

OPERATING AND INSTRUCTION

MANUAL

FOR

'TECHNICO' Furnace with Programmable Controller'



'TECHNICO' HIGH TEMPERATURE FURNACE:

Horizontal type double walled chamber. Made out of thick gauge CRCA sheet fully reinforced angle frame work to make the chamber mechanically very rigid. The outer shell has air cooling facility to have a cool exterior to make the skin temperature not to exceeds 80 degC at maximum working temperature. The inner chamber is formed by high grade Alumina Grooved Muffle to accommodate High Grade alumina Refractory tube of size : 50 mm Dia x 500 mm L.

The Space between the inner and outer chamber will be tightly packed with superior quality Zirconia fibre blanket to eliminate the radiation heat loss.

Imported Silicon Carbide Heating Rods evenly mounted on the two sides of the inner Tube for uniform heating.

The Temperature indicated and Controlled by Smart Range of Microprocessor based programmable PID controller auto tuned with Thyristor control Device. The Programmable controller will have facility to set heating rate, cooling rate and dwell time in various segments.

The working chamber will be provided with gas inlet and outlet for Inert Gas purging.

The Control panel accommodates are Main Switch , Microprocessor Programmable Controller , Thyristor Control Device , Voltmeter Digital , Ammeter Digital , Indicating Lamps.

Technical Specifications:

<i>Size</i>	<i>:</i>	<i>100 x 100 x 200 mm</i>
<i>Inner Tube Size</i>	<i>:</i>	<i>Length 50 mm dia x 500 mm L</i>
<i>Temperature Range</i>	<i>:</i>	<i>1450 Deg C (operating)</i>
<i>Temperature Accuracy</i>	<i>:</i>	<i>+/- 1 Deg C.</i>
<i>Power Rating</i>	<i>:</i>	<i>3.5 kw</i>
<i>Power supply</i>	<i>:</i>	<i>220-240 v, 50- 60 Hz, Single phase</i>

Operating Procedure:

1. Install the oven at the appropriate place leaving enough space around it for proper ventilation.
2. Check up all electrical connections. Ensure that there is no loose connection.
3. Connect the incoming power supply and switch 'ON'. The main lamp will glow, which indicates the incoming line is OK.
4. Then the control Switch "ON" and to set the programmer in the controller. (see Honey well manual for to set temperature)

Main Controller Temperature Setting and programming

1. Set the required program (temperature and time) in the program controller.
2. Press the SET key (SET), now the display shows the OUTL (output limit, which represents the current consumption by the heater. Refer honeywell-dc1000-dc1010-dc1030-dc1040-manual, pg no:4)
3. Press the SET key, the controller now displays the auto tuning status.
4. Now again press the set key, the controller displays the Alarm Level 1. (AL1). This controls the cooling process.
5. Again press the SET key, the controller displays the Alarm Level 2. (AL2). This is for program segment end alarm. This will give alarm, for the particular segment for which the alarm has to be needed, when the required segment process is over. The required segment number has to be set here.
6. Now again press the SET key. The controller shows the program pattern. The controller has two program patterns, and in each pattern, 8 segments can be set.
7. Pressing the SET key causes the increment in segment upto 8. Once the 8 segments has been programmed, pressing the SET key shows the process value and set value temperature.
8. Pressing the SET key shows the displays mentioned in the above points from 4-7. Then pressing the set key shows the programming pattern 1. When the

SHIFT key (◁), is pressed the pattern 1 will blink. Now using the Up or down key the program pattern is changed to pattern 2.

- 9. In the pattern 2, additional 8 segments can be programmed.**
- 10. For programming in each segment press the SHIFT key (◁) to change the parameters, when the SHIFT key is pressed, the first digit will start to blink. Press UP key (△) or DOWN key (▽) to increase or decrease the value of the digit, then press SHIFT key again to go to the next digit, repeat the above procedure until the required has been selected.**
- 11. Press the SET key to enter the desired value.**
- 12. The SET key also has the function of changing MODEs. If SET key is pressed, the display shows the next MODE.**
- 13. Press SET key for 5 sec. The display goes to level 2, press the SET key again to return to level 1.**
- 14. If any key is not pressed for 1 minute the display will return to level 1.**
- 15. If the A/M key is pressed the controller will switch to level 1.**
- 16. If the output percentage is "0", the controller output is off.**
- 17. For detailed operation and other PID settings refer the controller manual.**

Heater switch:

- 5. Switch 'ON' the heater switch. Heaters will Voltmeter Indicate the Volt value. Ammeter Indicate ampere value.**


TROUBLE SHOOTING FOR FURNACE WITH PROGRAMMABLE FURNACE.

PROBLEM	LIKELY CAUSE	REMEDIAL ACTION
MAINS INDICATOR LIGHT NOT ON WITH SWITCH IN ON POSITION	<ul style="list-style-type: none"> • DISCONNECTED OF MAIN LINE OR WIRING • DEFECTIVE SWITCH • BLOWN FUSE 	<ul style="list-style-type: none"> • CHECK LINE / WIRING AND CORRECT IT • CHANGE SWITCH • REPLACE FUSE
MAINS ON BUT HEATER NOT FUNCTIONING	<ul style="list-style-type: none"> • DEFECTIVE HEATER CONNECTIONS • OPEN HEATING ELEMENTS • CONTROLLER / RELAY DEFECTIVE • CONTACTOR COIL WEAK 	<ul style="list-style-type: none"> • CORRECT HEATER CONNECTIONS • REPLACE THE HEATERS • CHECK/REPLACE THE CONTROLLER / RELAY • TO REPLACE CONTACTOR COIL
INDICATOR / CONTROLLER NOT SHOWING INCREASE IN TEMP. OR SHOWS "I --"	<ul style="list-style-type: none"> • INDICATOR DEFECTIVE • THERMOCOUPLE OPEN • IMPROPER SENSOR CONNECTION 	<ul style="list-style-type: none"> • RECTIFY THE INDICATOR • REPLACE THE THERMOCOUPLE • CHECK AND CORRECT CONNECTION
HUMMING IN THE CONTACTOR	<ul style="list-style-type: none"> • RELAY DEFECTIVE • RUST / DUST DEPOSITED 	<ul style="list-style-type: none"> • CHANGE THE RELAY • CLEAN THE CONTACTOR

