Honeywell

DC1000 SERIES

DIGITAL CONTROLLER

PRODUCT MANUAL

Industrial Measurement & Control

51-52-25-113
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DC1010/1020/1030/1040 Product Manual

Symbol Definitions

The following advisory convention is used in this document to denote certain conditions.

Symbol	Definition

CAUTION

This **CAUTION** symbol on the equipment refers the user to the Product Manual for additional information. In this manual, this symbol appears next to required information. **Failure to comply with these instructions may result in product damage.**

WARNING

PERSONAL INJURY: Risk of electrical shock. This symbol warns the user of the potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 Vdc may be accessible.
Failure to comply with these instructions could result in death or serious injury.

Contents

1.   Overview
1.1   Introduction

Function

The DC1000 family of microprocessor based controllers combine a high degree of functionality and reliability in 4 different formats: 1/16 DIN, 1/8 DIN, 3/16 DIN, and 1/4 DIN.

With a typical accuracy of $\pm$ 0.5% of span, the DC1000 is an ideal controller for regulating temperature and other process variables in a variety of applications including dryers, semiconductor packaging & testing, plastic processing, packaging machinery, painting & coating, and climatic chambers.

Easy to Configure

Two different configuration levels provide easy access to parameters. A 4-digit security code prevents unauthorized changes. Parameters can also be hidden to the user to prevent improper configuration of the unit.

Various Control Algorithms

The DC1000 series of controllers provides several different algorithms:

- PID or ON/OFF Control

- Hear/Cool Algorithms with 2 different PID sets

- Motor Position Control without slidewire feedback

- Single Phase Control with/without zero crossover control

- Three Phase Control with/without zero crossover control

Mount Anywhere

The DC1000 family is industrial control equipments that must be panel mounted. The wiring terminals must be enclosed within the panel. The DC1000 is environmentally hardened and, when suitably enclosed, can be mounted virtually anywhere in plant or factory; on the wall, in a panel, or even on the process machine. It withstands ambient temperature up to 50°C (122°F).

CE Conformity (Europe)

This product is in conformity with the protection requirements of the following European Council Directive: **73/23/EEC**, the Low Voltage Directive, and **89/336/EEC**, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) is not guaranteed.

Enclosure Rating: Panel-mounted equipment rating IP00. This controller must be panel mounted and all terminals must be enclosed within the panel. Front panel IP65 (IEC 529) option is available.
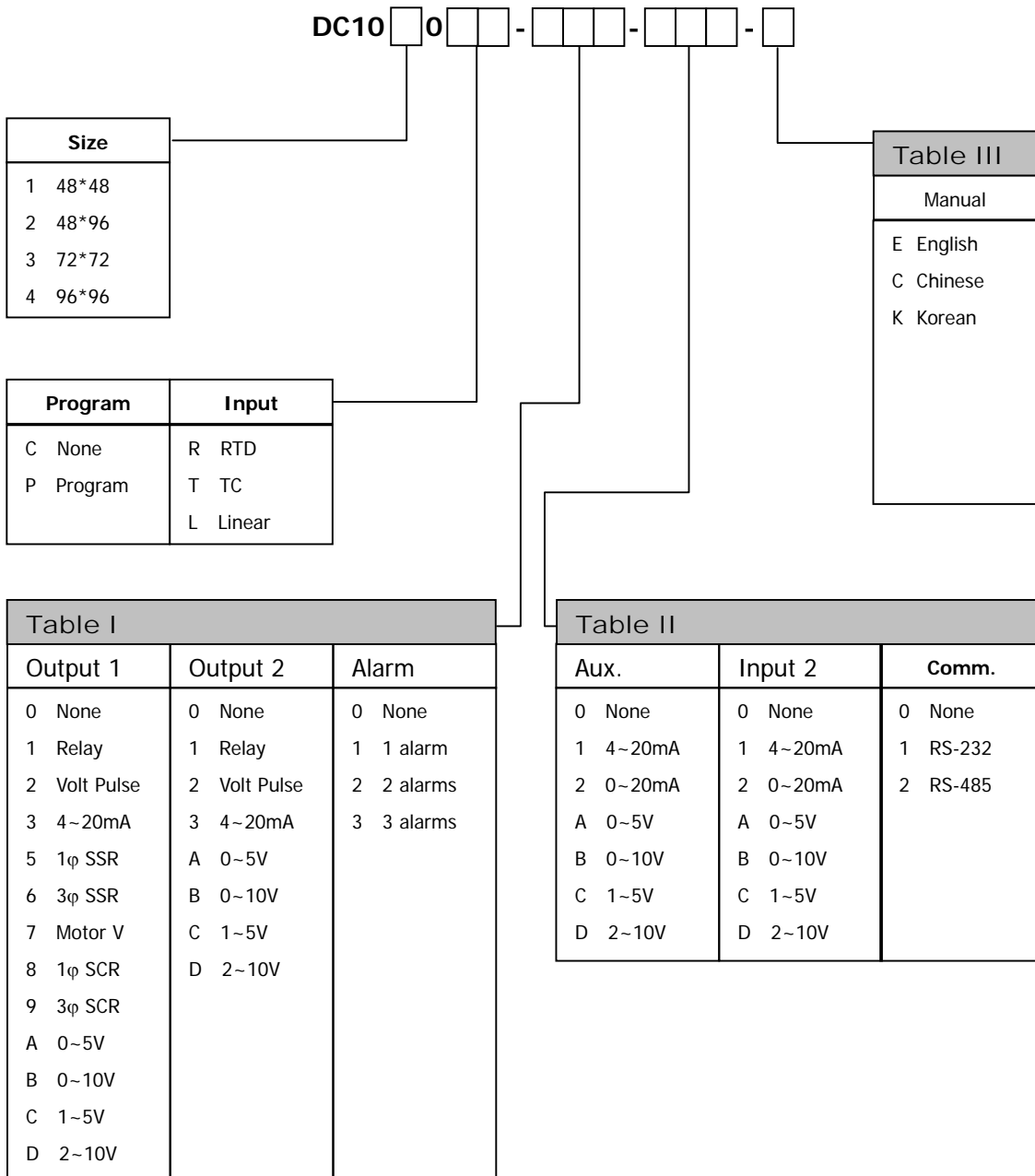
2.   Installation

> ⚠️ **WARNING**
>
> Local Regulations regarding electrical & safety must be observed.
>
> **Failure to comply with these instructions could result in death or serious injury.**

2.1   Model Number Interpretation

DC10☐0☐☐-☐☐☐-☐☐☐-☐

Size	
1	48*48
2	48*96
3	72*72
4	96*96

Program		Input	
C	None	R	RTD
P	Program	T	TC
		L	Linear

Table III

Manual	
E	English
C	Chinese
K	Korean

Table I

Output 1		Output 2		Alarm	
0	None	0	None	0	None
1	Relay	1	Relay	1	1 alarm
2	Volt Pulse	2	Volt Pulse	2	2 alarms
3	4~20mA	3	4~20mA	3	3 alarms
5	1φ SSR	A	0~5V		
6	3φ SSR	B	0~10V		
7	Motor V	C	1~5V		
8	1φ SCR	D	2~10V		
9	3φ SCR				
A	0~5V				
B	0~10V				
C	1~5V				
D	2~10V				

Table II

Aux.		Input 2		Comm.	
0	None	0	None	0	None
1	4~20mA	1	4~20mA	1	RS-232
2	0~20mA	2	0~20mA	2	RS-485
A	0~5V	A	0~5V		
B	0~10V	B	0~10V		
C	1~5V	C	1~5V		
D	2~10V	D	2~10V		

