DC 1000 SERIES ORDER INFOR

Example: DC1040CT-302-000-E

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	

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DC1010/DC1020/DC1030/DC1040

DIGITAL CONTROLLERS

Specification

Overview

The DC1000 Series are microprocessor-based controllers designed with a high degree of functionality and reliability at a competitive price. The controllers are available in different formats: 48x48 (1/16 DIN), 48x96 (1/8 DIN), 72x72 (3/16 DIN), 96x96 (1/4 DIN). This controller series is ideal for the control of temperature, humidity, pressure, flow etc. in a variety of applications including:

- Plastic Processing
- Package Machinery
- Painting and coating
- Semiconductor packaging / Testing
- Dryers

Features

Easy to Configure

Different configuration levels provide easy access to parameters.

Various Control Algorithm

Several different algorithms are available as follows:

- PID or ON/OFF Control
- Heat/Cool Control with 2 PID sets
- Motor Position Control (without slidewire feedback)

Auto-Tuning Capability

Advanced auto-tuning function calculates the optimized PID values for your specific control system.

Dual Display and Bar graph

Two large 4 digits display PV, SP and configuration parameters. One 10 LED bar-graph displays the control output (MV), and up to 8 LEDs display the status of the different outputs (Control, Alarm, …) and also provide indication of the Auto/Manual and programmer states.

Setpoint Programming

Two programs are available with a maximum of 8 segments. The 2 programs can be linked together and perform as a single 16 segment program.

Extended Alarm Capability

Up to three different alarm outputs are available per instrument and 17 kinds of event modes can be assigned to each of alarm output.

Communications

RS232 or RS485 (with ASC II & Modbus RTU Protocol) is optionally available with a maximum communication speed of 38400 bps.

IP65 Front Face Protection

IP65 rated front face permits use in applications where it may be subjected to moisture, dust conditions.

Remote Setpoint Capability

The setpoint can be defined from a remote PLC or other controller.

Manual & Automatic Modes

The control mode can be switched between Automatic and manual by clicking A/M key. (The A/M key is available with DC1020, DC1030 and DC1040)

Global Approvals – CE & cUL

All models are CE certified as a standard, and UL approved version for all models are available optionally.

Parameter Lock

A 4-digit security code prevents any unauthorized changes of parameters or configurations. Parameters can be hidden to user to prevent any mis-configuration of the unit.

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Specifications					
General					
Rated power supply voltage		100 to 240V AC 50/60Hz, 8VA max. 15 to 50V DC, 10VA max.			
Insulation Resistance		Over 10 MΩ under DC500V megger between input terminal and case(ground). Over 10 MΩ under DC500V megger between output terminal and case(ground).			
Withstand voltage		1000V AC 50/60Hz for 1min across input terminal and case(ground) 1500V AC 50/60Hz for 1min across output terminal and case(ground)			
Standard Conditions	Ambient Temp.	23 ± 2 °C			
	Ambient Humi.	60 ± 5% RH			
	Rated Power Supply	110V AC			
	Power Frequency	50 ± 1Hz or 60 ± 1HZ			
Operating Conditions	Ambient Temp.	0 to 50°C			
	Ambient Humi.	20 to 90%RH (non-condensing)			
	Rated Power Supply	100 to 240V AC 20 to 50V DC			
	Allowable Power Supply	85 to 264V AC 15 to 55VDC			
	Power Frequency	50 ± 2Hz or 60 ± 2Hz			
	Vibration Resistance	10m/s2 (approx. 1G), 10 to 55Hz for 10min each X, Y, Z directions			
Transportation and storage conditions	Ambient Temp.	-20 to +65 °C			
	Ambient Humi.	10 to +95% RH (non-condensing)			
	Vibration Resistance	20m/s2 (Approx. 2G), 10 to 55Hz for 2 hours each in X, Y, Z directions			
Exterior		Case and front panel : plastic			
Mounting		Panel-mount			
Model		DC1010	DC1020	DC1030	DC1040
Exterior Size (unit: mm) inch : W X H X D		50 X 50 X 97 (1.97X1.97X 3.82)	50 X 96 X 97 (1.97X3.78X3.82)	74 X 74 X 97 (2.91X2.91X3.82)	96 X 96 X 97 (3.78X3.78X3.82)
Panel Cutout (unit: mm) inch : W X H		44.5 X 44.5 (1.75 X 1.75)	44.5 X 90.5 (1.75 X 3.56)	68.5 X 68.5 (2.97 X 2.97)	90.5 X 90.5 (3.56 X 3.56)
Global Approvals		CE, cUL			

Interval = 20.5mm (0.807 in)

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Specifications		
Input/Output		
Analog Input 1	Number of Point	1 point (TC, RTD or Linear)
	Type	TC: K, J, R, S, B, E, T, N, W, U, PLII, L RTD : DPt100, JPt100, JPt50 Linear : 4~20mA / 1~5V / 2~10V * Note 1 0~20mA / 0~5V / 0~10V * Note 1
	Range	Refer to Table 1-1. * Temperature unit : °C, °F (switchable)
	Sampling cycle	250 ms
	Indication Accuracy	± 0.2% FS ± 1digit (for details Table1-1)
	Cold junction accuracy	±1.0°C (under standard conditions)
	Input bias (offset)	LSPL ~ USPL
	Digital Filter	0 - 200 sec (0: filter off)
	Decimal Point	0000, 000.0, 00.00, 0.000
Analog Input 2	Type	0~20mA / 0~5V / 0~10V 4~20mA / 1~5V / 2~10V
	Sampling Cycle	250ms
CT Input	Type	Measure AC current of single phase SC-80T : 0.0~80.0A
	Sampling Cycle	500msec
	Indication Accuracy	1% FS
	Resolution	0.1A ac
	Weight	12g
	Dielectric strength	2500Vac, for 1 min between terminal and case

NOTE 1. When OUT1 is ON and CT input value is less than HBA set value for 5 seconds, AL1 is activated. Otherwise, AL1 is not activated.

