuration

Signs	Name	Item	Addr.	Setting Range	Remarks
oA	oA	Security Code	10H	0~9999	6.4
ALo1	ALo1	The 1st Alarm Point Type	11H	Note1	7.3
ALo2	ALo2	The 2nd Alarm Point Type	12H	Note 1	7.3
ALo3	ALo3	The 3rd Alarm Point Type	13H	Note 1	7.3
ALo4	ALo4	The 4th Alarm Point Type	14H	Note 1	7.3
ALo5	ALo5	The 5th Alarm Point Type	15H	Note 1	7.3
ALo6	ALo6	The 6th Alarm Point Type	16H	Note 1	7.3
ALo7	ALo7	The 7th Alarm Point Type	17H	Note 1	7.3
ALo8	ALo8	The 8th Alarm Point Type	18H	Note 1	7.3
HYA1	HYA1	The 1st Alarm Point Hysterisis	19H	0~8000	7.3
HYA2	HYA2	The 2nd Alarm Point Hysterisis	1AH	0~8000	7.3
HYA3	HYA3	The 3rd Alarm Point Hysterisis	1BH	0~8000	7.3
HYA4	HYA4	The 4th Alarm Point Hysterisis	1CH	0~8000	7.3

HYA5	HYA5	The 5th Alarm Point Hysterisis	1DH	0~8000	7.3
HYA6	HYA6	The 6th Alarm Point Hysterisis	1EH	0~8000	7.3
cYt	cYt	Alarm on-delay time	1FH	0 ~ 20	7.3

➢ 3rd Group of Parameters Customer Linearization

Signs	Name	Item	Addr.	Setting Range	Remarks
c1	c1	Measured Value of the 1st Broken-line Point	20H	-1999~9999	7.2
b1	b1	Desired Value of the 1st Broken-line Point	21H	-1999~9999	7.2
c2	c2	Measured Value of the 2nd Broken-line Point	22H	-1999~9999	7.2
b2	b2	Desired Value of the 2nd Broken-line Point	23H	-1999~9999	7.2
c3	c3	Measured Value of the 3rd Broken-line Point	24H	-1999~9999	7.2
b3	b3	Desired Value of the 3rd Broken-line Point	25H	-1999~9999	7.2
c4	c4	Measured Value of the 4th Broken-line Point	26H	-1999~9999	7.2
b4	b4	Desired Value of 4th Broken-line Point	27H	-1999~9999	7.2
c5	c5	Measured Value of the 5th Broken-line Point	28H	-1999~9999	7.2

b5	b5	Desired Value of the 5th Broken-line Point	29H	-1999~9999	7.2
c6	c6	Measured Value of the 6th Broken-line Point	2AH	-1999~9999	7.2
b6	b6	Desired Value of the 6th Broken-line Point	2BH	-1999~9999	7.2
c7	c7	Measured Value of the 7th Broken-line Point	2CH	-1999~9999	7.2
b7	b7	Desired Value of the 7th Broken-line Point	2DH	-1999~9999	7.2
c8	c8	Measured Value of the 8th Broken-line Point	2EH	-1999~9999	7.2
b8	b8	Desired Value of the 8th Broken-line Point	2FH	-1999~9999	7.2

➢ 4th Group of Parameters Measurement & Display

Signs	Name	Item	Addr.	Setting Range	Remarks
InCH	incH	Input Signal Mode	30H	0 ~ 20	7.1
In-d	in-d	Indication of Decimal Point Position	31H	Note 2	7.1
u-r	u-r	Lower Range	32H	-1999~9999	7.1
F-r	F-r	Upper Range	33H	-1999~9999	7.1
In-A	in-A	Zero Correcting Value	34H	-1999~9999	8
FC	Fi	Full Scale Correcting Value	35H	0.500~1.500	8

FLtr	FLtr	Digital Filter Time Constant	36H	1 ~ 20	7.1
c-b	c-b	Linearization Function choice	37H	Note 3	7.2
PF	PF	Extraction of Square Root Selection	38H	Note 3	7.1
cHo	cHo	Low Signal Cut-out Threshold	39H	0 ~ 25	7.1
unit	unit	Engineering Units in Printing	3AH	0 ~ 15	7.6
bout	bout	Substitute in Fault	3CH	-1999~9999	9
HL	HL	Indication Mode of Set Value	3DH	0 ~ 8	7.1
bt-L	bt-L	Lower Range of Light Bar	3EH	-1999~9999	7.1
bt-H	bt-H	Upper Range of Light Bar	3FH	-1999~9999	7.1

➢ 5th Group of Parameters Communication, Re-Transmitted Output, etc.