2.2   Specification

TECHNICAL DATA		
PV Input	Type of Input	TC (K, J, R, S, B, E, N, T, W, PL II, U, L), RTD (Pt100Ω, JPt100Ω, JPt50Ω) Linear (-10~10mV, 0~10mV, 0~20mV, 0~50mV, 10~50mV)
	Input Sampling Time	500 ms
	Input Resolution	14 bit (each)
Indication	PV/SP Indication	4-digit, 7 segment display
	Constant Value Storage System	Non-volatile memory (EEPROM)
	Indication Accuracy	± 0.5%FS
Control Mode	Proportional Band (P)	0~200% (On/Off action at P=0)
	Integral Time (I)	0~3600 sec (PD action at I=0)
	Derivative Time (D)	0~900 sec (PI action at D=0)
	Cycle Time	0~150 sec (4~20mA→ 0, SSR→1, relay→10)
Output	Relay Output	Contact, SPST(DC1010)/SPDT(1020,1030,1040), 3A/240VAC
	Voltage Output	Voltage Pulse, 20VDC/20mA
	Linear Output	4~20mA, 0~5V, 0~10V, 1~5V, 2~10V
	Motor Control Output	Three Position Step Control (Time proportional motor control)
	Others	1φ SSR, 3φ SSR, 1φ SCR, 3φ SCR
Alarm	Channel	3 channels (optional)
	Mode	17 alarm mode available
	Timer	Flicker alarm, continued alarm, on delay timer alarm
Aux. Output	Output Signal	SP, PV
	Type of Output	4~20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V
2nd Input (RSP)	Type of Input	4~20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V
	Sampling Time	500 ms
Program	Pattern/Segment	2 pattern/ 8 segment (each)
	Availability	Pattern link & repeat, program/segment end alarm
Communication	Type of Communication	RS-232, RS-485
General Specifications	Rated Power Supply Voltage & Frequency	AC 90-240V, 50/60Hz or DC15-50V, 4VA
	Power Consumption	Max. 8VA
	Storage Temperature	-25°C~65°C
	Ambient Temperature	0°C~50°C
	Ambient Humidity	50~85% RH (no condensation)

| INPUT ACTUATIONS			
TC		K	0.0~200.0, 400.0, 600.0, 800.0, 1000, 1200 °C
		J	0.0~200.0, 400.0, 600.0, 800.0, 1000, 1200 °C
		R	0.0~1600, 1769 °C
		S	0.0~1600, 1769 °C
		B	0.0~1820 °C
		E	0.0~800, 1000 °C
		N	0.0~1200,1300 °C
		T	0.0~400.0, 200.0 °C, 0.0~350.0 °C
		W	0.0~2000, 2320 °C
		PL II	0.0~1300, 1390 °C
		U	-199.9~600.0, 200.0 °C, 0.0~400.0 °C
		L	0.0~400.0, 800.0 °C
RTD		Pt100	-199.9~600.0, 400.0, 200.0 °C, 0.0~200.0, 400.0, 600.0 °C
		JPt100	-199.9~600.0, 400.0, 200.0 °C, 0.0~200.0, 400.0, 600.0 °C
		JPt50	-199.9~600.0, 400.0, 200.0 °C, 0.0~200.0, 400.0, 600.0 °C
Linear	AN1	-10~10mV	
	AN2	0~10mV	
	AN3	0~20mV	
	AN4	0~50mV	0~20mA, 0~1V, 0~5V, 0~10V
	AN5	10~50mV	4~20mA, 1~5V, 2~10V

2.3   Mounting

CAUTION

Installation Precautions

The controller can be mounted on either a vertical or tilted panel using the mounting bracket supplied. Adequate access space must be available at the back of the panel for installation and servicing activities.

Failure to comply with these instructions may result in product damage.
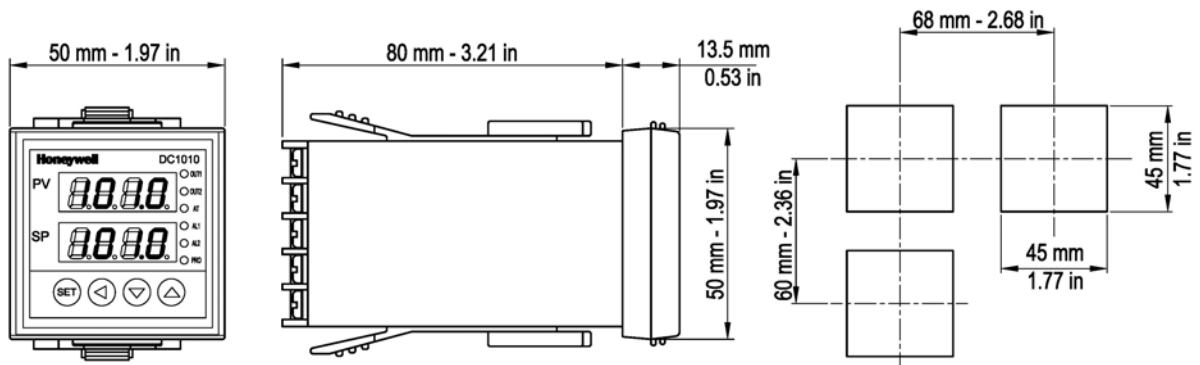

Side View
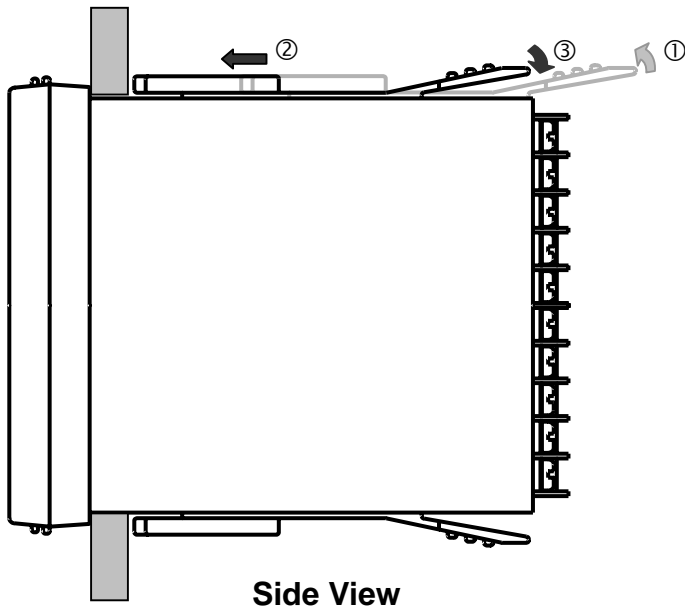
1 - Put the mounting bracket in the rail on the top & bottom of the case.

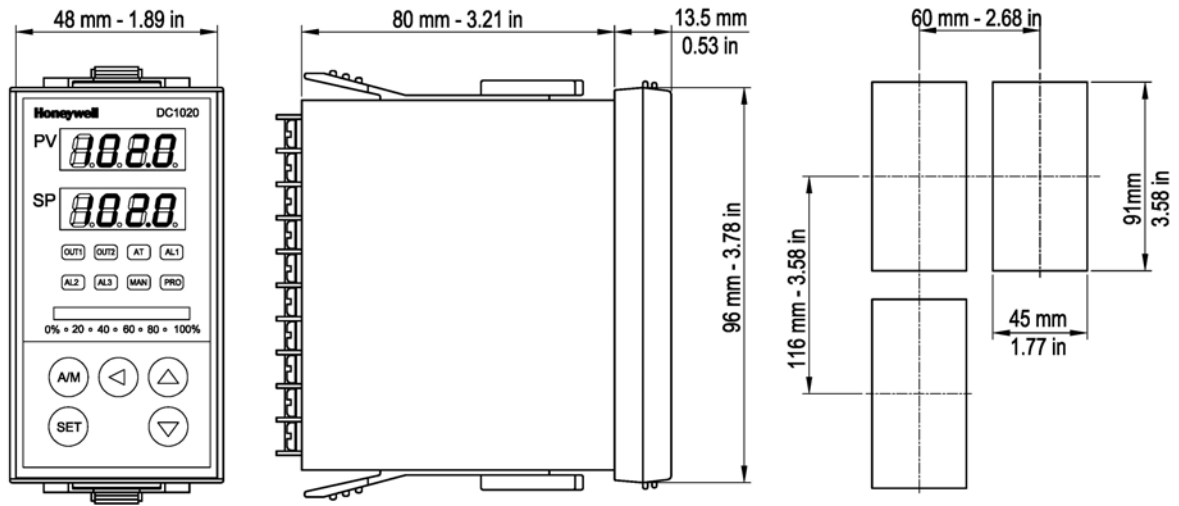2 - Bend the grip of the bracket & slide the bracket along the rail until the case is secured against the panel.