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Specification

Model			DC1010	DC1020	DC1030	DC1040
Input/Output						
Analog Output 1	Relay		SPST	SPD	SPST	SPDT
			3A, 220Vac, Resistive Load(100,000 time electrical life)			
	Voltage Pulse		PWM(SSR drive), ON: 20 Vdc, OFF: 0 V (max. load current 20mA) Open Time Terminal Voltage: 20 Vdc or less Time Proportional Cycle Time: 0-150 sec			
	Linear		DC Current (mA) : 0~20mA, 4~20mA (load resistance 500Ω) DC Voltage (V) : 0~5V, 0~10V, 1~5V, 2~10V (max. load current 20mA) Accuracy ± 5% of Span Update Cycle 500m sec			
Analog Output 2 (* Note 1)	Relay		SPST	SPST	SPST	SPST
			3A, 220Vac, Resistive Load(100,000 time electrical life)			
	Voltage pulse		PWM(SSR drive), ON: 20 Vdc, OFF: 0 V (max. load current 20mA) Open Time Terminal Voltage: 20 Vdc or less Time Proportional Cycle Time: 0-150 sec			
	Linear		DC Current (mA) : 0~20mA, 4~20mA (load resistance 500Ω) DC Voltage (V) : 0~5V, 0~10V, 1~5V, 2~10V (max. load current 20mA) Accuracy ± 5% of Span Update Cycle 500m sec			
Output Direction (OUD)			HEAT(Direct)/COOL(Reverse) (Selectable)			
Control Mode			Auto/Manual operation is switchable. *Manual output : Bumpless in normal mode OUTL in abnormal mode			
Transmission Output	Object		SP,PV			
	No. of point		1 point			
	Type		4-20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V			
	Accuracy		+/- 0.2% of span			
	Update Cycle		500 ms			
Digital Output	Relay	AL1	SPST	SPDT	SPST	SPDT
		AL2	SPST	SPDT	SPST	SPDT
		AL3	-	SPST	SPST	SPDT
			3A, 220Vac, Resistive Load(100,000 time electrical life)			

* For Heat/Cool Control Output only.

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Specification			
PID Control & Auto-Tuning			
Proportional Band (P1,P2)			Proportional Band: 0.0 ~ 200.0%
Integral time (I1, I2)			Integral time : 0 ~ 3600 sec
Derivative time (D1, D2)			0 ~ 900 sec
Auto-Tuning Value			0 ~ USPL
HYS1, HYS2			0 ~ 1000 (for ON/OFF control)
Dead Band (DB1)			Not defined.
GAP1, GAP2			0 ~ 1000(for HEAT/COOL control)
Cycle Time			0 ~ 150 sec
Communication			
Speed			1200, 2400, 4800, 9600, 19200, 38400 bps
Protocol			RTU, ModBus
Parity check			Odd / Even
Bit length			8
Communication			RS232C,RS485
Events(ALARMS)			
PV Event	Code	01 / 11	Deviation-High alarm (inhibit / no-inhibit)
		02 / 12	Deviation-Low alarm (inhibit / no-inhibit)
		03 / 13	Deviation High/Low Limit alarm (inhibit / no-inhibit)
		04 / 14	Deviation High/Low Limit range alarm (inhibit / no-inhibit)
		05 / 15	Absolute High alarm by PV (inhibit / no-inhibit)
		06 / 16	Absolute Low alarm by PV (inhibit / no-inhibit)
	SET VALUE		-1999~ USPL (Absolute value, Deviation value)
	Activation Hysterisis		0 ~ 1000
	On Delay Time		0 : Flicker 99M 59S : Continuance 00M 01S to 99M 58S : Time Delay
Program	Code	07	Segment End alarm(in progress of program)
		17	Program RU
System	Code	08	System Error ON
		18	System Error OFF
TIME	Code	19	Delaying timer (00Hours 00Min ~ 99Hour 59Min)
HBA	Code	09	Heater Break A

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Specification

Program (Optional)

Program section	No. of programs	2 (Program 1 & Program 2)
	No. of segments	8 segments/1 program
	Segment time	Segment time: Setting by set points(SP) and time (Max. 99hours 59minutes)
	Control output	0~100% When OUT=0%, Program End.
	WAIT function	Rear Wait Time may exceed set time of the particular segment. In this case, remaining time is set as 0 and pending; if the temperature that was measured does not reach target value ± WAIT set point. It proceeds to the next segment after it is confirmed that temperature reach the range of set point (target value ± WAIT)
		Setup range: ± 0 ~ 1000 by decimal point.
	Repeat	Repeat / Non-repeat
	Program link	When Program number is 0, Link program 1 and 2.
	Program start	(1) Start from SP=0 (2) Start from PV
	Power Failure	Hot Start / Cold Start
	TIME UNIT	Hour. Minute / Minute. Second

Ramp & Soak

Slope(Ramp)	Temperature : 0.0 to 99.99 / min
SOAK TIMER	Max. 99 hours 59 min
POWER FAILURE	It starts from PV.

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Table 1-1

Analog Input Range (Thermocouple)

Input Type		Code	Temperature Range		Indication Accuracy	Remarks
			°C	°F		
TC(Note1)	K	K1	0.0~200.0	0.0~392.0	+/-0.2%FS	
		K2	0.0 ~ 400.0	0.0~752.0		
		K3	0 ~ 600	0~1112		
		K4	0 ~ 800	0~1472		
		K5	0 ~ 1000	0~1832		
		K6	0 ~ 1200	0 ~ 2192		
	J	J1	0.0~200.0	0.0~392.0	+/-0.2%FS	
		J2	0.0 ~ 400.0	0.0~752.0		
		J3	0 ~ 600	0~1112		
		J4	0 ~ 800	0~1472		
		J5	0 ~ 1000	0~1832		
		J6	0 ~ 1200	0 ~ 2192		
	R	R1	0~1600	0~2912	+/-0.2%FS	+/-2 °C under 100 °C +/-3.6 °F under 212 °F
		R2	0~1769	0~3216		
	S	S1	0~1600	0~2912	+/-0.2%FS	
		S2	0~1769	0~3216		
	B1		0~1820	0~3308	+/-0.2%FS	No guarantee at 0 ~ 400°C
	E	E1	0~800	0~1472	+/-0.2%FS	
		E2	0~900	0~1652		
	N	N1	0~1200	0~2192	+/-0.2%FS	
		N2	0~1300	0~2372		
	T	T1	-199.9~400.0	-199.9~752.0	+/-0.2%FS	+/-1 °C under -100 °C +/-1.8 °F under -148 °F
		T2	-199.9~200.0	-199.9~392.0		
		T3	0.0~350.0	0.0~662.0		
	W5Re/ W26Re		0~2300	0~3632	+/-0.2%FS	
			0~2320	0~4208		
	PLII	PL1	0~1300	0~2372	+/-0.2%FS	
		PL2	0~1390	0~2534		
	U	U1	-199.9~600.0	-199.9~999.9	+/-0.2%FS	+/-1 °C under -100 °C +/-1.8 °F under-148 °F
		U2	-199.9~200.0	-199.9~392.0		
	L	L1	0~400	0~752	+/-0.2%FS	
		L2	0~800	0~1472		