Signs	Name	Item	Addr.	Setting Rage	Remarks
Add	Add	Communication Addr.	40H	0 ~ 99	7.5
bAud	bAud	Communication Rate	41H	Note 4	7.5
ctd	ctd	Alarm Output Controlling Right Selection	44H	Note 3	7.5
ctA	ctA	Re-Transmitted Output Controlling Right Selection	45H	Note 3	7.5
oA1	oA1	Alarm Setting Code Selection	46H	Note 3	6.2
Li	Li	Cold Junction Compensate	47H	0.000~2.000	8

		Correcting Value			
oP	oP	Re-Transmitted Output Mode	4DH	0 ~ 2	7.4
bA-L	bA-L	Lower Range of Re-Transmitted Output	4EH	-1999~9999	7.4
bA-H	bA-H	Upper Range of Re-Transmitted Output	4FH	-1999~9999	7.4

➢ 6th Group of Parameter Print & Recording

Signs	Name	Item	Addr.	Setting Range	Remarks
Po	Po	Print Mode	50H	0 ~ 3	7.6
Pt-H	Pt-H	Print Time Interval（h.）	51H	0 ~ 23	7.6
Pt-F	Pt-F	Print Time Interval（min.）	52H	0 ~ 59	7.6
Pt-A	Pt-A	Print Time Interval（s.）	53H	0 ~ 59	7.6
t-Y	t-Y	Clock（year）	54H	0 ~ 99	7.6
t-n	t-n	Clock（month）	55H	1 ~ 12	7.6
t-d	t-d	Clock（day）	56H	1 ~ 31	7.6
t-H	t-H	Clock（hour）	57H	0 ~ 23	7.6
t-F	t-F	Clock（min.）	58H	0 ~ 59	7.6
rF	rF	Recording Time Interval（min.）	5CH	0 ~ 59	7.7
rA	rA	Recording Time Interval（sec.）	5DH	0 ~ 59	7.7
cr	cr	Recording Mode	5EH	Note 3	7.7

Note 1: 0~9 correspond with the 10 alarm types in sequence from - - -H to d-PR.

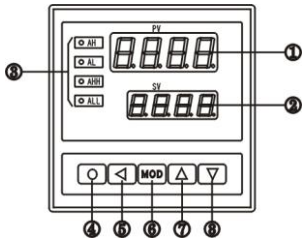
Note 2: 0~3 correspond with in sequence 0.000, 00.00, 000.0, 0000.

Note 3: 0 corresponds with OFF, 1 corresponds with ON.

Note 4: 0~3 correspond with in sequence 2400, 4800, 9600, 19.2k.

6 Operations

6.1 Descriptions on Faceplate & Keys (take B-F model as an example)



Name		Remarks
Display Window	①Display Window of Measured Value	• Indication of Measured Values. • Indicating signs and values of Parameters in the Parameter Set Up Mode. • Decimal point of final digit is the recording designation.
	② Alarm Setting Window	• Indication of Alarm Set Value.
③ **Indicator Lights**		• Indication of alarm status at each Alarm-point.
Operational	④the ● Key	• In Measuring Mode, hold down the key for more than 2 seconds to enter the Set

Keys		Up Mode. • In Set Up Mode, hold down the key for more than 2 seconds, when displaying sign of parameters to enter the next group of parameters or return to the Measuring Mode.
	⑤the ◄ Key	• No effect in Measuring Mode. • In Set Up Mode： ① Calling out the original parameter values; ②Moving the modified digit.
	⑥the MOD Key	• No effect in Measuring Mode. •Saving the modified parameter value in Set Up Mode.
	⑦the ▲ Key	• Startup printing in Measuring Mode • Increase parameter values or change setting mode in Set Up Mode
	⑧the ▼ Key	• Decrease parameter values or change setting mode in Set Up Mode

6.2 Descriptions of Configuration Parameters Setting

The parameter of the instrument is divided into several groups. The group number of each parameter is listed in *Parameter Tables* in Chapter 5.