WARRANTY CERTIFICATE

TECHNICO LABORATORY PRODUCTS PVT. LTD., No. 264, Sidco Industrial Estate, Thirumudivakkam, Chennai - 44. Ph: 91-44-2478 1984, 2478 1985 / 1986 e-mail : technicolab@g.mail.com Fax: 91-44-2478 1972 website: technicolaboratory.com	
Name & Address of Customer: The Prof. Head, Department of Physics, Indian Institute of Technology Roorke, Uttarkhand - 247667.	Your Order: Dated : 26.07.2010
NAME OF THE PRODUCT: Furnace with Programmable temperature Controller Size: 100 mm x 100 mm x 200 mm INV.NO. M228/10-11 Date : 12.10.2010	
<p>Certified that the above equipment supplied has been tested and we extend a warranty for a period of 12 months against any manufacturing defects from 12.01.2011 to 11.01.2012.</p> <p>The Warranty however does not cover bulbs, transistors, switches, glass parts and any other components of fragile/consumable in nature for which TECHNICO LABORATORY PRODUCTS PVT. LTD., does not receive any Guarantee from its suppliers.</p> <ul style="list-style-type: none">• The Warranty is void if found that the equipment has been handled in a careless and negligent manner by the user or if the equipment is used for applications other than what it is intended for.• The Warranty ceases to exist if the equipment is not connected through a proper stabilized power source using Automatic/Servo Voltage Stabilizer.• The Warranty also ceases exist in the event of extraordinary power surge or lightning, floods and similar acts of nature.• During the Post-Warranty period, TECHNICO LABORATORY PRODUCTS PVT. LTD. offers annual Maintenance and Service Contact packages for proper upkeep of the instruments. <p>In case of any defects, service should be availed only from us or from our authorized Representatives. We will not be responsible for mishandling by un-authorized people.</p>	

For TECHNICO LABORATORY PRODUCTS PVT.LTD.


Authorized Signatory

*Program off →

(▼)

Prccs Down Kcy + Sct Kcy.

*Program ON (or) Reset →

Press UP Key (▲) 5 Sec.

Controller Lock

Press Set Key 5 Sec.

and Show the P1 Value

and press Set key '1' Value

and press Set 'd' Value

and press Set 'db' Value

and press Set At ULValue

and press Set Cyt1 Value

and press Set P2 Value

and press Set '2' Value

and press Set 'd2' Value

and press Set Cyt2 Value

and press Set GAP-1 Value

and press Set GAP-2 Value

and then Press Set LCK

0000 → Controller Lock Open.



0101 → Controller Lock Close.

Tubular Furnace Temperature Settings Chart

SNO.	SET	FUNCTION	POINTS
1.	Set ↓	Out L	0
2.	Set ↓	AT	0
3.	Set ↓	AL	1
4.	Set ↓	AL	2
5.	Set ↓	PET	1
6.	Set ↓	SEG	1 - 0
7.	Set ↓	Time	0
8.	Set ↓	Seg - 1	200 ⁰ C
9.	Set ↓	Time - 1	0.50 minute
10.	Set ↓	Out - 1	100%
11.	Set ↓	Seg - 2	500 ⁰ C
12.	Set ↓	Time - 2	1.0 hr.
13.	Set ↓	Out - 2	100%
14.	Set ↓	Seg - 3	800 ⁰ C
15.	Set ↓	Time - 3	1.0 hr.
16.	Set ↓	Out - 3	100%
17.	Set ↓	Seg - 4	1000 ⁰ C
18.	Set ↓	Time - 4	0.40 minute
19.	Set ↓	Out - 4	100%
20.	Set ↓	Seg - 5	1200 ⁰ C
21.	Set ↓	Time - 5	0.40 minute
22.	Set ↓	Out - 5	100%
23.	Set ↓	Seg - 6	1400 ⁰ C
24.	Set ↓	Time - 6	0.40 minute
25.	Set	Out - 6	100%

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.

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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
- Heat/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

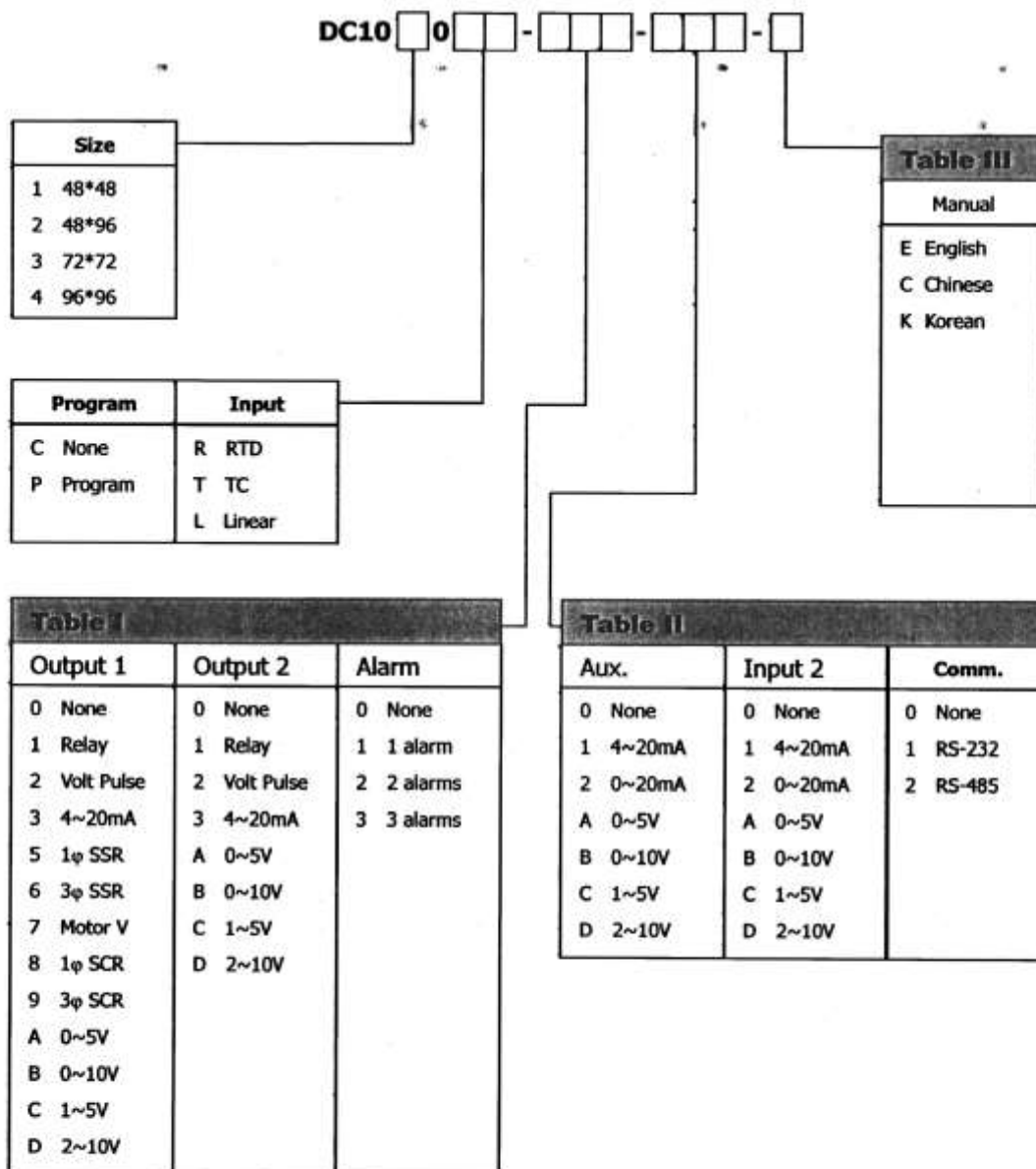


WARNING

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



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 (Pt100 Ω , JPt100 Ω , JPt50 Ω) 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	$\pm 0.5\%FS$
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 \rightarrow 0, SSR \rightarrow 1, relay \rightarrow 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	1 ϕ SSR, 3 ϕ SSR, 1 ϕ SCR, 3 ϕ 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
2 nd 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