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Table 1-2

Analog Input Range (RTD)						
Input Type		Code	Input Type		Indication Accuracy	Remarks
			°C	°F		
RTD	JPt100	JP1	-199.9~600.0	-199.9~999.9	+/-0.2%FS	+/-0.5 °C under -100 °C +/-0.9 °F under-148 °F
		JP2	-199.9~400.0	-199.9~752.0		
		JP3	-199.9~200.0	-199.9~392.0		
		JP4	0~200	0~392		
		JP5	0~400	0~752		
		JP6	0~600	0~1112		
	DIN Pt100	DP1	-199.9~600.0	-199.9~999.9	+/-0.2%FS	+/-0.5 °C under -100 °C +/-0.9 °F under-148 °F
		DP2	-199.9~400.0	-199.9~752.0		
		DP3	-199.9~200.0	-199.9~392.0		
		DP4	0~200	0~392		
		DP5	0~400	0~752		
		DP6	0~600	0~1112		
	Pt50	JP.1	-199.9~600.0	-199.9~999.9	+/-0.2%FS	+/-0.5 °C under -100 °C +/-0.9 °F under-148 °F
		JP.2	-199.9~400.0	-199.9~752.0		
		JP.3	-199.9~200.0	-199.9~392.0		
		JP.4	0~200	0~392		
		JP.5	0~400	0~752		
		JP.6	0~600	0~1112		

Table 1-3

Analog Input Range (Linear)					
Input Type	Code	Source	Range	Indication Accuracy	Remarks
Linear	AN1		-1999~9999	+/-0.1% of span	
	AN2				
	AN3				
	AN4				0-20mA, 0-1V, 0-5V, 0-10V
	AN5				4-20mA, 1-5V, 2-10V

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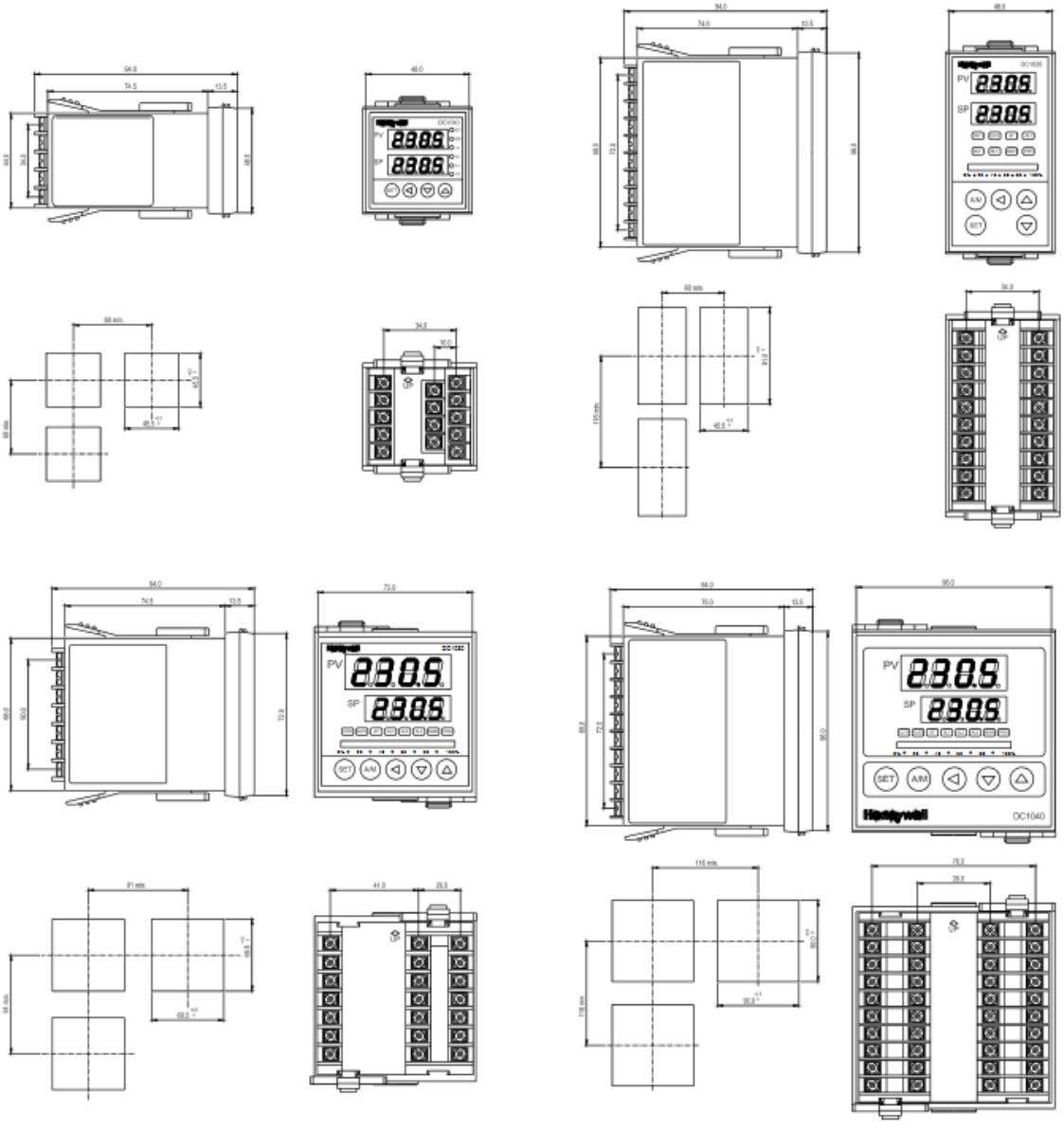
Picture 1.1