3 - Put the grip of the bracket on the groove to fasten the case to the panel.
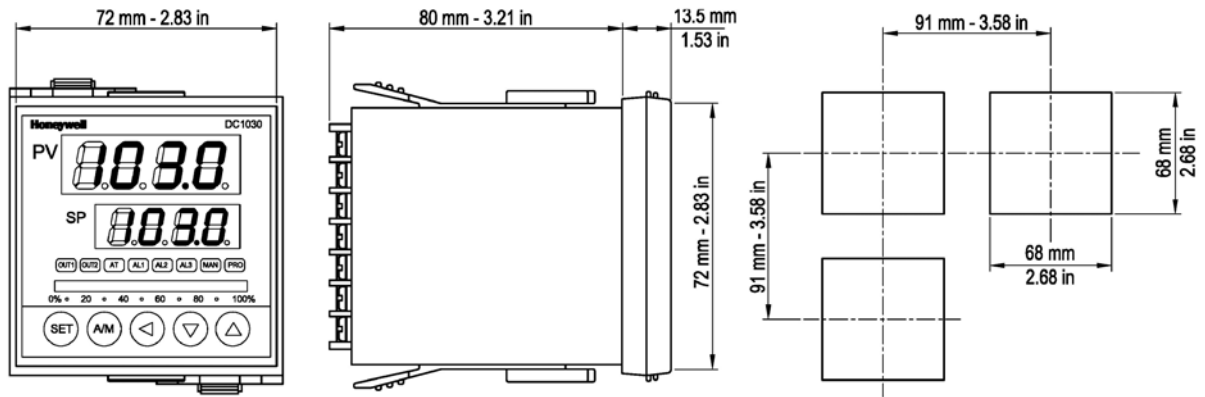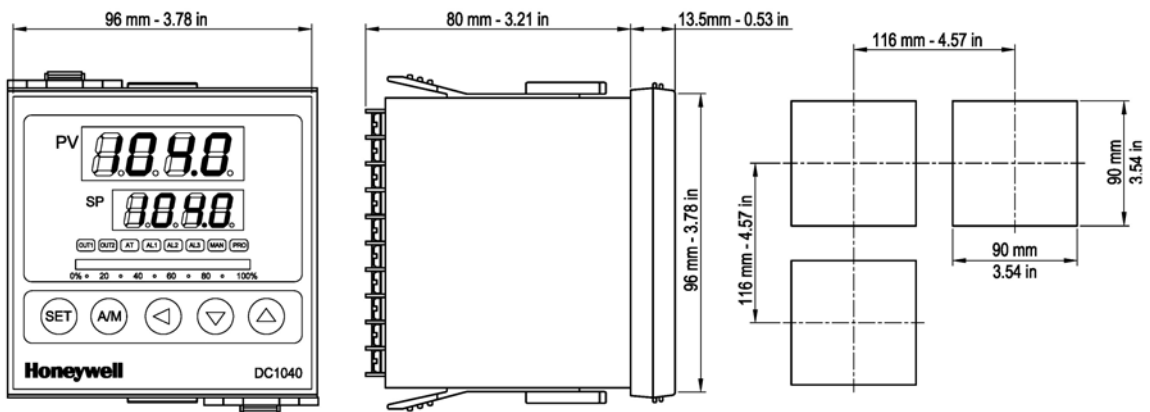
2.4   External Dimension

2.4.1   DC1010

2.4.2   DC1020

2.4.3   DC1030

2.4.4   DC1040

2.5 Wiring Diagrams

> ⚡ **WARNING**
>
> **Electrical Consideration / Precautions**
>
> The controller is considered "rack and panel mounted equipment" per EN61010-1, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements. Conformity with 72/23/EEC Low Voltage Directive, requires the user to provide adequate protection against a shock hazard. The user shall install this controller in an enclosure that prevents OPERATOR access to the rear terminals.
>
> **Failure to comply with these instructions could result in death or serious injury.**

> ⚠ **CAUTION**
>
> Applying 85-264Vac to a controller rated for 15-50Vdc will severely damage the controller and is a fire and smoke hazard.
>
> **Failure to comply with these instructions may result in product damage.**

> ⚠ **CAUTION**
>
> **Wiring Requirements**
>
> Shielded twisted pair cable is required for all Analog I/O, Process Variable, RTD, Thermocouple, dc millivolt, low level signal, mA, Digital Output, and computer interface circuits.
>
> **Failure to comply with these instructions may result in product damage.**