The 2nd and the following groups of parameters are controlled by Security Code. Access will be denied if Security Code is not set.

Whether the 1st group of parameters is controlled by Security Code can be selected through setting of oA1. If the oA1 is OFF, the Security Code will be of no effect; if the oA1 is ON and the Security Code is not set, the data is accessible and modified but cannot be saved.

In the Set Up Mode and no key operation is carried out in 1 minute, the instrument will automatically quit the Set Up Mode.

6.3 Setting of Alarm Set Value

The Set Value of alarm in the 1st Group of parameters, instrument without alarm function has no such group of parameters.

① Hold down the ● key for more than 2 seconds to enter the Set Up Mode, and the instrument indicates the Sign of the 1st parameter.

② Press the MOD key to select other parameters of this group in sequence.

③ Press the ◄ key to indicate the former

Setting value of current parameter. Flashing digit is the modifier digit.

④ Press the ◄ key to shift the modifier digit. By pressing the ▲ to increase, or ▼ to decrease, the desired parameter value can be assigned.

⑤ Press the MOD key to save the modified parameter, and switch to the next parameter. If it is the last parameter of the group, press the MOD key to quit the Set Up Mode.

Repeat steps ② ~ ⑤ to set other parameters of the group.

★ If the modified parameter cannot be saved, that is because the oA1 is ON and the group of parameter is controlled by Security Code. The Security Code should be set first.

6.4 Setting of the Security Code

In Measuring Mode or in the 1st group of parameter sign indicating, the Security Code can be set.

① Hold down the ● key till oA is indicated.

② Press ◀ to enter the modifying status. Modify the value to 1111 by pressing ◀, ▲, ▼ keys.

③ Press the MOD key to finish setting.

★ When the instrument is power-up or no key operation is performed for more than 1 minute, the Security Code will be automatically clean out.

6.5 Setting of Other Parameters

① First, set the Security Code following the steps in Chapter 6.4.

② Because the 2nd group of parameters is where the Security Code is, after setting the Security Code, press the MOD key to select other parameters of the group.

③ Other groups of parameters: Hold down the ● key to enter each group. The instrument indicates the 1st actual parameter sign of the Group.

④ After setting to the group of the desired parameters, press the MOD key to select the assigned parameters of the group in sequence circularly.

⑤ Press the ◄ key to indicate the former set value of the current parameter. Flashing digit is the modifier digit.

⑥ Press the ◄ key to shift the modifier digit. By pressing the ▲ key to increase, or ▼ key to decrease, the parameter can be modified to the desired value.

★ When symbolized parameter values are modified, the flashing digit should be final digit.

⑦ Press the MOD key to save the modified parameter, and switch to the next one.

Repeat steps ④ ~ ⑦ to set other parameters of the group.

Quit Set Up Mode : When parameter signs are indicated, hold down the setting key ● to quit the Set Up Mode.

6.6 Setting of Alarm Set Value(Dimensions of 48 × 48)

The Set Value of alarm in the 1st Group of parameters, instrument without alarm function has no such group of parameters.

① Hold down the ◄ key for more than 2 seconds to enter the Set Up Mode, and the instrument indicates the Sign of the 1st parameter.

② Press the MOD key to select other parameters of this group in sequence.

③ Press the ▲ key to indicate the former set value of the alarm

parameter. Flashing digit is the modifier digit.

④Press the ▲ key to shift the modifier digit. By pressing the ▲ key to increase, or ▼ key to decrease, the parameter can be modified to the desired value.

⑤ Press the MOD key to save the modified parameter, and switch to the next parameter. If it is the last parameter of the group, press the MOD key to quit the Set Up Mode.

Repeat steps ② ~ ⑤ to set other parameters of the group.

★ If the modified parameter cannot be saved, that is because the oA1 is ON and the group of parameter is controlled by Security Code. The Security Code should be set first.