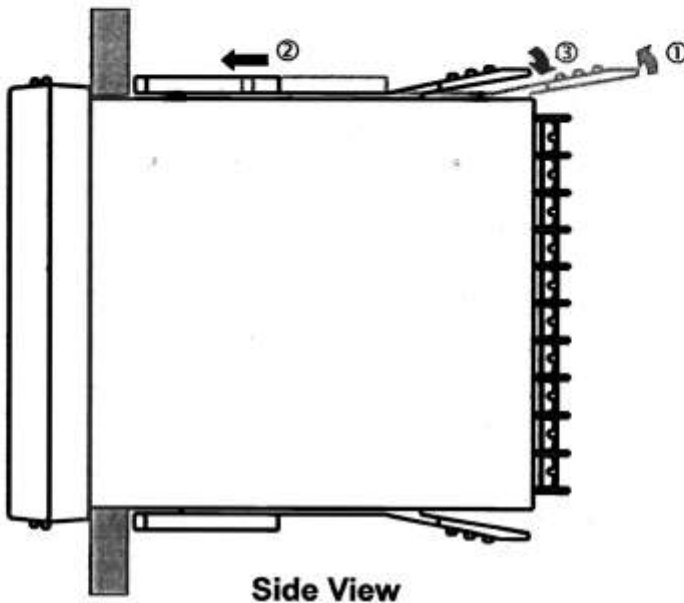


CAUTION

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.



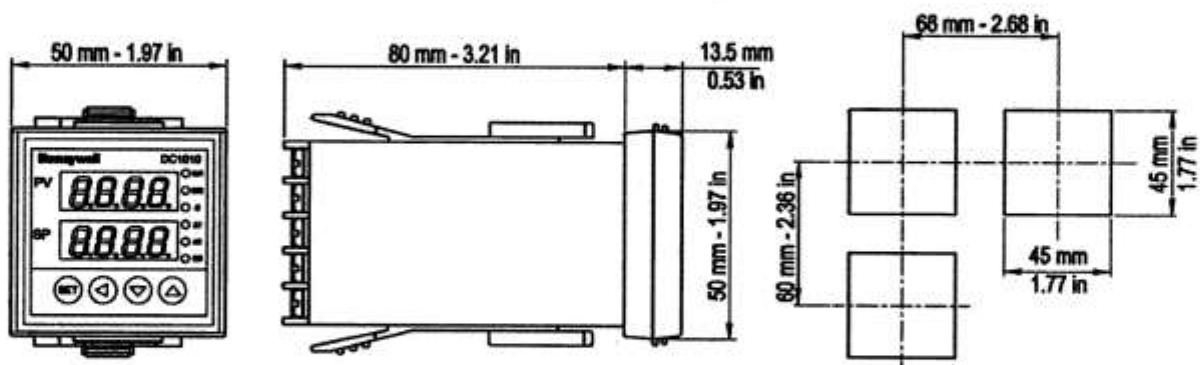
1 - Put the mounting bracket in the rail on the top & bottom of the case.

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

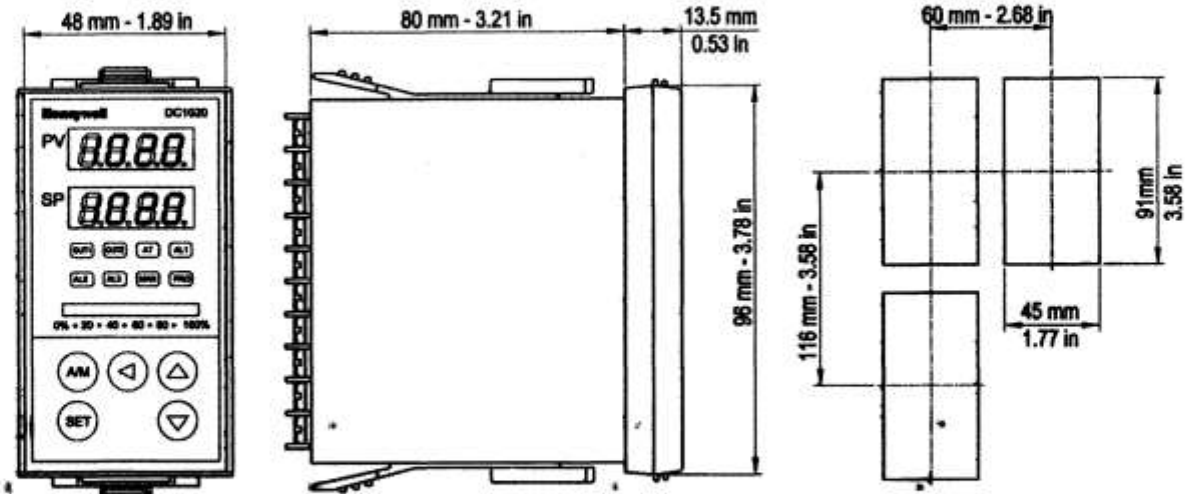
3 - Put the grip of the bracket on the groove to fasten the case to the panel.