> ⚠ **CAUTION**
>
> **Line Voltage Wiring**
>
> This controller is suitable for connection to 90-240 Vac, 50/60 Hz or 15-50 Vdc, power supply mains. It is the user responsibility to provide the following
>
> - 90-240 Vac - a switch, fuse (1/2A, 250V) or a circuit breaker.
> - 15-50 Vdc – a switch, fuse (1A, 125A) or a circuit breaker
>
> Fuse types – North America non-time delay, Europe – Type F, quick acting fuse(s).
>
> The above items should be installed together with DC1000 for the products electrical protection.
>
> The switch or circuit-breaker should be located close to the controller, within easy reach of the operator. The switch or circuit-breaker should be marked as the disconnecting device for the controller.
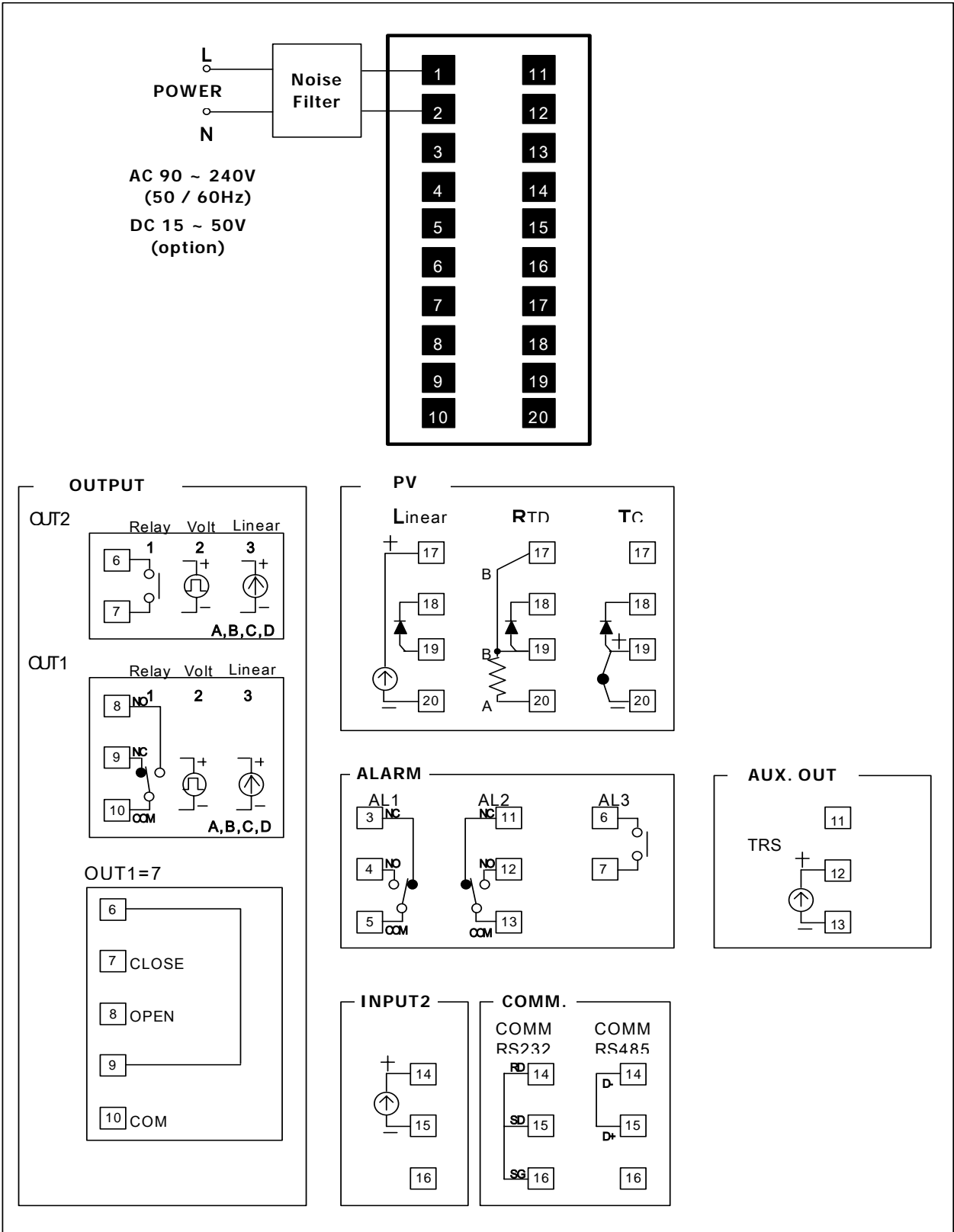>
> When applying power to multiple instruments, make sure that sufficient current is supplied. Otherwise, the instruments may not start up normally due to the voltage drop caused by the in-rush current.
>
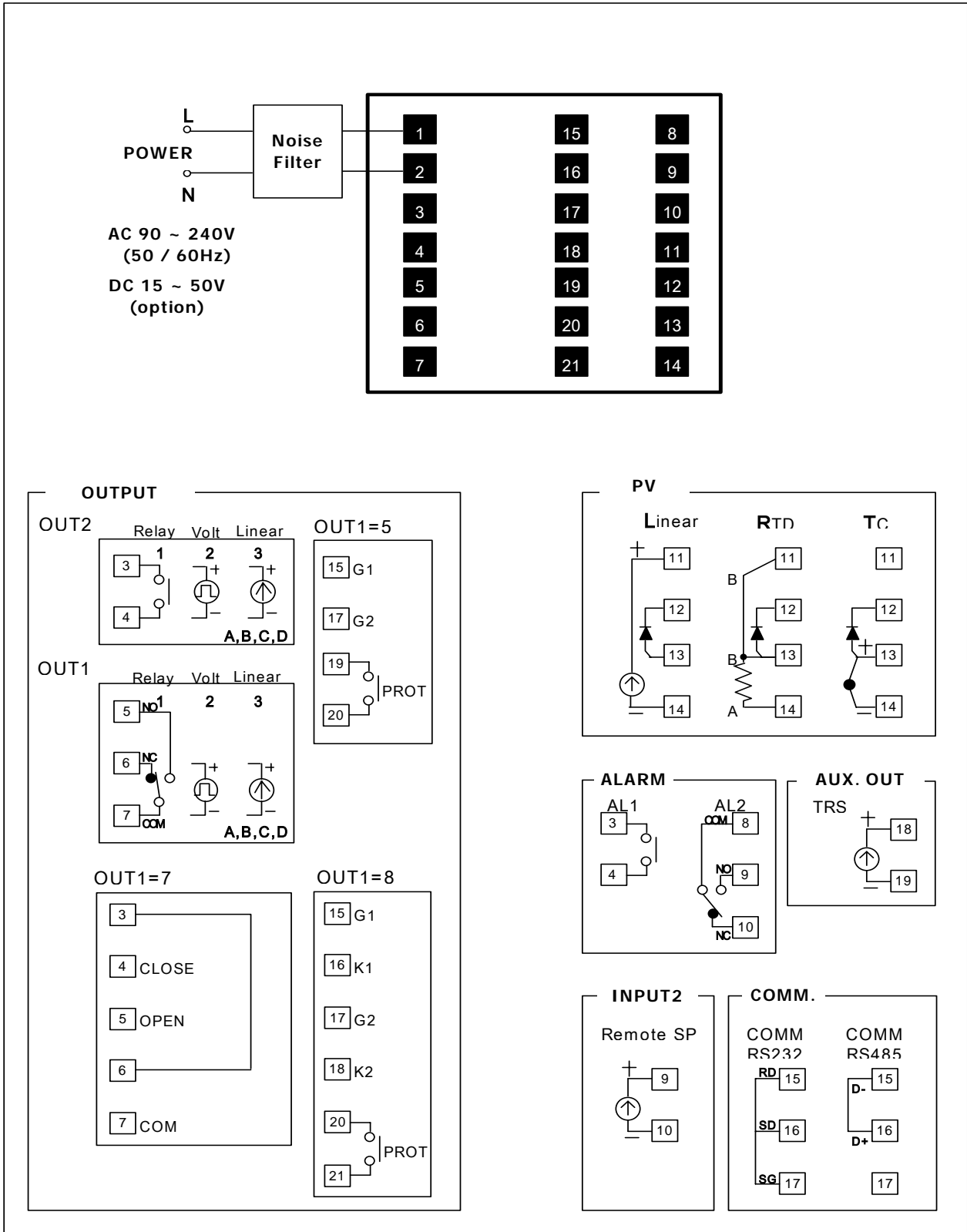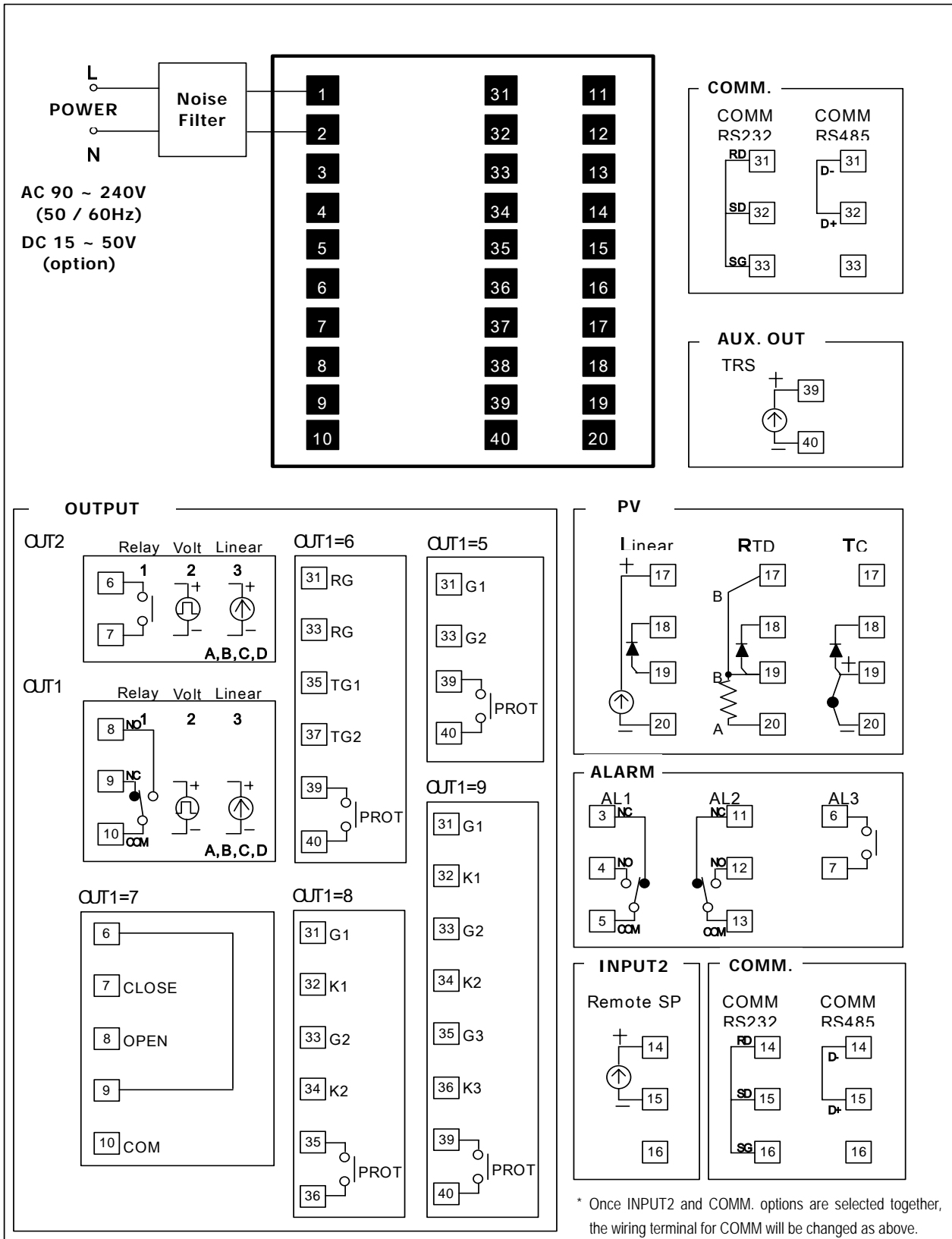> **Failure to comply with these instructions may result in product damage.**
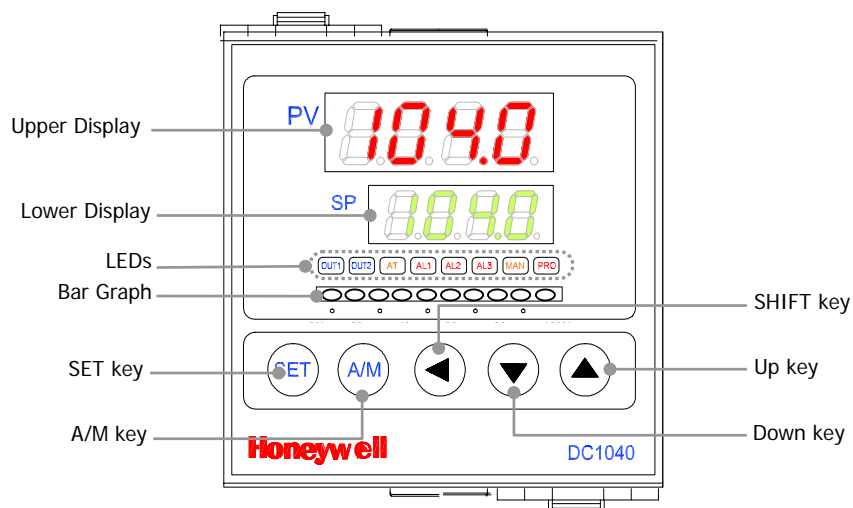
2.5.1 DC1010
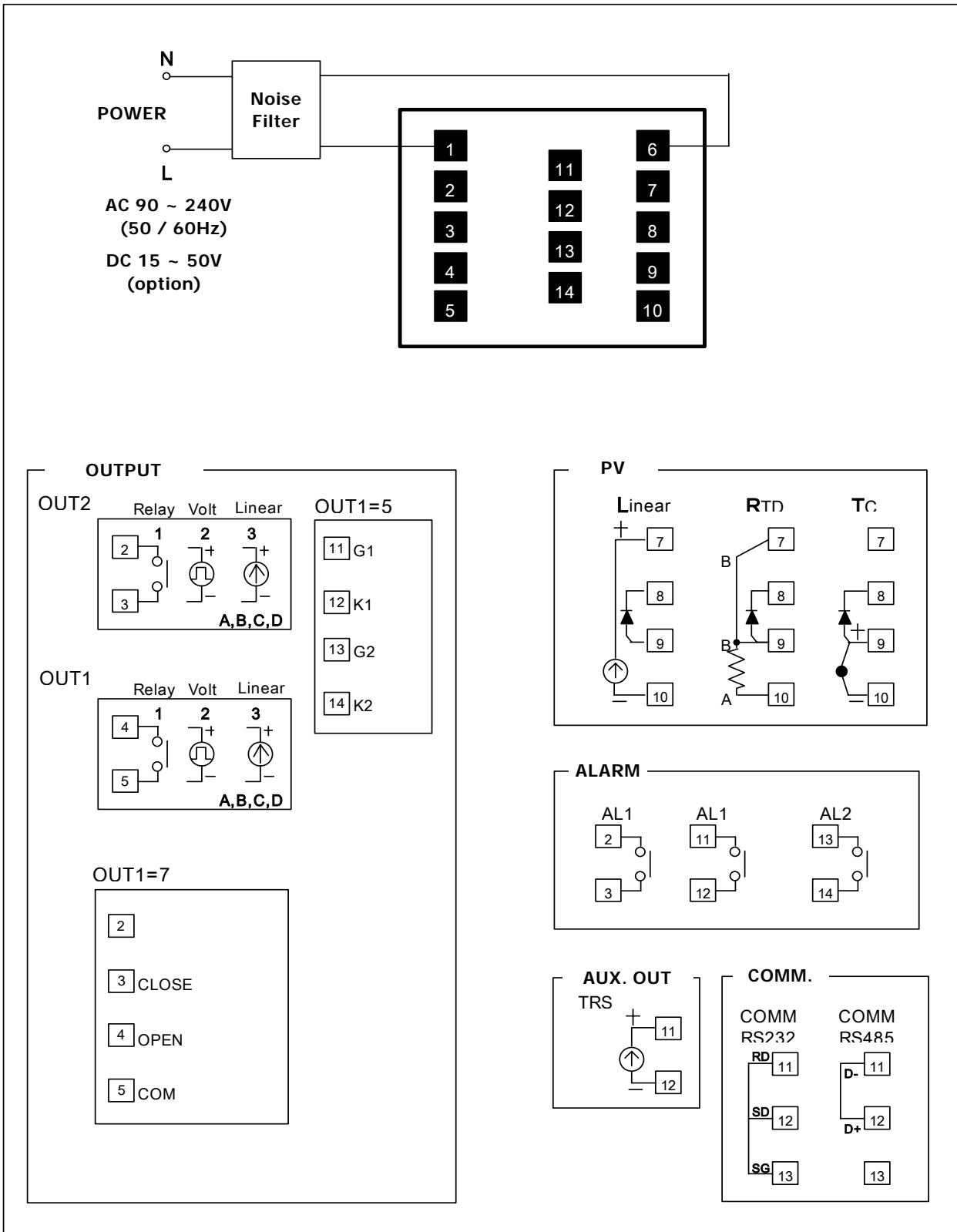
2.5.2 DC1020