6.7 Setting of the Security Code(Dimensions of 48 × 48)

In Measuring Mode or in the 1st group of parameter sign indicating, the Security Code can be set.

① Hold down the ◄ key till oA is indicated.

② Press ◄ to enter the modifying status. Modify the value to 1111 by pressing ◄, ▲, ▼ keys.

③ Press the MOD key to finish setting.

★ When the instrument is power-up or no key operation is performed for more than 1 minute, the Security Code will be automatically clean out.

6.8 Setting of Other Parameters(Dimensions of 48 × 48)

① First, set the Security Code following the steps in Chapter 5.3.

② Because the 2nd group of parameters is where the Security Code is, after setting the Security Code, press the MOD key to select other parameters of the group.

③ Other groups of parameters: Hold down the ◀ key to enter each group. The instrument indicates the 1st actual parameter sign of the Group.

④ After setting to the group of the desired parameters, press the MOD key to select the assigned parameters of the group in sequence circularly.

⑤ Press the ◀ key to indicate the former set value of the current parameter. Flashing digit is the modifier digit.

⑥ Press the ◀ key to shift the modifier digit. By pressing the ▲

key to increase, or ▼ key to decrease, the parameter can be modified to the desired value.

★ When symbolized parameter values are modified, the flashing digit should be final digit.

⑦ Press the MOD key to save the modified parameter, and switch to the next one.

Repeat steps ④ ~ ⑦ to set other parameters of the group.

Quit Set Up Mode: When parameter signs are indicated, hold down the setting key ◀ to quit the Set Up Mode.

★ In the process of setting parameters, if no key operation is carried out for over 1 minute, instrument will automatically quit Set Up Mode.

7 Instructions on Functions & Parameters

7.1 Measurements & Displays

The process from sampling to indicating:

Sampling → Digital Filtering → Dimension Conversions → Calibrations → Linearization Calculations → Indication

- Dimension Conversions:

  For RTD signal, consult Graduation Table of resistance — temperature.

  For Thermocouple Signal, consult Graduation Table of mV — temperature.

  For other signals, conversion can be done by upper range and lower range that have been set.

If necessary conversion can also be done according to the reference listing of signals and indications or formulas provided by user.

- Calibrations: See Chapter 8.
- Customer Linearization Calculations: See Chapter 7.2.

The following lists the relevant parameters of measurements and indications. Incorrect settings may result in false indications.

❗ Displays are affected by calibrations and Linearization Calculations.

- InPt (incH) —— Input Signal Selection

Settings should correspond with instrument models and practical input signal. The parameter value is denoted in the form of sign. The following lists the corresponding relations:

No.	Signs	Input Signals
0	P100	Pt100
1	c100	cu100
2	cu50	cu50
3	bA1	BA1
4	bA2	BA2
5	G53	G53
6	___K	K
7	___S	S
8	___r	R
9	___b	b
10	___n	N

No.	Signs	Input Signals
11	___E	E
12	___J	J
13	___t	T
14	4-20	4mA~20mA
15	0-10	0mA~10mA
16	0-20	0mA~20mA
17	1-5u	1V~5V
18	0-5u	0V~5V
19	__mu	mV
20	___L	Pressure Gauges with Resistance Transmitter

- in-d —— Decimal Point Position Selection Indicated Measured Value

For RTD inputs: 000.0 is the only selection

For Thermocouple inputs:

When 0000. is selected, resolution of display is 1℃;

when 000.0 is selected, resolution of display is 0.1℃, but the indication values cannot exceed 1000℃.

For other signal inputs: select according to requirements

- u-r (u-r) —— Lower Range
- F-r (F-r) —— Upper Range

The 2 parameters define the corresponding starting-point value and the end point value of indicated values of those input signals. For RTD and Thermocouple inputs, they have nothing to do with the 2 parameters and can be ignored.

Example : 4 mA~20mA input, corresponding to 0~1.600MPa, then set four above-mentioned parameters:

InPH = 4-20; In-d = 0.000

u-r = 0.000; F-r = 1.600

- FLtr (FLtr) —— Digital Filtering Time Constant

Used for overcoming fluctuation of the indicated values caused by signal too instability. The bigger the setting value is the greater the effect will be and the slower the reaction to the change of the input signal. The default setting is 1.