External Dimension



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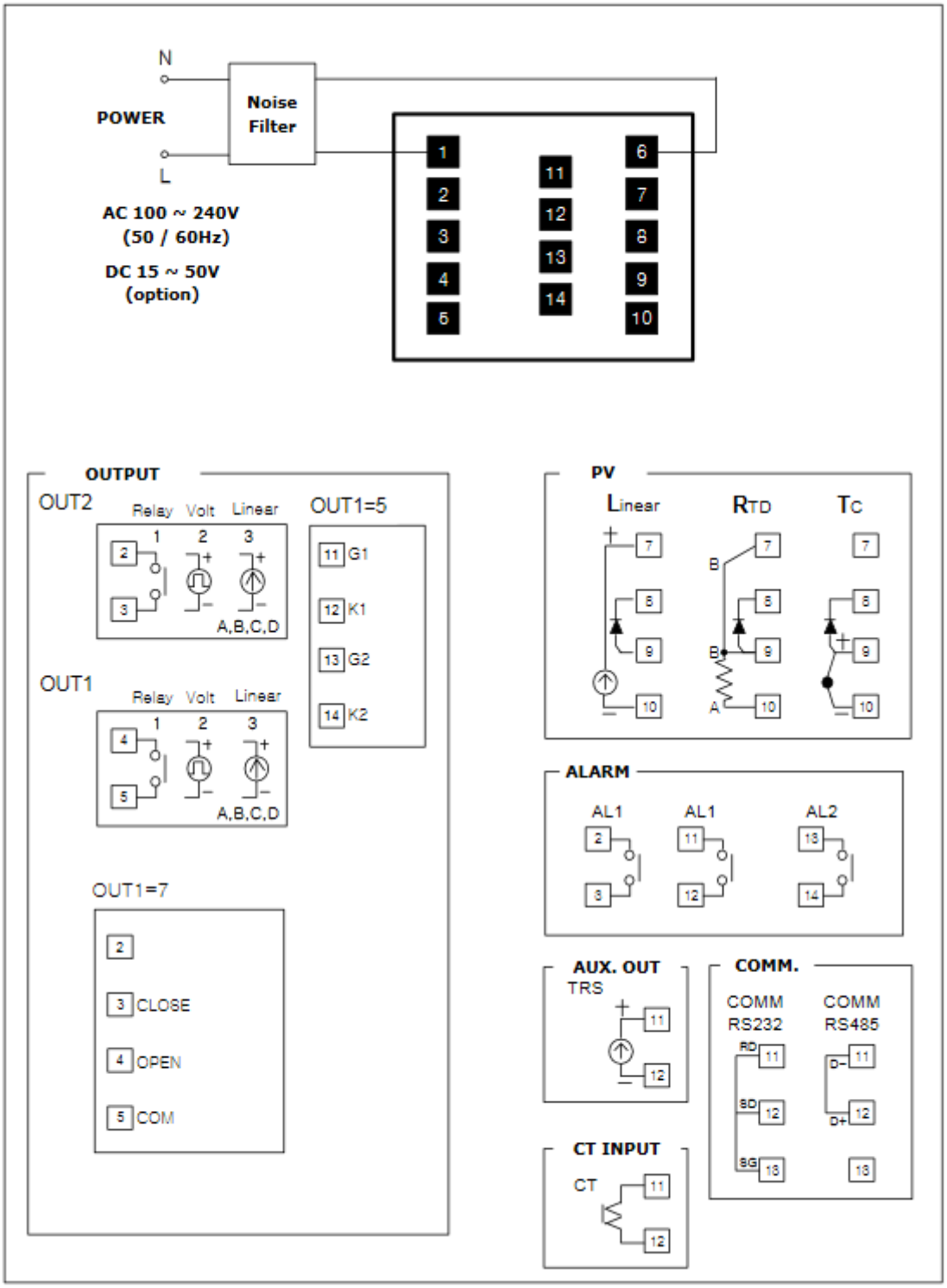
Picture 1-2