2.5.3 DC1030

2.5.4 DC1040
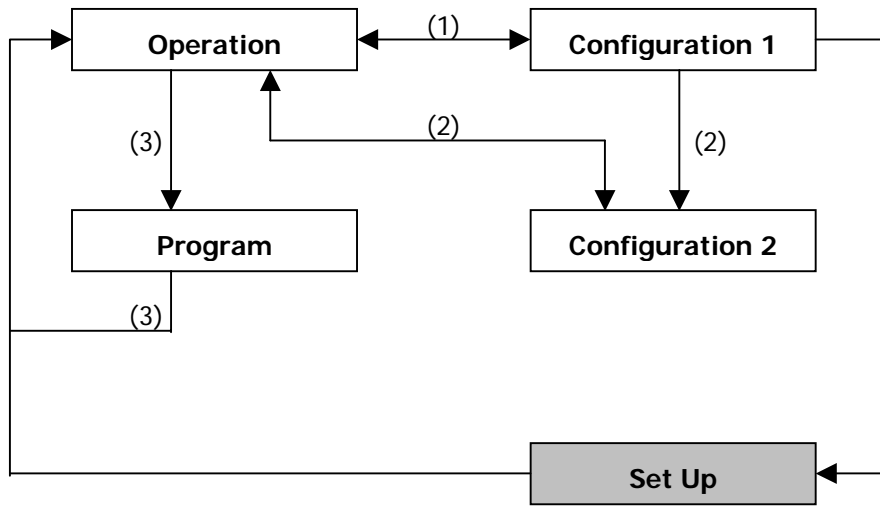
3.   Configuration
3.1   Operator Interface

Upper Display	4 digits dedicated to display the PV. In configuration mode, this display indicates the name of parameter.
Lower Display	4 digits dedicated to display the SP. In configuration mode, this display indicates the value of parameter or the status of parameter selected.
Bar Graph	A bargraph of 10 green LEDs' indicates the value of the output in percentage.

LEDs

OUT1	Status of 'Output 1'.
OUT2	Status of 'Output 2'.
AT	When the LED is ON, it indicates the controller is in automatic tuning process .
AL1	Status of 'Alarm 1'.
AL2	Status of 'Alarm 2'.
AL3	Status of 'Alarm 3'.
MAN	When the LED is ON, it indicates the controller is in manual mode.
PRO	When a program is running, the LED flickers.
	When a program is suspended, the LED is ON.
	When no program is running, the LED is OFF.