2.4 External Dimension

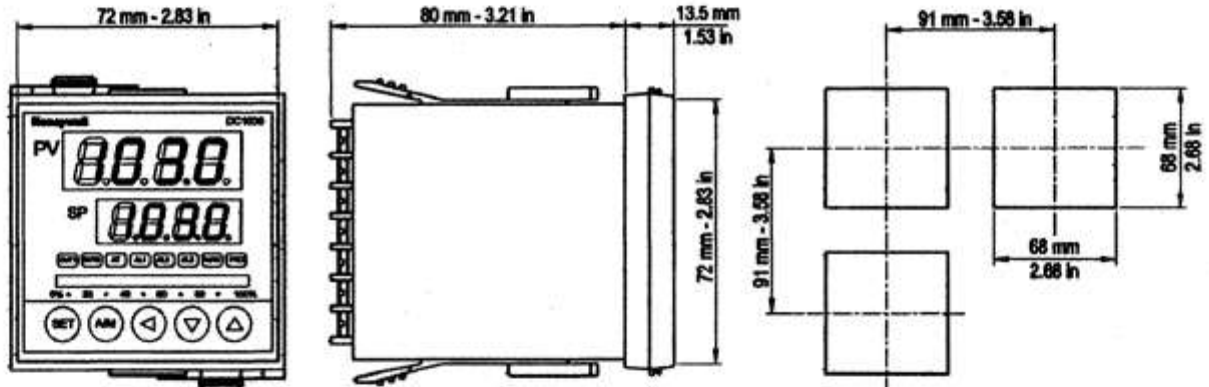
2.4.1 DC1010



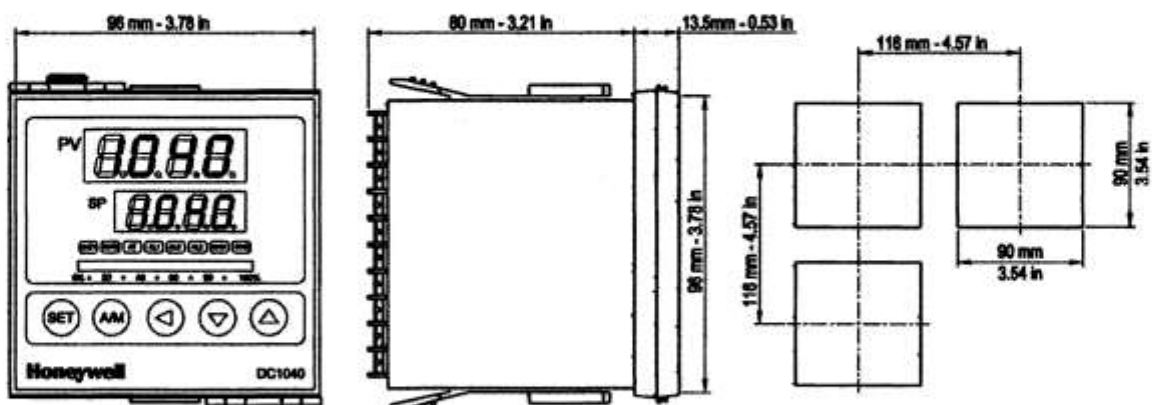
2.4.2 DC1020



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).

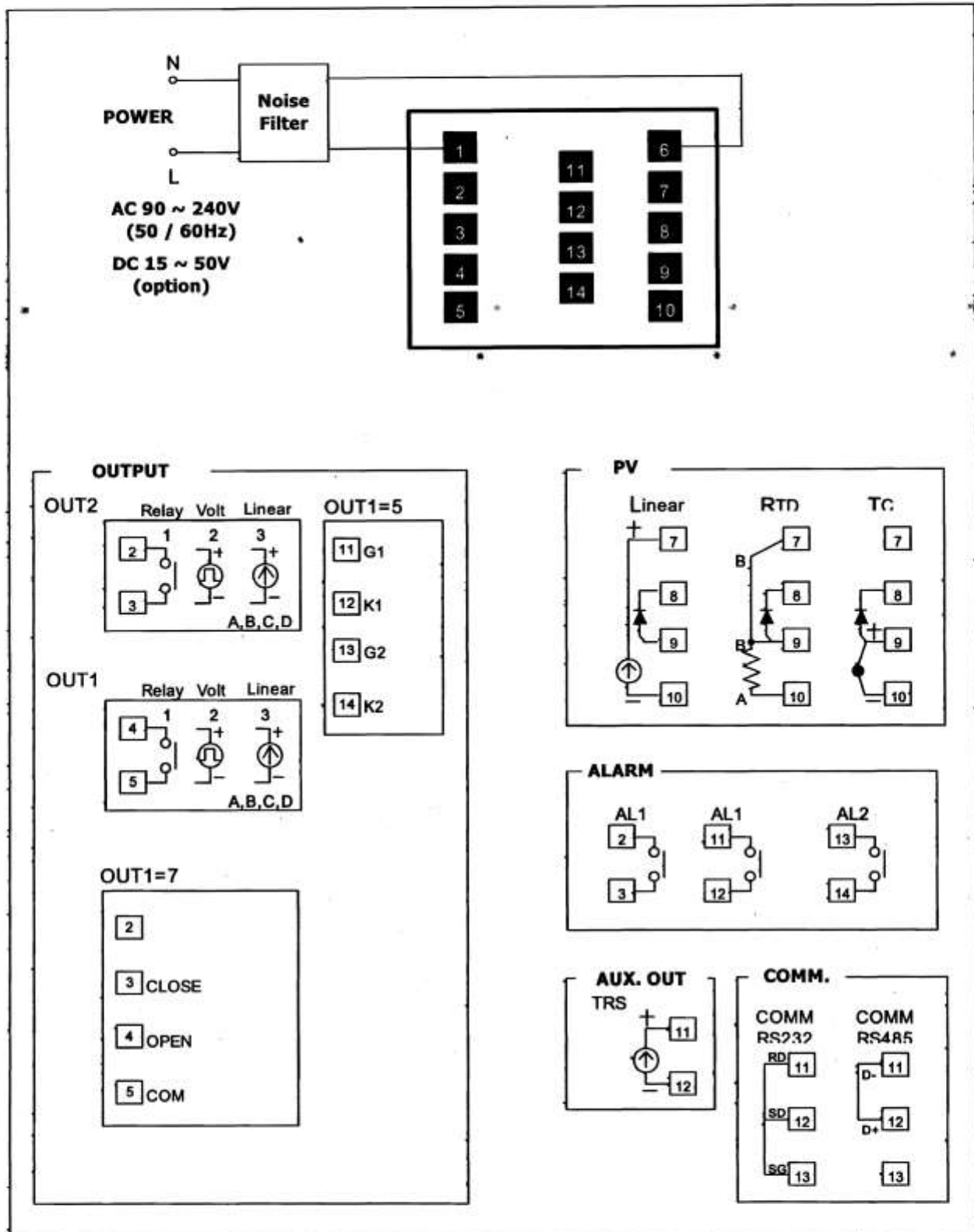
The above items should be installed together with DC1000 for the products electrical protection.

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.