Wiring Diagram – DC1010



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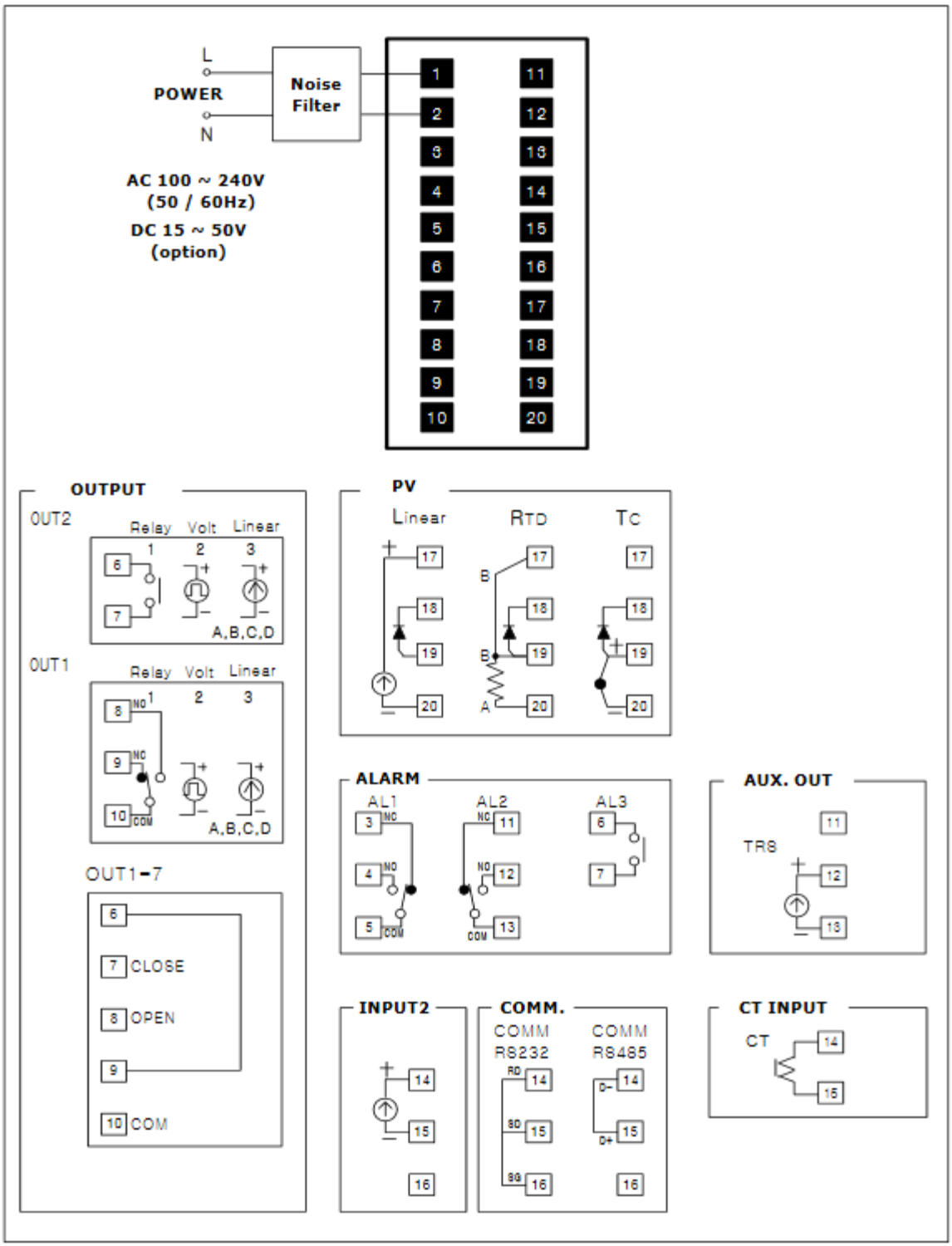
Picture 1-3

Wiring Diagram – DC1020



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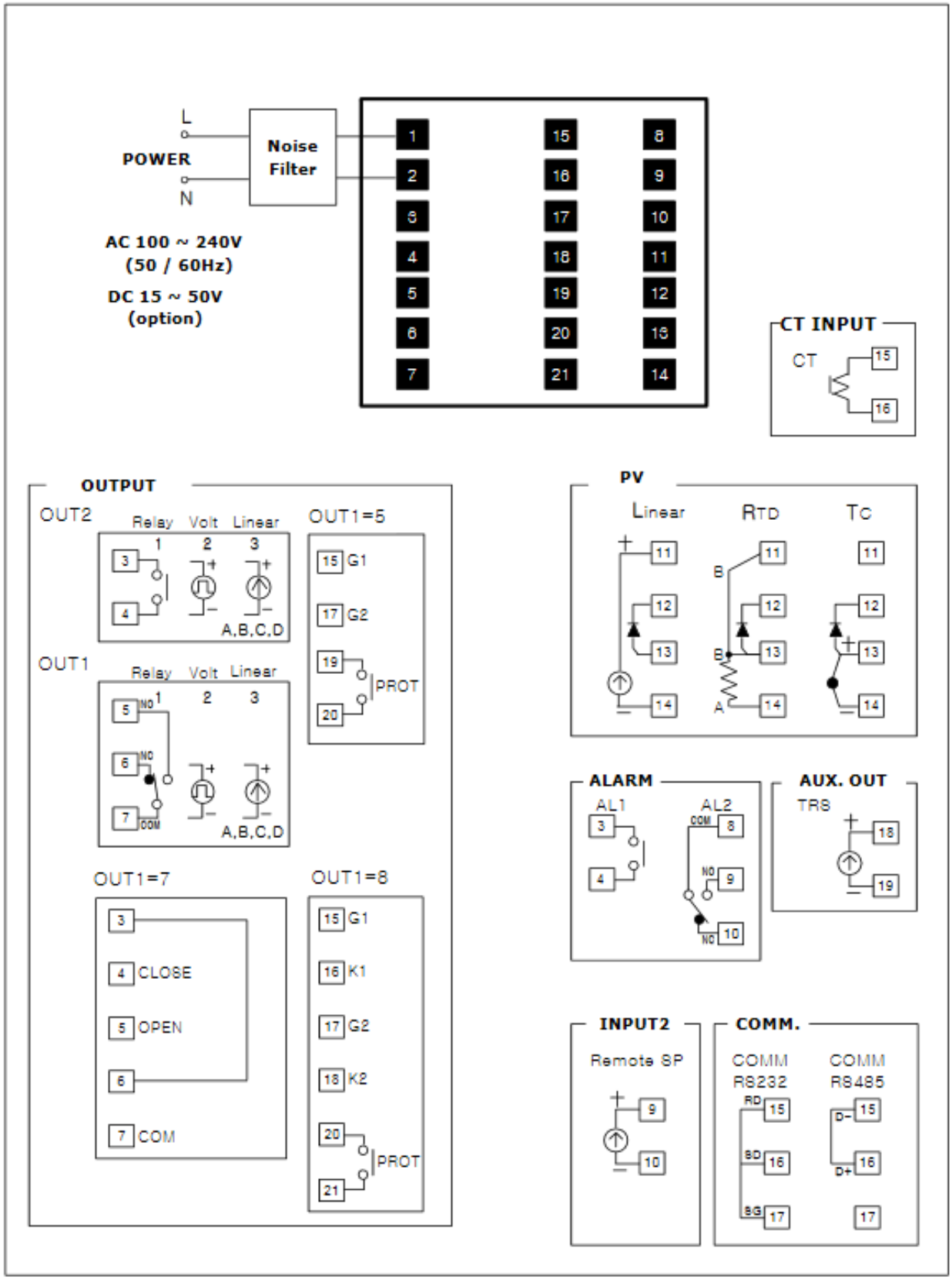
Picture 1-4