Keys

SET	SET key allows moving from one parameter to another or saving a new value of parameter or a status of parameter changed.
A/M	A/M key allows switching from automatic mode to manual mode or from manual mode to automatic mode.
SHIFT	SHIFT key allows shifting the digits to modify parameters.
UP	UP key allows increasing the value of a digit selected or changing the status of parameter.
DOWN	DOWN key allows decreasing the value of a digit selected or changing the status of parameter.

3.2   MODE Access


```
   ┌──────────────┐    (1)    ┌──────────────────┐
   │  Operation   │◄────────►│ Configuration 1  │
   └──────────────┘           └──────────────────┘
        │ (3)          (2)            │ (2)
        ▼                              ▼
   ┌──────────────┐           ┌──────────────────┐
   │   Program    │           │ Configuration 2  │
   └──────────────┘           └──────────────────┘
        │ (3)
        ▼
   ┌──────────────────────────────────────────────┐
   │                   Set Up                      │
   └──────────────────────────────────────────────┘
```

How to move from one MODE to another

(1)   Press 'SET' key for 5 seconds; it grants access to 'Configuration 1' mode or return to 'Operation' mode from 'Configuration 1' mode.

(2)   Press 'SHIFT' key for 5 seconds while pressing 'SET' key first; it grants access to 'Configuration 2' mode or return to 'Operation' mode.

(3)   All parameters related to program configuration will be displayed next to parameters in 'Operation' mode. (* These parameters will be shown in program model only)

NOTICE
DO NOT access 'Set Up' mode without instruction from technical assistant.

3.3   MODEs

3.3.1   Operation

	Parameter	Description
PV Display / SP Display displays	PV Display SP Display	
↓ **SET** OUtL 100	Output Limit Percentage (%)	To limit the Maximum of Control Ouput
↓ **SET** At nO	Auto Tuning Status	* Default 'No'
↓ **SET** AL 1 0	Alarm 1 Value of alarm setpoint	Enter deviation value or absolute value Depending on alarm mode selected
↓ **SET** AL 2 0	Alarm 2 The same with Alarm1	
↓ **SET** AL 3 0	Alarm 3 The same with Alarm 1	

* The 'OUTL' is not shown in default mode.

* 'AL2' & 'AL3' are shown only in the model the relevant options are taken.

3.3.2   Configuration 1

'Configuration 1' will be shown by pressing 'SET' key for 5 seconds in 'Operation' mode.

	Parameter	Description
P 1 **3.0** ↓ SET	Main Control (OUT1) P value (Proportional Band)	Range: 0~200% P1=0, ON/OFF Control
I 1 **240** ↓ SET	Main Control (OUT1) I value (Integral Time)	Range: 0~3600 seconds I=0, Integral off
d 1 **60** ↓ SET	Main Control (OUT1) D value (Derivative Time)	Range: 0~900 seconds D=0, Derivative off
db 1 **100** ↓ SET	Main Control Dead-Band Time	* DO NOT CHANGE THE VALUE
AtʋL **0** ↓ SET	Main Control (OUT1) 'Auto tuning' offset	Range: 0~ Upper limit value (USPL) Prevent from 'Overshoot' during auto tuning
CYt 1 **10** ↓ SET	Main Control (OUT1) Cycle of Control Output	Output type (SSR → 1, 4~20mA→0, relay→10) Range: 0~150 seconds
HYS 1 **1** ↓ SET	Main Control (OUT1) Actuation of Hystersis	Just in case of ON/OFF control (P1=0) (Range: 0~1000) ON : PV<=(SP-HYS1) OFF : PV > (SP+HYS1)
P2 **3** ↓ SET	Sub Control (OUT2) P value (Proportional band)	The same with the method of P1 configuration
I 2 **240** ↓ SET	Sub Control (OUT2) I value (Integral Time)	The same with the method of I1 configuration
d2 **60** ↓ SET	Sub Control (OUT2) D value (Derivative Time)	The same with the method of D1 configuration
CYt2 **10** ↓ SET	Sub Control (OUT2) Cycle of Control Output	The same with the method of CYT1 configuration
HYS2 **1** ↓ SET	Sub Control (OUT2) Hysteresis	The same with the method of HYS1 configuration
GAP 1 **0** ↓ SET	Main Control (OUT 1) Gap	Control ouput is turned off before getting to SP Turning Point = SP-GAP1; OFF (OUT1=Heat)
GAP2 **0** ↓ SET	Sub Control (OUT2) Gap	Control Output to be turned on before getting to SP Turning Point = SP+GAP2; ON (OUT2=Cool)
LCʋ **0000** ↓ SET	Function Lock	* Refer to '2.3 Function Lock' in P.10

* The parameters are only for 'Output' 2 function, so it will appear only in the model which has the "OUT2" option.

3.3.3 Configuration 2

'Configuration 2' mode will be shown by pressing 'SHIFT' key for 5 seconds WHILE pressing 'SET' key FIRST in 'Operation' or 'Configuration 2' mode.

	Parameter	Description
InP1 / **r2**	Input 1 (INP1)	To define input type & input range * Refer to
↓ SET		
AnL1 / **0**	Input 1 (INP1) Lower limit of linear Input	To be used during the calibration for linear input * DO NOT change this value without technical support
↓ SET		
AnH1 / **5000**	Input 1 (INP1) Upper limit of linear Input	To be used during the calibration for linear input * DO NOT change this value without technical support
↓ SET		
dP / **0000**	Decimal Point	Available in linear input only
↓ SET		
LSPL / **0.0**	Lower limit of Input range	i.e) Linear input = 4~20mA, when 4mA (0%), set the indication value for lower limit
↓ SET		
USPL / **400.0**	Upper limit of Input range	when 20mA (100%), set the indication value for upper limit
↓ SET		
AnL2 / **0**	Input 2 (INP2) Lower limit of linear input	To be used during the calibration for linear input * DO NOT change this value without technical support
↓ SET		
AnH2 / **5000**	Input 2 (INP2) Upper limit of linear input	To be used during the calibration for linear input * DO NOT change this value without technical support
↓ SET		
ALd1 / **11**	Alarm Code of 'Alarm 1'	* Refer to
↓ SET		
ALt1 / **99.59**	Time Set for 'Alarm 1'	* Range: 0 - 99 min 59 sec 0= flickering alarm, 99.59= continuant alarm Others = Time delay of alarm
↓ SET		
ALd2 / **02**	Alarm Code of 'Alarm2'	
↓ SET		
ALt2 / **99.59**	Time Set for 'Alarm 2'	The same configuration method with ALT1
↓ SET		
ALd3 / **01**	Alarm Code of 'Alarm 3'	
↓ SET		
ALt3 / **0**	Time Set for 'Alarm 3'	The same configuration method with ALT1
↓ SET		
HYSA / **0**	Hysteresis of alarms	To set the hysteresis of alarm actuation (Range: 0 – 1000) ON : PV<=(SP-HYS1) OFF : PV > (SP+HYS1)
↓ SET		

	Parameter	Description
CLO1 / **230**	Main Control (OUT1) Lower limit of linear output	To adjust the linear control output during the calibration * DO NOT change the value without technical support
CHO1 / **3600**	Main Control (OUT1) Upper limit of linear output	To adjust the linear control output during calibration * DO NOT change the value without technical support
CLO2 / **150**	Sub Control (OUT2) Lower limit of linear output	The same configuration method with 'CL01'
CHO2 / **3500**	Sub Control (OUT2) Upper limit of linear output	The same configuration method with 'CH01'
CLO3 / **0**	Aux. Output Lower limit of linear output	The same configuration method with 'CL01'
CHO3 / **5000**	Aux. Output Upper limit of linear output	The same configuration method with 'CH01'
rUCY / **5**	Timer for Motor Control	Full actuation time of Time proportional motor control Range: 5 – 200 sec
ŪAιt / **0**	WAIT function	To set 'wait' for program operation 0= No wait, others = Wait volume
SEtA / **0000**	Extra SET	DO NOT change the value of this parameter
ιdn0 / **1**	ID Number	Communication ID number
bAUd / **2400**	Baud Rate	DO NOT change the value of this parameter
SŪOS / **0**	SP compensation	Range: -1000~1000
PŪOS / **0**	PV compensation	Range: LSPL~USPL
Unιt / **C**	Unit of PV & SP	Selection: C, F, and A (linear)
SOFt / **020**	Soft Filter	To adjust PV response time (Range: 0.05 – 1.00) * The bigger value gives the faster response.