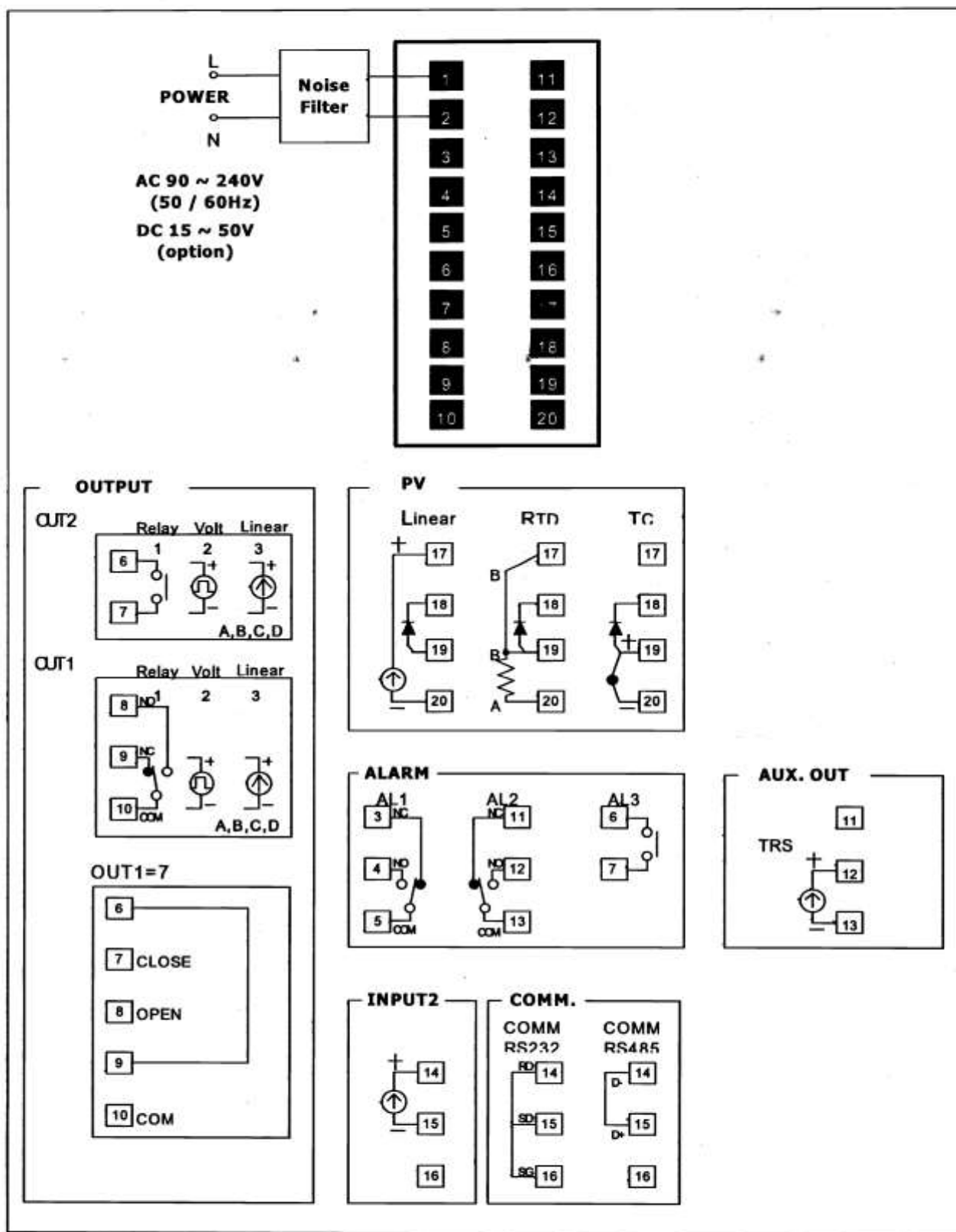
When applying power to multiple instruments, make sure that sufficient current is supplied. Otherwise, the instruments may not start up normally due to the voltage drop caused by the in-rush current.

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

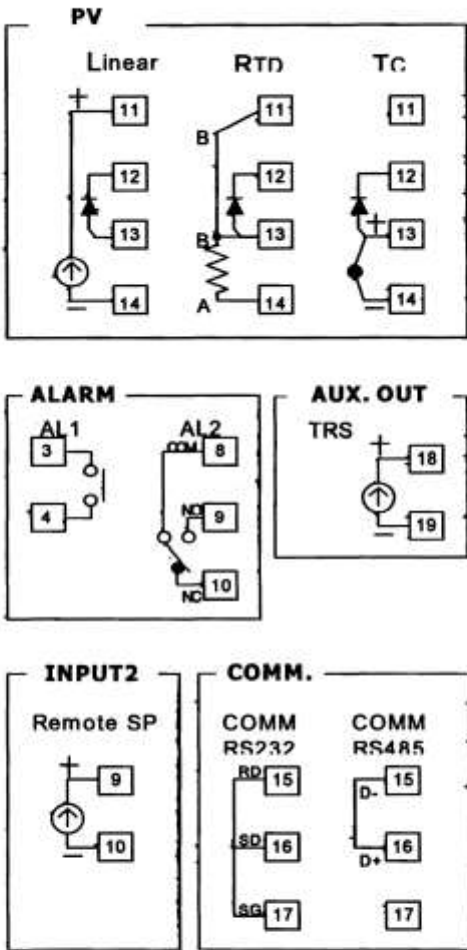
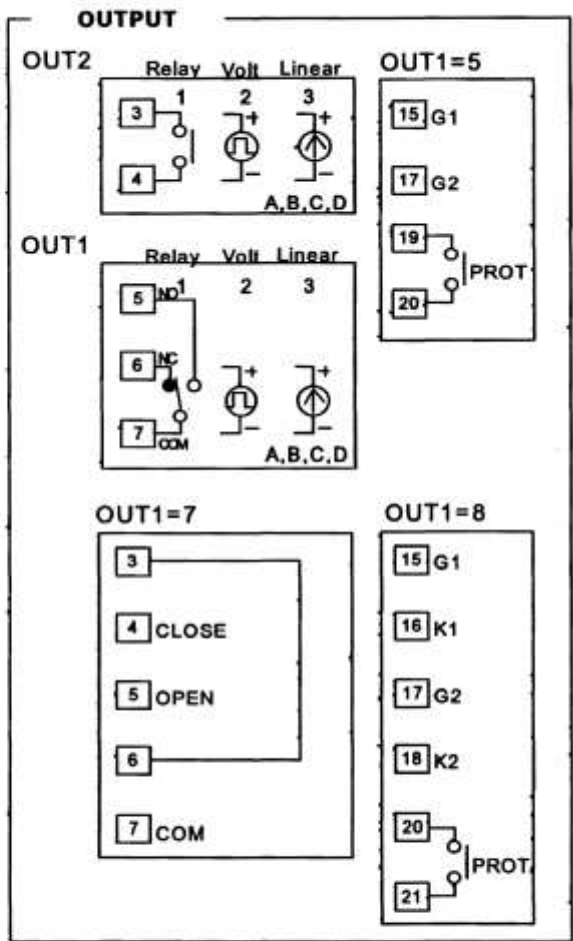
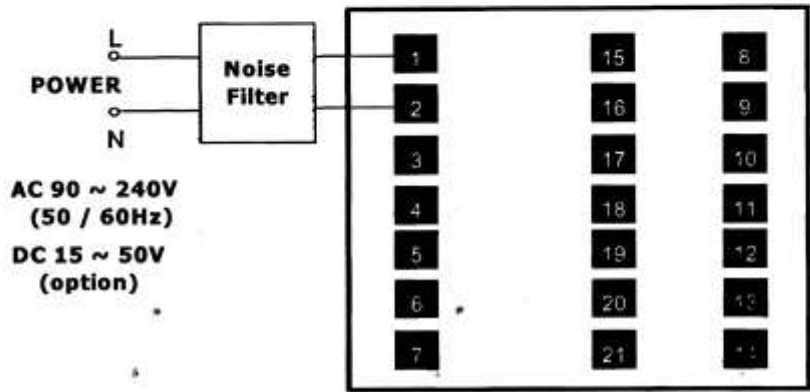
2.5.1 DC1010