- PF (PF) —— Selection of Extraction of Square Root

For Current or Voltage signal from the orifice flowmeter output only, if it is ON, the instrument implements extraction of square root on the input signal. Should choose OFF for other signals.

- cHo (cHo) —— Low Signal Cut-out Threshold

When the Extraction of Square Root Function is selected, if the input signal is less than threshold value, the instrument will treat it as the signal is 0 and the setting range of the parameters is 0~25 which means 0%~25%.

The parameter can be set at 0 when the function is not in use.

- HL (HL) —— Selection of Alarm Set Values Indication

Instruments with Alarm Set Value indication indicate a certain value by selection of this parameter.

Settings of 0~8 correspond to Au, AH, AL, AHH, ALL, bH, bL, bHH, bLL in sequence.

- bt-L (bt-L) —— Lower limit of Light Bar Indication
- bt-H (bt-H) —— Upper limit of Light Bar Indication

Instruments with Light Bar indication function set the indication range by these two parameters.

7.2 Customer Linearization Function

This function is an optional function.

If the correlation between the input signal and the indicated value is non-linear and monotonously ascending, it cannot be described on order, and its data must be determined by user when calibrating, the Customer 8 Segments Broken-line Linearization Function can be used.

Monotonously ascending means that when the input signal increases the indicating value increases too within the whole range of the input signal. It may never occur that the input signal increases while the indicating value decreases.

① Linearization Calculating relevant parameters:

c-b (c-b) —— Linearization Function Selection

c1 ~ c8: Indicate Measured Value reading of each Broken-line Calculating point

b1 ~ b8: Indicate Desired Value of each Broken-line Calculating point

Measured Value reading: The indication value before Linearization Calculation.

Desired Value: The desired indicated value of after Linearization Calculation

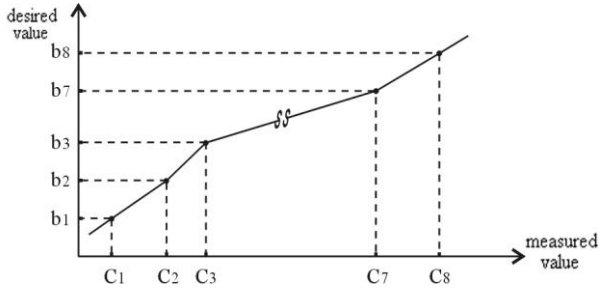
② Operation Guide:

- Linearization Calculation should be done after Dimension Conversions and calibrations, and the relevant parameters should be set the way described in Chapter 7.1.
- Set c-b to OFF to close the Linearization Calculating

Function.

- Having been connected with the input signal, the instrument increases the input signal gradually. Meanwhile it records the Measured Value and Desired Value of each broken-line point while increasing the input signal. Then c1 ~ c8 and b1 ~ b8 are available instantly.
- Set c-b parameter as ON, start the Linearization Calculation function and set parameters of c1 ~ c8 and b1 ~ b8.

③ Diagram



For Measured Values less than C1, instrument will auto-calculate according to the slope of the next sect.

For Measured Values more than C8, instrument will auto-calculate according to the slope of the previous sect.

7.3 Alarm Output

This function is an optional function.

Instrument can be set 8 Alarm Output at most.

Each Alarm Output has 3 parameters, which are used to set alarm values, select alarm types and set alarm hysteresis separately. But hysteresis of the 7th and 8th alarm points is fixed to 0, which cannot be reset.

- The parameters AH, AL, AHH, ALL, bH, bL, bHH, bLL are Alarm Set Value of alarm outputs from the 1st to 8th in sequence.
- The parameters ALo1 ~ ALo8 are alarm types of 8 alarm points in sequence.
- The parameters HYA1 ~ HYA6 are alarm hysteresis of the 1st to 6th alarm output in sequence.

In addition, there are another 2 parameters are common for all Alarm Output.