* Those 2 parameters are only for adjusting the linear signal of control output, not for the limitation of the control output or any other purpose. Please, DO NOT change the values without Technical Support, see Contacts page.

| Parameter	Description
CASC	* DO NOT change the value
OUd / HEAt — Operation Mode	Heating (direct) or Cooling (reverse)
DPAd / SF=y — Control Process	PID or Fuzzy
H= / 60 — Frequency	50 or 60Hz * Please, check whether the proper frequency is selected

3.4   Alarms

3.4.1   Deviation Alarm

The Alarm SP (Set Point) is to be changed as the SP moves. In this case, the Alarm SP preserves a certain deviation value with the SP. When an alarm is set, a certain deviation value with the preset SP should be defined.
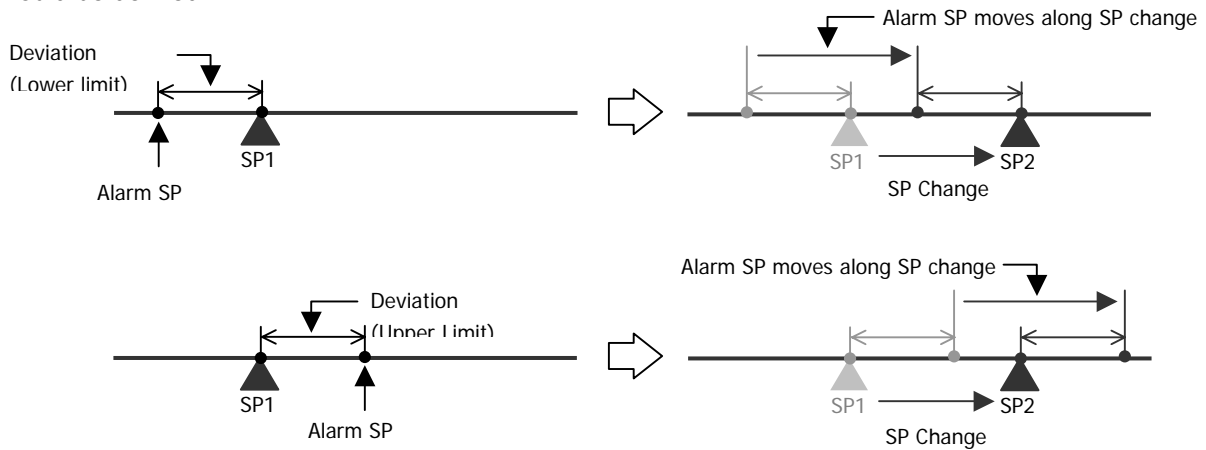
3.4.1.1   Upper Limit Deviation Alarm (Alarm Code 01, Alarm release in the first alarming situation)

▲ : **Set Point**

△ : **Alarm Set Point**
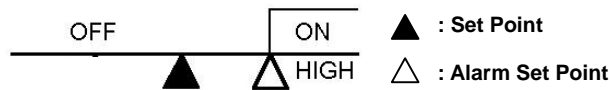
3.4.1.2   Upper Limit Deviation Alarm (Alarm Code 11, No alarm release in the first alarming situation)

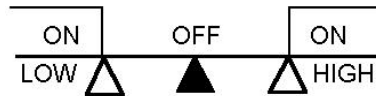3.4.1.3 Lower Limit Deviation Alarm (Alarm Code 02, Alarm release in the first alarming situation)
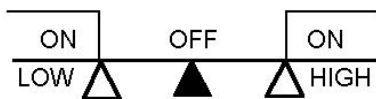
ON   OFF
LOW

3.4.1.4 Lower Limit Deviation Alarm (Alarm Code 12, No alarm release in the first alarming situation)

ON   OFF
LOW

3.4.1.5 Dev. Band Breakaway Alarm(Alarm Code 03, Alarm release in the first alarming situation)
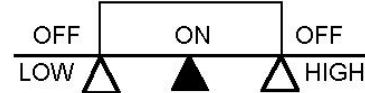
ON   OFF   ON
LOW   HIGH

3.4.1.6 Dev. Band Breakaway Alarm(Alarm Code 13, No alarm release in the first alarming situation)

ON   OFF   ON
LOW   HIGH

3.4.1.7 Deviation Band Alarm (Alarm Code 04, Alarm release in the first alarming situation)

OFF   ON   OFF
LOW   HIGH
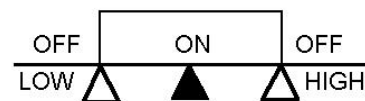
3.4.1.8 Deviation Band Alarm (Alarm Code 14, No alarm release in the first alarming situation)

OFF   ON   OFF
LOW   HIGH

3.4.2   Absolute Value Alarm

The Alarm SP (Set Point) is to be fixed even though the SP moves. When an alarm is set, the absolute value of the Alarm SP should be defined.

Alarm Set Point (Fixed)

SP1   SP2   SP3
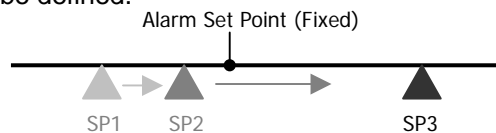
3.4.2.1 Absolute Upper Limit Alarm (Alarm Code 05, Alarm release in the first alarming situation)

OFF   ON
LOW   HIGH
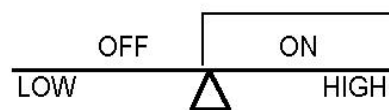
3.4.2.2 Absolute Upper Limit Alarm (Alarm Code 15, No alarm release in the first alarming situation)

OFF   ON
LOW   HIGH
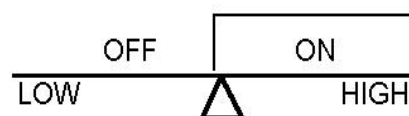
3.4.2.3 Absolute Lower Limit Alarm (Alarm Code 06, Alarm release in the first alarming situation)
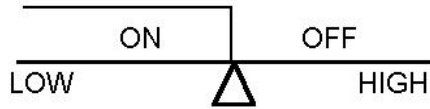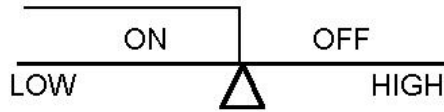
```
        ON          OFF
  LOW        △       HIGH
```

3.4.2.4 Absolute Lower Limit Alarm (Alarm Code 16, No alarm release in the first alarming situation)

```
        ON          OFF
  LOW        △       HIGH
```

3.4.3 Program Alarm

3.4.3.1 Segment End Alarm (Alarm Code 07)
Once the selected segment is completed, the alarm becomes actuated
- ALD1 – ALD3   Set the Alarm Code 07
- AL1 – AL3   Enter Segment No. for alarms
- ALT1 – ALT3   Define the alarm timing
                   (0→ Flickering, 99.59 → Continuant, Others → Time Delay)

3.4.3.2 Program RUN Alarm (Alarm Code 17)
While a program runs, the alarm becomes actuated

```
    RUN    |    END
    ON     |    OFF
                        AL
```
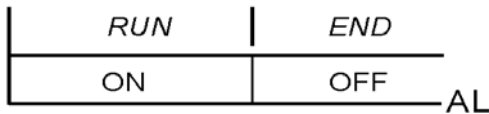
3.4.4 System Alarm

3.4.4.1 System Error Alarm (Alarm Code 08)

```
   Normal  |    Error
    OFF    |    ON
                        AL
```
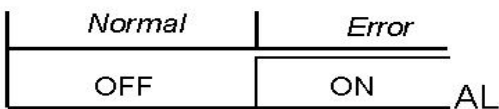
3.4.4.2 System Error Alarm (Alarm Code 18)

```
   Normal  |    Error
    ON     |    OFF
                        AL
```
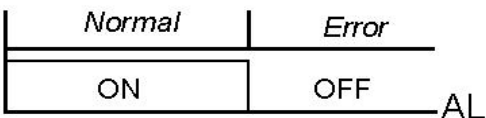
3.4.4.3 Timer Alarm (Alarm Code 19)
Once the PV reaches to the SP, the alarm becomes actuated after a certain time delay.
(Range: 00 hour 00 min – 99 hour 59 min)

3.5   Function Lock

According to the status of the parameter "LCK" in 'Configuration 1' mode, 'access to modes' and 'change of values' can be prohibited.