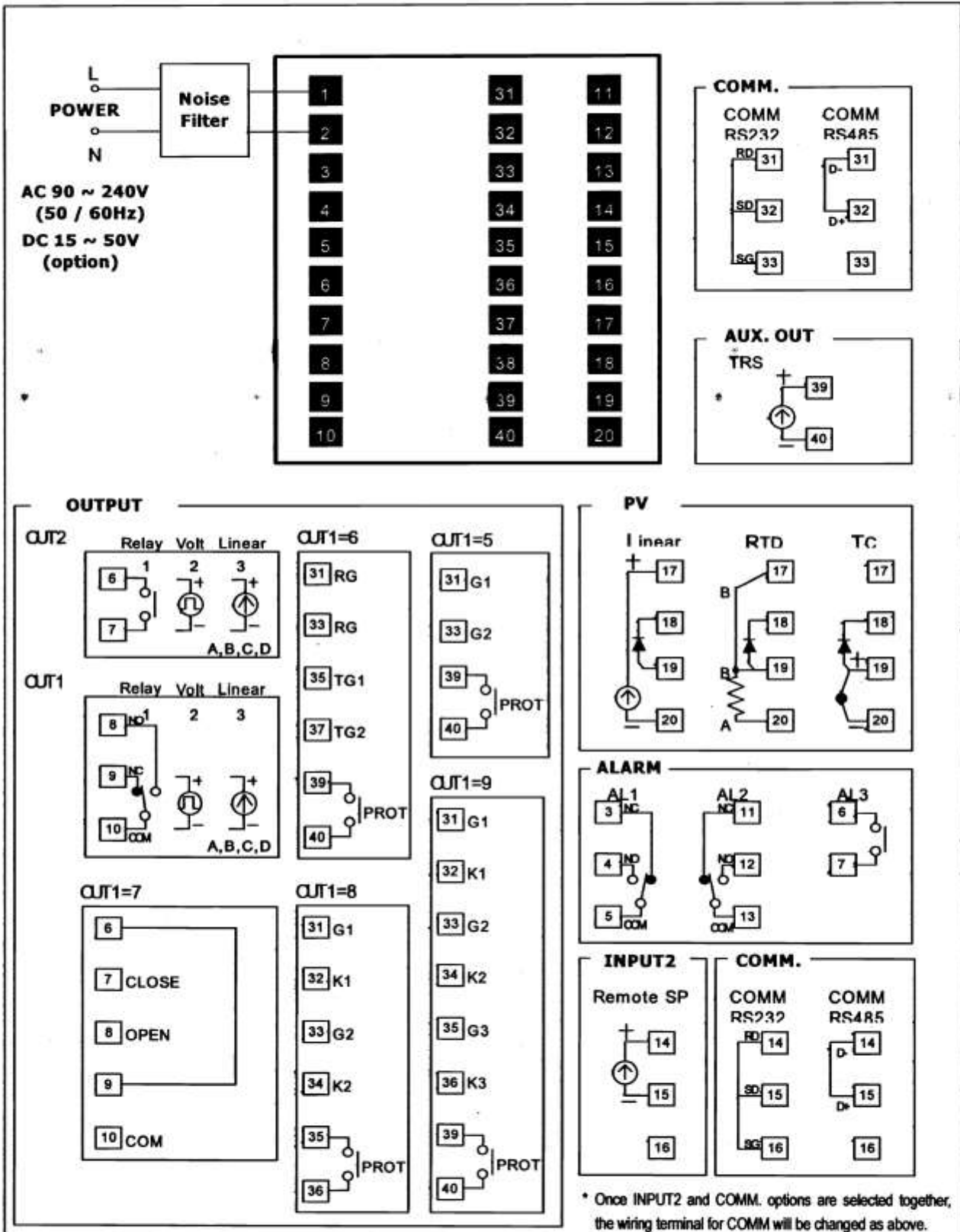
2.5.2 DC1020



2.5.3 DC1030



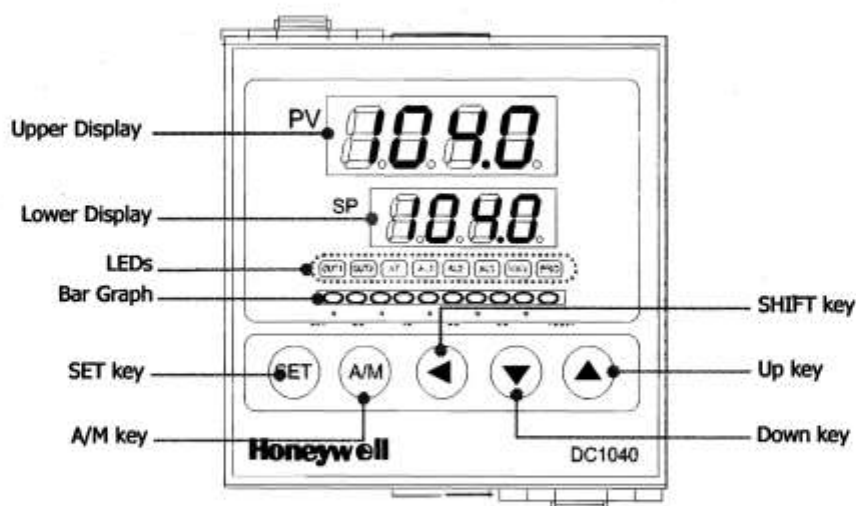
2.5.4 DC1040



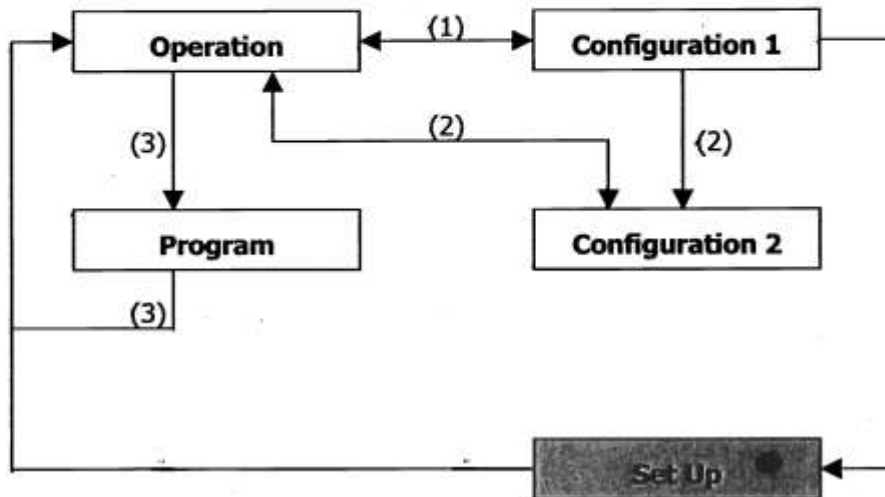
3. Configuration

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 LEDs	A bargraph of 10 green LEDs' indicates the value of the output in percentage.
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



How to move from one MODE to another



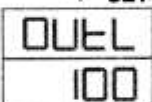
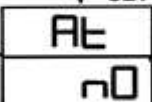
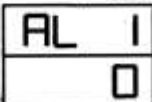
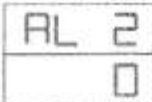
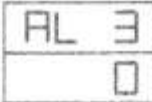
- (1) Press 'SET' key for 5 seconds; it grants access to 'Configuration 1' mode or return to 'Operation' mode from 'Configuration 1' mode.
- (2) Press 'SHIFT' key for 5 seconds while pressing 'SET' key first; it grants access to 'Configuration 2' mode or return to 'Operation' mode.
- (3) All parameters 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	
↓ SET		
	Output Limit Percentage (%)	To limit the Maximum of Control Ouput
↓ SET		
	Auto Tuning Status	* Default 'No',
↓ SET		
	Alarm 1 Value of alarm setpoint	Enter deviation value or absolute value Depending on alarm mode selected
↓ SET		
	Alarm 2 The same with Alarm1	
↓ SET		
	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

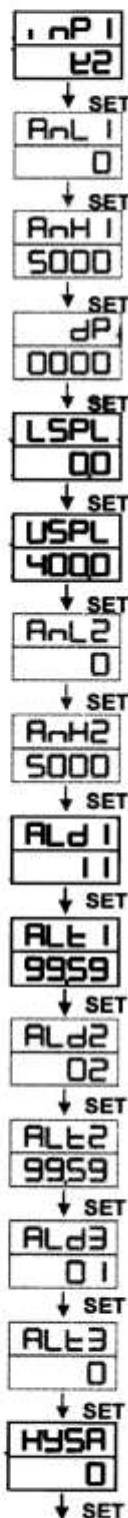
'Configuration 1' will be shown by pressing 'SET' key for 5 seconds in 'Operation' mode.

	Parameter	Description
P1	Main Control (OUT1)	Range: 0~200%
3.0	P value (Proportional Band)	P1=0, ON/OFF Control
↓ SET		
I1	Main Control (OUT1)	Range: 0~3600 seconds
240	I value (Integral Time)	I=0, Integral off
↓ SET		
D1	Main Control (OUT1)	Range: 0~900 seconds
60	D value (Derivative Time)	D=0, Derivative off
↓ SET		
db1	Main Control	* DO NOT CHANGE THE VALUE
100	Dead-Band Time	
↓ SET		
At-L	Main Control (OUT1)	Range: 0~ Upper limit value (USPL)
0	'Auto tuning' offset	Prevent from 'Overshoot' during auto tuning
↓ SET		
CYt1	Main Control (OUT1)	Output type (SSR → 1, 4~20mA→0, relay→10)
10	Cycle of Control Output	Range: 0~150 seconds
↓ SET		
HYS1	Main Control (OUT1)	Just in case of ON/OFF control (P1=0) (Range: 0~1000)
1	Actuation of Hysteresis	ON : $PV \leq (SP - HYS1)$ OFF : $PV > (SP + HYS1)$
↓ SET		
P2	Sub Control (OUT2)	The same with the method of P1 configuration
3	P value (Proportional band)	
↓ SET		
I2	Sub Control (OUT2)	The same with the method of I1 configuration
240	I value (Integral Time)	
↓ SET		
D2	Sub Control (OUT2)	The same with the method of D1 configuration
60	D value (Derivative Time)	
↓ SET		