- Au (Av) —— comparison value of deviational alarm type

Alarm will be activated when the deviation of the Measured Value and this value exceeds the Alarm Set Value. Non-deviational alarm has nothing to do with this parameter.

- cYt (cYt) —— Alarm On-Delay Time

The setting range is 0~20 seconds. At 0, the Alarm On-Delay Time function is ineffective.

If the Measured Value exceeds the Alarm Set Value, On-Delay Time is started, and in the period of the Time, the Measured Value is always in alarm status, and then the alarm output signal will be emitted when the Alarm On-Delay Time ends. Otherwise alarm signal will not be emitted.

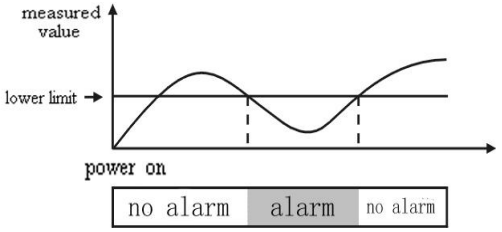
The end of Alarm output is also controlling by the On-Delay Time.

- Alarm Type: There are 10 alarm types, which include 5 basic modes and 5 armed state modes. Alarm Type at each

alarm point can be selected through AL01 ~ AL08 parameters.

The armed state alarm mode means no alarm outputs when instrument power-up even Measured Value is in alarm status. The armed state condition will be built up when Measured Value has entered the non-alarm zone. After that alarm function will be activated.

Example: Diagram of lower limit alarm of armed state:



When AL01 ~ AL08 parameters setting:

---H: Upper limit alarm, Alarm active when Measured Value > Alarm Set Value

---L: Lower limit alarm, Alarm active when Measured Value < Alarm Set Value

-PAH: Upper deviation alarm, Alarm active when (Measured Value—AU) > Alarm Set Value.

-PAL: lower deviation alarm, Alarm active when (AU— Measured Value) > Alarm Set Value

--PA: Absolute value of deviation alarm, Alarm active

when | PV—Measured Value | > Alarm Set Value

d--H: Upper limit of armed state alarm

d--L: Lower limit of armed state alarm

dPAH: Upper deviation of armed state alarm

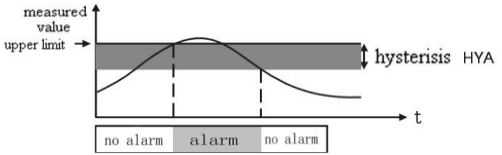
dPAL: Lower deviation of armed state alarm

d-PA: Absolute value of deviation of armed state alarm

When deviation alarm is selected, Alarm Set Value cannot be negative.

- Alarm Hysterisis: An extensional zone of Alarm clears can be set according to requirements, to avoid frequently act of Alarm Relay caused by Measured Value fluctuating around Alarm Set Value .

Example: When upper limit alarms:



All alarm setting will be invalidation when the instrument with communication function and ctd parameter is set as ON.

7.4 Re-Transmitted Output

This function is an optional function.

Re-Transmitted Output has 3 parameters:

- oP (op) —— Output signal selection

  When choose 4-20: Output is 4mA -20mA (or 1 V -5V)

  0- 10: Output is 0mA -10mA

  0-20: Output is 0mA -20mA (or 0 V -5V)

- bA-L (bA-L) —— Settings of lower range of Re-Transmitted Output

- bA-H (bA-H) —— Settings of upper range of Re-Transmitted Output

Example : For instruments with Thermocouple input which Re-Transmitted Output of 4mA-20mA correspond to 500-1200℃, settings should be oP = 4-20, bA-L = 500, bA-H = 1200.

❗All Re-Transmitted Output setting will be invalidation when the instrument has been communication function and ctA parameter is set as ON.

7.5 Communication Interface

This function is an optional function.

There are 4 parameters related with the communication function:

- Add (Add) —— Communication address of instruments. Setting range: 0-99 Default setting is 1.

- bAud (bAud) —— Selection of communication rate. There are 4 choices available which are 2400, 4800, 9600,

19.20k. Default setting is 9,600.