Wiring Diagram – DC1030



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44 ซอยบรมราชชนนี 70 ถนนบรมราชชนนี แขวงศาลาธรรมสพน์ เขตทวีวัฒนา กรุงเทพฯ 10170
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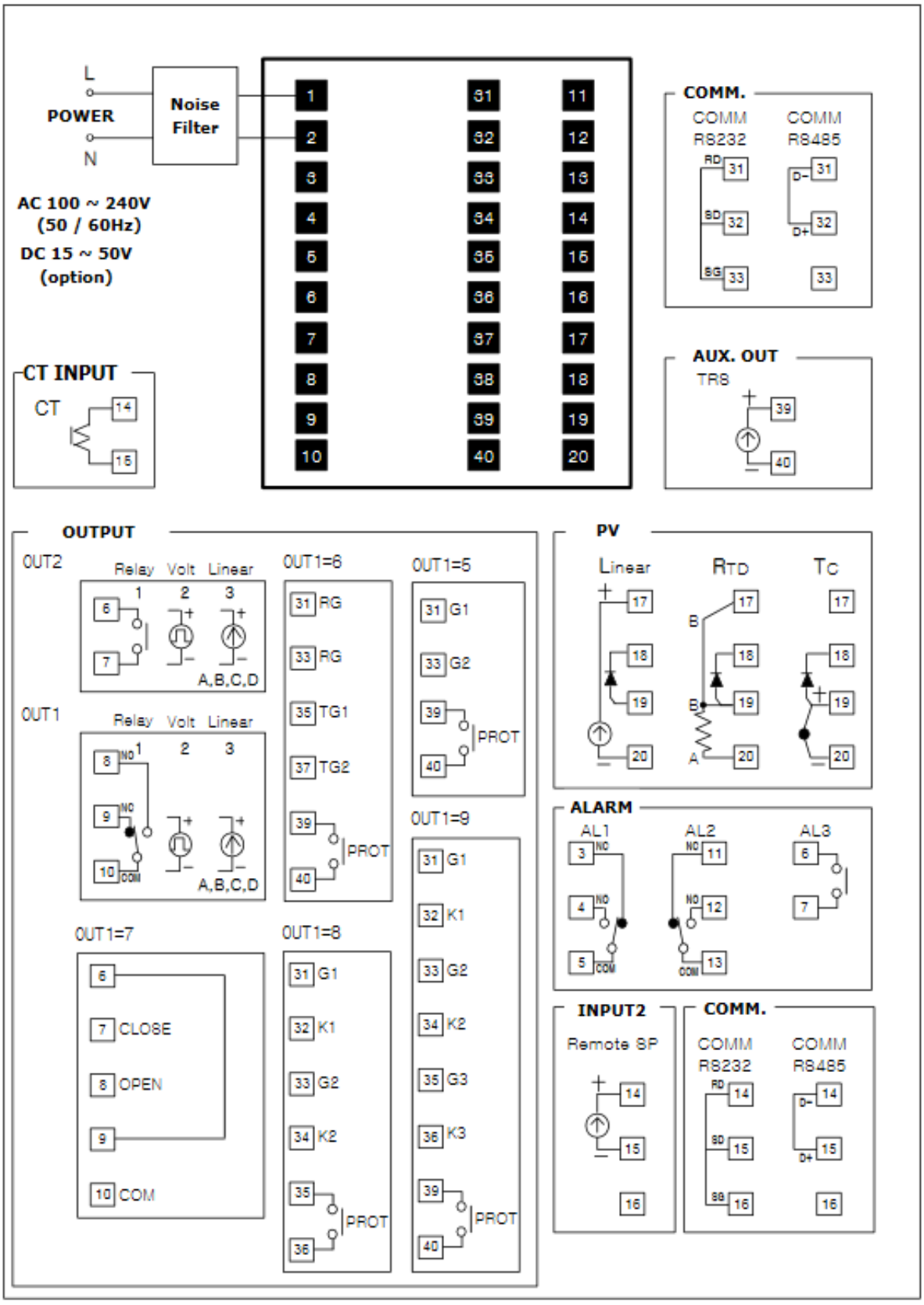
Picture 1-5



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Model Interpretation

Instruction

- **Select the desired key Number. The arrow to the right marks the selections available**
- **Make one selection each from Tables I throung III using the column below the proper arrow**
- **A dot(*) denotes unrestricted availability. A letter denotes restricted availability.**

Key Number
DC10_ _ _ _ -[I]-[II]-[III]

Description		Selection	Availability ↓	↓	↓	↓
Size	48x48 mm (DIN) 1/16)	DC101_ _ _				
	48x96 mm (DIN 1/8)	DC102_ _ _				
	72x72 mm	DC103_ _ _				
	96x96 (DIN 1/4)	DC104_ _ _				
Power&Approvals	90-240 Vac Power /CE	DC10_0_ _	•	•	•	•
	15-50 Vdc Power /CE	DC10_1_ _	b	b	b	b
	90-240 Vac Power /IP 65 /CE	DC10_2_ _	•	•	•	•
	15-50 Vac Power /IP65/CE	DC10_3_ _	b	b	b	b
	90-240 Vac Power /IP65/CE/UL Agency Approval	DC10_4_ _	•	•	•	•
	15-50 Vdc Power /IP65/CE/UL Agency Approval	DC10_5_ _	b	b	b	b
Program	None	DC10_ _c_	•	•	•	•
	Program (2 patterns,8 segments per 1 pattern)	DC10_ _P_	•	•	•	•
Input	RTD	DC10_ _ _R	•	•	•	•
	TC	DC10_ _ _T	•	•	•	•
	Linear	DC10_ _ _L	•	•	•	•