CYt2	Sub Control (OUT2)	The same with the method of CYT1 configuration
10	Cycle of Control Output	
↓ SET		
HYS2	Sub Control (OUT2)	The same with the method of HYS1 configuration
1	Hysteresis	
↓ SET		
GAP1	Main Control (OUT1)	Control output is turned off before getting to SP
0	Gap	Turning Point = $SP - GAP1$; OFF (OUT1=Heat)
↓ SET		
GAP2	Sub Control (OUT2)	Control Output to be turned on before getting to SP
0	Gap	Turning Point = $SP + GAP2$; ON (OUT2=Cool)
↓ SET		
LCF	Function Lock	* Refer to '2.3 Function Lock' in P.10
0000		
↓ SET		

* 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
Input 1 (INP1)	To define input type & input range * Refer to
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
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
Decimal Point	Available in linear input only
Lower limit of Input range	i.e) Linear input = 4~20mA, when 4mA (0%), set the indication value for lower limit
Upper limit of Input range	when 20mA (100%), set the indication value for upper limit
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
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
Alarm Code of 'Alarm 1'	* Refer to
Time Set for 'Alarm 1'	* Range: 0 - 99 min 59 sec 0= flickering alarm, 99.59= continuant alarm Others = Time delay of alarm
Alarm Code of 'Alarm2'	
Time Set for 'Alarm 2'	The same configuration method with ALT1
Alarm Code of 'Alarm 3'	
Time Set for 'Alarm 3'	The same configuration method with ALT1
Hysteresis of alarms	To set the hysteresis of alarm actuation (Range: 0 – 1000) ON : $PV \leq (SP - HYS1)$ OFF : $PV > (SP + HYS1)$

	Parameter	Description
↓	CL01 230	Main Control (OUT1) Lower limit of linear output
↓ SET	CH01 3600	Main Control (OUT1) Upper limit of linear output
↓ SET	CL02 150	Sub Control (OUT2) Lower limit of linear output
↓ SET	CH02 3500	Sub Control (OUT2) Upper limit of linear output
↓ SET	CL03 0	Aux. Output Lower limit of linear output
↓ SET	CH03 5000	Aux. Output Upper limit of linear output
↓ SET	TCY 5	Timer for Motor Control Full actuation time of Time proportional motor control Range: 5 – 200 sec
↓ SET	WA 0	WAIT function To set 'wait' for program operation 0= No wait, others = Wait volume
↓ SET	SEtA 0000	Extra SET DO NOT change the value of this parameter
↓ SET	IDn 1	ID Number Communication ID number
↓ SET	bAUd 2400	Baud Rate DO NOT change the value of this parameter
↓ SET	SP05 0	SP compensation Range: -1000~1000
↓ SET	PV05 0	PV compensation Range: LSPL~USPL
↓ SET	Un t C	Unit of PV & SP Selection: C, F, and A (linear)
↓ SET	SOFT 0.20	Soft Filter To adjust PV response time (Range: 0.05 – 1.00) * The bigger value gives the faster response.