- ctd (ctd) —— Controlling Right Selection of Alarm Output

If it is set OFF, instrument controls according to alarm function. If set ON, the right will be transferred to PC. Then the alarm output of instrument will be directly controlled by ON/OFF command sent by PC.

- ctA (ctA) —— Controlling Right Selection of Re-Transmitted Output

If it is set OFF, instrument outputs according to Re-Transmitted Output function. If set ON, the right will be transferred to PC, and Re-Transmitter Output will be controlled directly by analog output command sent by PC.

For some relevant communication commands and protocols, see *Communication Protocols* Commands related to the T Series are as follows:

#AA↙ Read Measured Value

#AA0001↙ Read analog output value (Re-Transmitted Output)

#AA0002↙ Read ON/OFF input status

#AA0003↙ Read ON/OFF output status (alarm output)

#AA99↙ Read version of instrument

' AABB↙ Read signs of instrument parameters(Name)

$AABB↙ Read values of instrument parameters

%AABB(data) ↙ Set instrument parameters

&AA(data) ↙ Output analog signals

&AABBDD↙ Output ON/OFF signals

For instruments with recording functions, and Commands related to recording, see Chapter 8 in *Communication Protocols*.

7.6 Print Interfaces & Print Units

This function is an optional function.

Instruments are equipped with print units with RS232 interface. The communication rate of the print unit is set as 9600.

The 2nd communication interface of instrument with both Communication Interface and Print Interface is used for printing. Its communication rate has been fixed at 9600 interiorly, which needn't to be set. The 1st communication interface of instrument with only print interface is used for printing. Its communication rate needs to be set at 9600 through bAud parameter.

Here are some relevant parameters of Print Interface:

- bAud (bAud) —— Communication rate selection. It must be set 9600.
- unit (unit) ——Selection of engineering unit of Measured Value

There are 16 selections. If the required unit is not included, special notification is needed on order.

Reference list of the number and print engineering units:

0	1	2	3	4	5	6	7
℃	RH %	MPa	kPa	Pa	kN	N	kg
8	9	10	11	12	13	14	15

mm	m	m^3/h	V	A	t/h	l/m	ppm

- Po (Po) —— Selection of Print Mode

  When select 0: Do not print

  When select 1 : Press ▲ key to start printing.

  When select 2 : ▲ key + Timing to start printing

  When select 3 : ▲ key + Timing + Alarm to start printing

- P-H (P-H) ——Interval of timing printing,(hour).
- P-F (P-F) ——Interval of timing printing, (minute).
- P-A (P-A) ——Interval of timing printing, (second).
- There are 5 more parameters to set and adjust the in-house hardware clock of the instrument:

t-y, t-n, t-d, t-H, t-F are year, month, day, hour, minute in sequence.

7.7 Recording Unit

This function is an optional function.

Parameters related to the Recording Unit:

- rF (rF)——Recording interval(minute)
- rA (Ra)——Recording interval(second)
- cr (cr) —— Selection of recording mode. If set ON, circular recording is set; if set OFF, non-circular is set. The instrument should be re-power-up after setting changed.

The decimal point of final digit of measuring display window is the

recording indicator light. It flashes once every time when the instrument records during recording interval.

For recording value formats and reading modes, see Chapter 8 in *Communication Protocols.*

For setting and calibration of in-house hardware clock, see Chapter 7.6.

8 Calibrations

Calibration can minish errors of zero and full range caused by sensors, transmitters and lead resistance, etc., and raises the measurement accuracy of the system. It can be actualized through Zero correction parameter and Full Scale correction parameter.

Zero correction should be done first when Calibration, and the Full Scale correction later.

- in-A (in-A) —— Zero Correction Value. The default setting is 0

  Indicating Value = Indicating Value before Zero correction + in-A

- Fi (Fi) —— Full Scale Correction Value. The default setting is 1.000

  Indicating Value = Indicating Value before Full Scale correction × Fi

For instruments with thermocouple input, calibration of Cold Junction Compensate accuracy can be done through Li parameter.

- Li (Li) —— Cold Junction Compensate Correction

The default setting is 1.000, compensate accuracy is ± 0.2℃. Increasing value of this parameter can make compensated temperature increase; decreasing value of this parameter can make compensated temperature decrease.