TABLE I

Control Output 1	None	0 _ _	•	•	•	•
	Relay,Contact,SPDT,3A/240 VAC	1_ _	•	•	•	•
	Volt,Voltage Pulse,20 VDC/20mA	2_ _	•	•	•	•
	mA Current,4-20mA	3_ _	•	•	•	•
	Three Position Step Motor Control	7_ _		c	d	c
	0-5 V	A_ _	•	•	•	•
	0-10 V	B_ _	•	•	•	•
	1-5V	C_ _	•	•	•	•
	2-10 V	D_ _	•	•	•	•
Control Output 2 (Heat/Cool)	None	_0_	•	•	•	•
	Relay,Contact,SPDT,3A/240VAC	_1_	•	•	•	•
	Volt,Voltage Pulse,20VDC/20 mA	_2_	•	•	•	•
	mA Current,4-20 mA	_3_	•	•	•	•
	0-5V	_4_	•	•	•	•
	0-10V	_5_	•	•	•	•
	1-5V	_6_	•	•	•	•
	2-10V	_7_	•	•	•	•
Alarm Event &Heat Break Alarm	1 Alarm Relay	_ _1	e	•	l	•
	2 Alarm Relay	_ _2	f	g	j	•
	3 Alarm Relay	_ _3		h		
	HBA	_ _A	e'	p	i'	•
	HBA+1 Alarm Relay	_ _B		g'	j'	•
	HBA+2 Alarm Relay	_ _C				k'

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DC10_ _ _ _ Availability 10 20 30 40 ↓ ↓ ↓ ↓

Table II

Transmitter	None	0 _ _	•	•	•	•
	4-20 mA	1_ _	•	•	•	•
	0-20 mA	2_ _	•	•	•	•
	0-5 V	A_ _	•	•	•	•
	0-10 V	B_ _	•	•	•	•
	1-5 V	C_ _	•	•	•	•
	2-10 V	D_ _	•	•	•	•
Remote SP	None	_0_	•	•	•	•
	4-20 mA	_1_		I	I	I
	0-20 mA	_2_		I	I	I
	0-5 V	_A_		I	I	I
	0-10 V	_B_		I	I	I
	1-5 V	_C_		I	I	I
	2-10 V	_D_		I	I	I
Communication	None	_ _0	•	•	•	•
	RS-232	_ _1	**m**	**n**	•	•
	RS-485	_ _2	**m**	**n**	•	•
	RS-232 (Modbus RTU)	_ _A	**m**	**n**	•	•
	RS-485(Modbus RTU)	_ _B	**m**	**n**	•	•

TABLE III

Manual	English	E		•	•	•	•
	Chinese	C					
	French	F					
	Korea	K		•	•	•	•

RESTRICTION /NOTE

Restriction Letter	Available Only With		Not Available With	
	Table	Selection	Table	Selection
b			II	X_ _
c	I	_0 1,_02		
d	I& II	DC10 _ _ _ _-_01-_0_-_		
e,e'			I & II	DC10_ _ _ _-_x_-_ _1-_
e'			I	_x_
f			I& II	DC10_ _ _ _-_x_-x_ _-_
g,g'			I& II II	DC10_ _ _ _-_x_-x_ _-_ X_X
g'			II II	_x_ _ _x
h	I& II	DC10_ _ _ _-_0_-_0_-_		
i,i'			I& II	Dc10 _ _ _ _-_x_-_x_-_
i'			II	_ _x
j,j'	I& II	DC10_ _ _ _-_0_-_0_-_		
j'			II	_ _x
k,k'	I& II	DC10_ _ _ _-_0_-_ _0-_		
k'			II	_x_
l				DC10_ _ _P
m			II	X_ _
n			II	_x_
p			II II	_x_ _ _x

*X: Option Selected
0: Option Not Selected

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HONEYWELL

DC 1010 / 1020
1030 / 1040

DIGITAL CONTROLLER
PRODUCT MANUAL

51-52-25-113
06/02

Before using this manual, please check to ensure the Model number, input type Range and output match your requirements.

1. Front Panel Overview

1.1 Display

PV : Process Value, 4-digit display (Color Red)

SP : Set Point, 4-digit display (Color Green)

1.2 LED Indicators

OUT1 : Output 1, color green

OUT2 : Output 2, color green

AT : Auto-Tuning, color yellow

PRO : Program, color yellow

AL1 : Alarm 1, color red

AL2 : Alarm 2, color red

MAN : Manual, color yellow

1.3 Keys

SET : MODE & SET key

◁ : SHIFT key

▽ : DOWN key

△ : UP key

A/M : Auto/Manual key

2. Auto Tuning

2.1 When AT is set to 'YES', auto tuning can be initiated.

2.2 After completion of auto tuning, the PID parameter are automatically Entered into memory.

2.3 ATVL = auto tuning offset, the off set value when entered will be calculated and subtracted from the SP.

(It prevents over-shooting during auto tuning)

SP-ATVL = Auto-tuning value, ATVL = Auto tuning offset

Ex.) SP = 200°C, ATVL = 5, Auto tuning point is at 195°C

* ATVL means auto-tuning point (195°C) in the above example.

2.4 Auto tuning failure

2.4.1 ATVL is too large.

→ If unsure, set ATVL = 0)

2.4.2 Process lag is to long for Auto Tune to function correctly.

→ Set PID parameter manually.