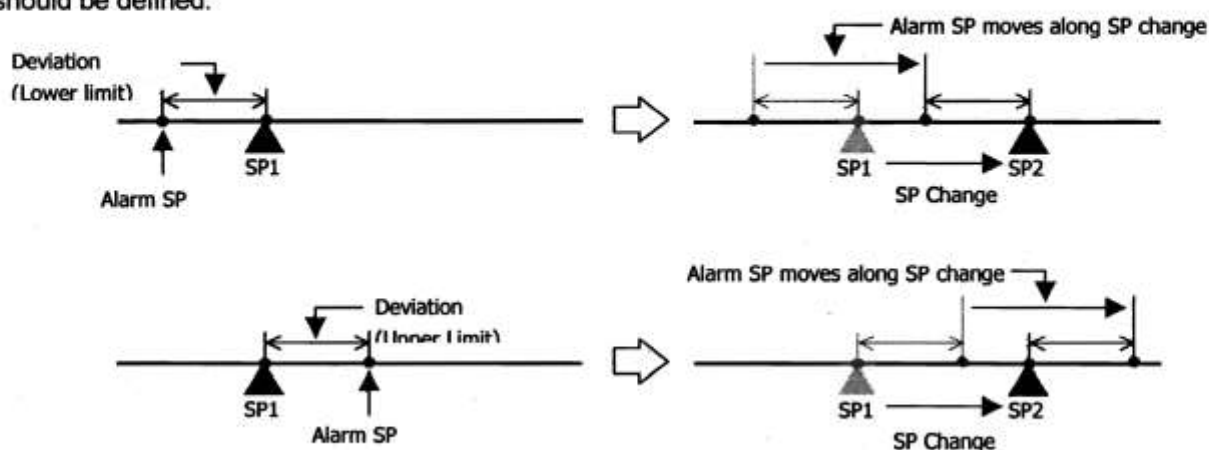
* Those 2 parameters are only for adjusting the linear signal of control output, not for the limitation of the control output or any other purpose. Please, DO NOT change the values without Technical Support, see Contacts page.

	Parameter	Description
↓	CASC	* DO NOT change the value
↓ SET	OUT HEAT	Operation Mode Heating (direct) or Cooling (reverse)
↓ SET	OPAd SF=4	Control Process PID or Fuzzy
↓ SET	H= 60	Frequency 50 or 60Hz * Please, check whether the proper frequency is selected
↓ SET		

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)



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)



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



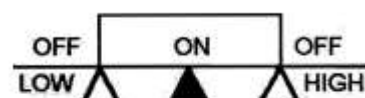
3.4.1.5 Dev. Band Breakaway Alarm (Alarm Code 03, Alarm release in the first alarming situation)



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



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

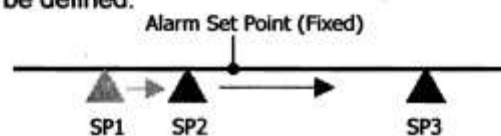


3.4.1.8 Deviation Band Alarm (Alarm Code 14, No alarm release in the first alarming situation)

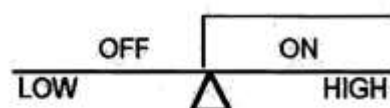


3.4.2 Absolute Value Alarm

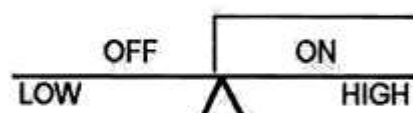
The Alarm SP (Set Point) is to be fixed even though the SP moves. When an alarm is set, the absolute value of the Alarm SP should be defined.



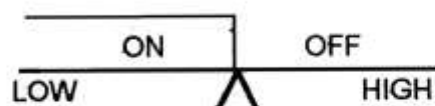
3.4.2.1 Absolute Upper Limit Alarm (Alarm Code 05, Alarm release in the first alarming situation)



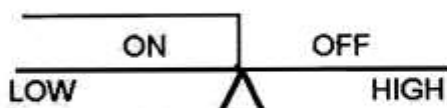
3.4.2.2 Absolute Upper Limit Alarm (Alarm Code 15, No alarm release in the first alarming situation)



3.4.2.3 Absolute Lower Limit Alarm (Alarm Code 06, Alarm release in the first alarming situation)



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



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

<i>RUN</i>	<i>END</i>
ON	OFF

AL

3.4.4 System Alarm

3.4.4.1 System Error Alarm (Alarm Code 08)

<i>Normal</i>	<i>Error</i>
OFF	ON

AL

3.4.4.2 System Error Alarm (Alarm Code 18)

<i>Normal</i>	<i>Error</i>
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	K1	0.0~200.0°C	0.0~392.0°F
	K2	0.0~400.0°C	0.0~752.0°F
	K3	0~600°C	0~1112°F
	K4	0~800°C	0~1472°F
	K5	0~1000°C	0~1832°F
	K6	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	W1	0~2000°C	0~3632°F
	W2	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. (DC10X0XT-XXX-XXX-X)

4.2 RTDs

TYPE	CODE	RANGE	
JIS Pt100	JP1	-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	dP1	-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	JP1	-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

* The default of Input Code is 'DP3' for the model of RTD input type. (DC10X0XR-XXX-XXX-X)

4.3 Linear Inputs

CODE	SIGNAL	INPUT TYPE	RANGE
AN1	-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.
(DC10X0XL-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.

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
1 n IE	Open the circuit of 'INPUT 1' (sensor)	Check the wiring
* AdCF	A/D Convert Failure	Service Call required
* C JCE	Cold junction compensation failure	Service Call required
1 n 2E	Open the circuit of 'INPUT 2' (sensor)	Check the wiring
uuu 1	Excess of PV over upper limit (INPUT 1)	<ul style="list-style-type: none"> - Check sensor wiring & input code - Adjust the range of indication
nnn 1	Shortage of PV under lower limit (INPUT1)	
uuu 2	Excess of PV over upper limit (INPUT2)	
nnn 2	Shortage of PV under lower limit (INPUT2)	
* r ACF	Memory (RAM) failure	Service call required
1 n tF	Interface failure	Check wiring of input
AU tF	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.

Sales and Service

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below.

Warranty/Remedy

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