If Cold Junction Compensate is not needed, this parameter can be set 0.

❗ If the input signal is short, the instrument will indicate the actual temperature of input terminal. Being affected by the heat of the instrument itself, the temperature may be higher than room temperature. In practical

applications, when compensating cable connected to the input terminal, the temperature of instrument itself is the Cold Junction temperature that is being measured. So the heat of the instrument will not affect the accuracy of measurements.

9 Countermeasures against Input Signal Troubles

Countermeasures against Input Signal Troubles function can ensure the equipment run safely and can prevent operational accidents like interlock actions, shutdown, etc., which are caused by input signal trouble. o.L means input signal trouble.

Input signal trouble means situations as follows:

- RTD or Thermocouple open circuit
- When inputting other signals, too much of input signal may result in A/D Converter overflowing.

➢ bout (bout) —— Substitution Measured Value, when input signal trouble occurs.

When instrument judges that input signal is in trouble, the set bout value will be used to replace the former input signal, and will be used as the criterion of the alarm output and the value of Re-Transmitter Output.

Parameter settings can still be carried out when the instrument indicates oL.

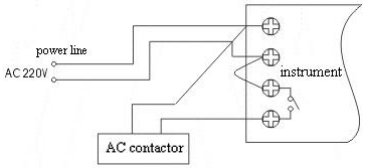
Input Signal Fault Alarm function can be increased according to customer's needs.

✎ If the instrument doesn't have the alarm output function, Re-Transmitter Output and the communication function, this parameter will not function anymore.

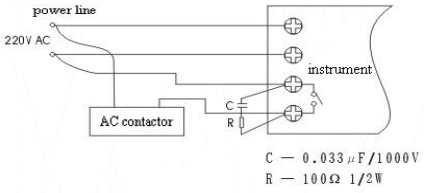
10 Anti-Interference Measures

When the instrument discovers some big fluctuation or pulsates, that is caused by too much noise, which can be reduced or eliminated by taking measures as following.

- The input signal cable should use shielded cable, whose shielding layer is grounding or connected with the input ground terminal of instrument, and should separated with power line with higher voltage of 100V as far as possible.
- Instrument's power supply should be separated with inductive load power supply (like AC contactor) as far as possible.



Wrong Connection



Correct Connection

- Parallel connect RC spark absorber circuit on the control contacts with inductive load.
- Properly setting of digital filtering time constant.
- Use on-delay time alarm function of the instrument to avoid misoperation caused by noise.

11 Conventional Nonstandard Functions

In some particular use, some of the following function may be useful. These functions are not availability of standard version of the instrument. Special notification is needed on order.

Reset of Indicating Value

It is usually used for sensors who has biggish zero drift or zero shift constantly. The indication zero of instrument reset, through keys on the faceplate or exterior contacts input.

Buzzer

The instrument can with built-in buzzers or control exterior buzzer by output contacts. The buzzer sounds when alarm active, then the sounds can be stopped by pressing the acknowledge key.

Powered Down Memorizing

The instrument records the measured value the time power is cut off, which can be indicated after re-power-up. Indicate current measured value, after acknowledged by pressing a key.

Alarm Latching

After the measured value reaches the alarm value, alarm is emitted and latched, and resumption can only be acknowledged by pressing a key.

The Maximum Held

The maximum value ever appeared during the measure process, which can be viewed or deleted by pressing keys on faceplate.

Indication Latching

When the exterior input contact is closed, the indication will remain the measured value of the close time. The indication of current measured

value will resume after contact is cut off.

Dual-colors Light Bar Indications

Dual colors of red and green make indication more intuitionistic.

Average Value Indications

The average interval can be set. The instrument indicates the average value of all measured values in this period time. The Average Value indication is usually used for the measured signals with greater fluctuation.

Dual Measured Value Indication

The 1st indication is Measured Value; the 2nd indication is the indirect Measured Value that is result from calculation in instructed way.

Dual Isolation Output

2 channels Re-Transmitted Outputs with full isolation Current or Voltage signal can use for 2 receiving equipments separately.

Positive / Negative Polarity Input

Used for ±5V, ±mV or Sensor signal.