LCK=0000   MODE ACCESS   Access to 'Operation', 'Configuration1 & 2' modes allowe (* Default)

LCK=0100   ⌐MODE ACCESS   Access to 'Operation' & 'Configuration 1' mode allowed
            └ VALUE CHANGE   Every value change in each mode allowed

LCK=0110   ⌐ MODE ACCESS   Access to 'Operation' & 'Configuration 1' mode allowed
            └ VALUE CHANGE   Value changes only in 'Operation' mode allowed

LCK=0001   ⌐ MODE ACCESS   Access to 'Operation' mode allowed
            └ VALUE CHANGE   Value change of SP (Set Point) allowed only

LCK=1111   MODE ACCESS   Access to "Set Up" mode allowed

LCK=0101   All access & value changes prohibited except the change of "LCK" status

---

⚠️ WARNING

PERSONAL INJURY:

Configuration should be performed only by personnel who are technically competent to do so. Local Regulations regarding electrical & safety must be observed.

Failure to comply with these instructions could result in death or serious injury.

4.   Input Codes

The input code in 'Configuration 2' mode must be selected properly before the operation starts.

4.1   Thermocouples

TYPE	CODE	RANGE	
K	ʁ1	0.0~200.0°C	0.0~392.0°F
	ʁ2	0.0~400.0°C	0.0~752.0°F
	ʁ3	0~600°C	0~1112°F
	ʁ4	0~800°C	0~1472°F
	ʁ5	0~1000°C	0~1832°F
	ʁ6	0~1200°C	0~2192°F
J	J1	0.0~200.0°C	0.0~392.0°F
	J2	0.0~400.0°C	0.0~752.0°F
	J3	0~600°C	0~1112°F
	J4	0~800°C	0~1472°F
	J5	0~1000°C	0~1832°F
	J6	0~1200°C	0~2192°F
R	r1	0~1600°C	0~2912°F
	r2	0~1796°C	0~3216°F
S	S1	0~1600°C	0~2912°F
	S2	0~1796°C	0~3216°F
B	b1	0~1820°C	0~3308°F
E	E1	0~800°C	0~1472°F
	E2	0~1000°C	0~1832°F
N	n1	0~1200°C	0~2192°F
	n2	0~1300°C	0~2372°F
T	t1	0.0~400.0°C	0.0~752.0°F
	t2	0.0~200.0°C	0.0~392.0°F
	t3	0.0~350.0°C	0.0~662.0°F
W	ū1	0~2000°C	0~3632°F
	ū2	0~2320°C	0~2372°F
PLII	PL1	0~1300°C	0~2372°F
	PL2	0~1390°C	0~2534°F
U	U1	-199.9~600.0°C	-199.9~999.9°F
	U2	-199.9~200.0°C	-199.9~392.0°F
	U3	0.0~400.0°C	0.0~752.0°F
L	L1	0~400°C	0~752°F
	L2	0~800°C	0~1472°F

* The default of Input Code is 'K2' for the model of thermocouple input type. (DC10X0X**T**-XXX-XXX-X)

4.2   RTDs

TYPE	CODE	RANGE	
JIS Pt100	JP 1	-199.9~600.0°C	-199.9~999.9°F
	JP2	-199.9~400.0°C	-199.9~752.0°F
	JP3	-199.9~200.0°C	-199.9~392.0°F
	JP4	0~200°C	0~392°F
	JP5	0~400°C	0~752°F
	JP6	0~600°C	0~1112°F
DIN Pt100	dP 1	-199.9~600.0°C	-199.9~999.9°F
	dP2	-199.9~400.0°C	-199.9~752.0°F
	dP3	-199.9~200.0°C	-199.9~392.0°F
	dP4	0~200°C	0~392°F
	dP5	0~400°C	0~752°F
	dP6	0~600°C	0~1112°F
JIS Pt50	JP.1	-199.9~600.0°C	-199.9~999.9°F
	JP.2	-199.9~400.0°C	-199.9~752.0°F
	JP.3	-199.9~200.0°C	-199.9~392.0°F
	JP.4	0~200°C	0~392°F
	JP.5	0~400°C	0~752°F
	JP.6	0~600°C	0~1112°F

* The default of Input Code is 'DP3' for the model of RTD input type. (DC10X0X**R**-XXX-XXX-X)

4.3   Linear Inputs

CODE	SIGNAL	INPUT TYPE	RANGE
An 1	-10 - 10mV		-1999~9999
An2	0 - 10mV		-1999~9999
An3	0 - 20mV		-1999~9999
An4	0 - 50mV	0-20mA, 0-1V, 0-5V, 0-10V	-1999~9999
An5	10 - 50mV	4-20mA, 1-5V, 2-10V	-1999~9999

* The default of Input Code is 'AN5' (4-20mA) for the model of linear input type.

(DC10X0X**L**-XXX-XXX-X)

NOTICE

* DO NOT change the input type without Technical Support because some hardware

changes are required on the input board in order to select a certain linear input type.

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5. Operation

5.1 Type of Control

5.1.1 Manual Operation

The control output can be managed manually. When the 'A/M' key is pressed, the parameter of 'OUTL' will appear in the upper display, and a fixed control output is shown in lower display (% value). Once the value is changed, the control output is changed and fixed again.

5.1.2 ON/OFF Control

The output type must be Relay Output (DC10X0XX-1XX-XXX-X). The 'P' value can be changed to 0 in 'Configuration 1' mode to produce an ON/OFF control output.

When the PV (process variable) reaches the SP (set point), the control output is ON (100%), when it reaches the SP the control output becomes OFF (0%).

* To prevent the control output from flickering too frequently the hysteresis ('HYS1' in 'Operation' mode) is to be set.

5.1.3 PID Control

PID control is the default control type of this controller. If 'AT' in 'Operation' mode becomes 'YES', the auto tuning process will start. After the auto tuning is completed, the controller gets optimum PID values for the control system and starts the operation automatically. (PID values can be set manually in 'Configuration 1' mode without auto tuning procedure.)

5.2 Set Point

After all the wiring connection is completed and power is applied, the targeted SP (Set Point) is to be entered. When power is applied, the default display is the PV & SP display. The SP may now be entered. (Change the value targeted, and press 'SET' key for saving)

5.3 Alarm Set Point

If necessary, each alarm should be set properly.

- Set the Alarm Code required in 'ALd1' (ALd2 / ALd3) in 'Configuration 2' mode
  (Alarm Code: 00 to 19)
- Define the alarm timing required for 'ALt1' (ALt2 / ALt3) in 'Configuration 2' mode
  '0000' → flickering alarm, '9959' → continuant alarm
  'XXXX' → XX min XX sec (Time Delay)
- Enter the deviation value or absolute value in 'AL1' (AL2 / AL3) in 'Operation' mode depending on the Alarm Code selected above.
- Set the hysteresis of alarms in 'HYSA' in 'Configuration 2' mode. (If necessary)

6. Error Message

In case the following error messages appear in the upper display of controller, please refer to the Error message table below, or call technical support. See Contacts page for details.

Sign	Description	Solution
ın1E	Open the circuit of 'INPUT 1' (sensor)	Check the wiring
* AdCF	A/D Convert Failure	Service Call required
* CJCE	Cold junction compensation failure	Service Call required
ın2E	Open the circuit of 'INPUT 2' (sensor)	Check the wiring
∪∪∪1	Excess of PV over upper limit (INPUT 1)	- Check sensor wiring & input code
∩∩∩1	Shortage of PV under lower limit (INPUT1)	
∪∪∪2	Excess of PV over upper limit (INPUT2)	- Adjust the range of indication
∩∩∩2	Shortage of PV under lower limit (INPUT2)	
* rAoF	Memory (RAM) failure	Service call required
ıntF	Interface failure	Check wiring of input
AUtF	Auto tuning failure	Check wiring of output

⚠ WARNING

PERSONAL INJURY:

Controller checks should be performed only by personnel who are technically competent to do so. Local Regulations regarding electrical & safety must be observed.

Failure to comply with these instructions could result in death or serious injury.