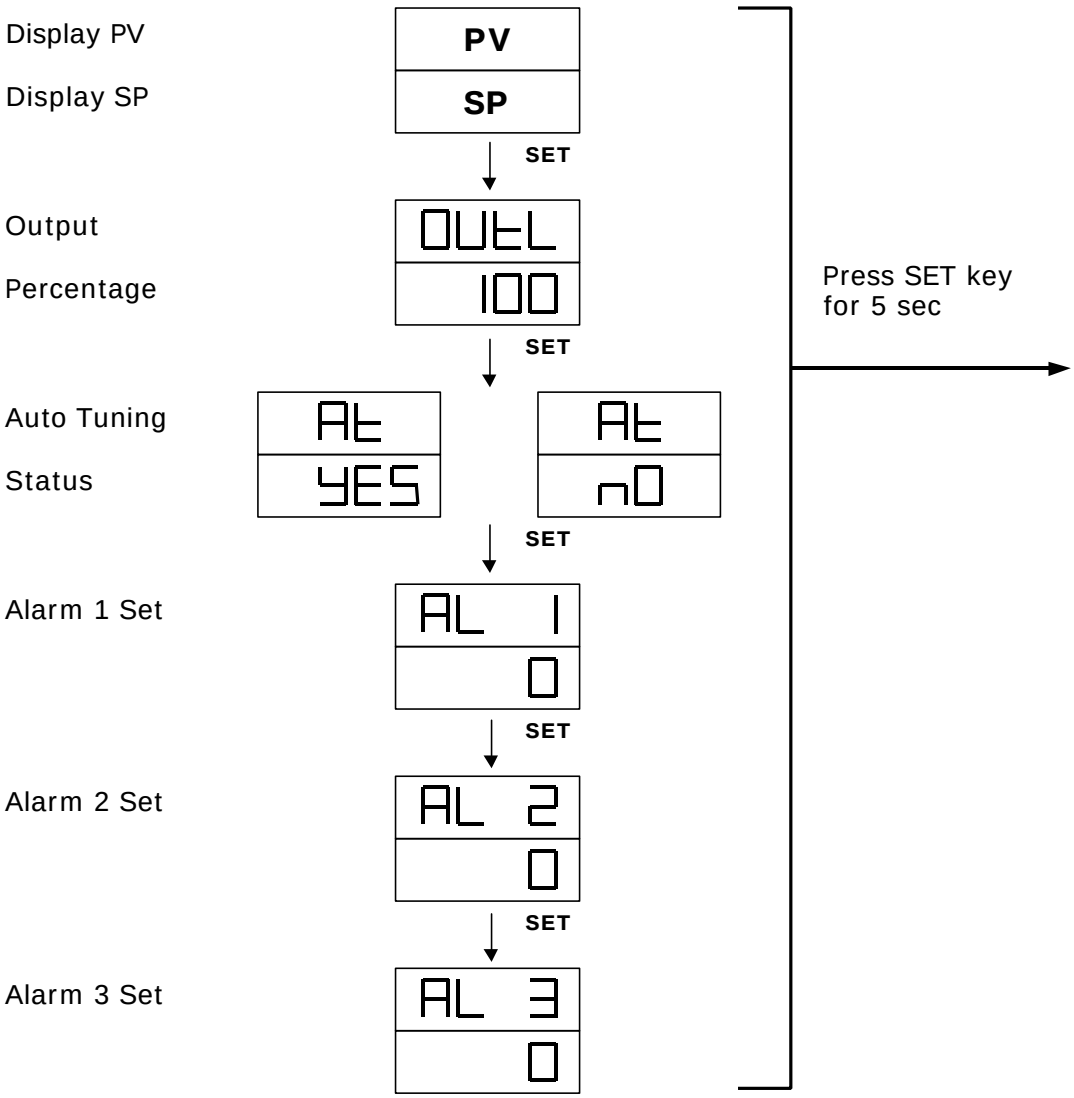
3. Error Information

	Open circuit sensor input 1
*	A/D converter failed
*	Cold junction compensation failed
	Open circuit of sensor input 2
	PV exceeds USPL
	PV under LSPL
	Input 2 signal has exceeded the upper limit
	Input 2 signal has exceeded the lower limit
*	RAM failed
	Interface failed
	Auto tuning failed

Note) Error * code indicates critical failure unit must be replaced.

4. Operating Flow

4.1 Level 1



4.1.1 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. Press the SET key to enter the desired value.

4.1.2 The SET key also has the function of changing MODEs. If SET key is pressed, the display shows the next MODE.

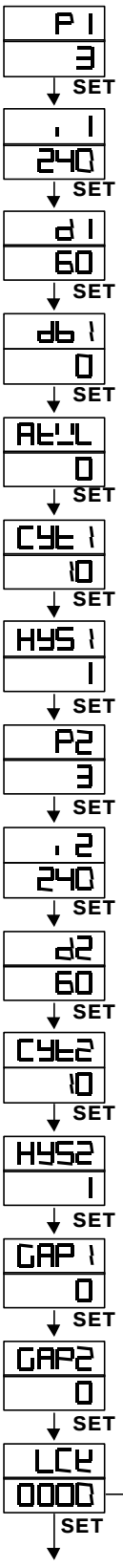
4.1.3 Press SET key for 5 sec. The display goes to level 2, press the SET key again to return to level 1.

4.1.4 If any key is not pressed for 1 minute the display will return to level 1.

4.1.5 If the A/M key is pressed the controller will switch to level 1.

4.1.6 If the output percentage is “0”, the controller output is off.

4.2 Level 2



Main Control Proportional Band	Range: 0~200% ON/OFF at P=0
Main Control Integral Time	Range: 0~3600 sec Integral off at I=0
Main Control Derivative Time	Range: 0~900 sec Derivative off at D=0
Main Control Dead-band Time	Dead Time Compensation Range: 0~1000 sec
Main Control Auto Tuning off-set	Range: 0~USPL
Main Control Proportional Cycle	Output (SSR → 1, 4~20mA→0, relay→over 10) Range: 0~150 sec * Refer to 8.10 Cycle Time
Main Control Hysterisis	For ON/OFF control only Range: 0~1000
Sub Control Proportional band	Same as P1
Sub Control Integral Time	Same as I1
Sub Control Derivative Time	Same as D1
Sub Control Proportional Cycle	Same as CYT1
Sub Control Hysterisis	Same as HYS1
Main Control Gap (Output 1)	For output 2 use only, set the value turning "OFF" early to SP
Sub Control Gap (Output 2)	For output 2 use only, set the value turning "ON" early to SP
Function Lock	

LCK=0100, To enter Level 1 & 2 and to change their parameters allowed.

LCK=0110, To enter Level 1 & 2 and to change the parameters on Level 1 allowed.

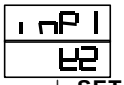
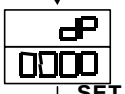
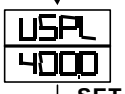
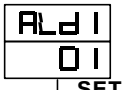
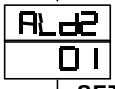
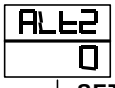
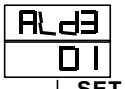
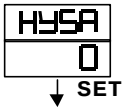
LCK=0001, To enter Level 1 only and to change SP allowed.

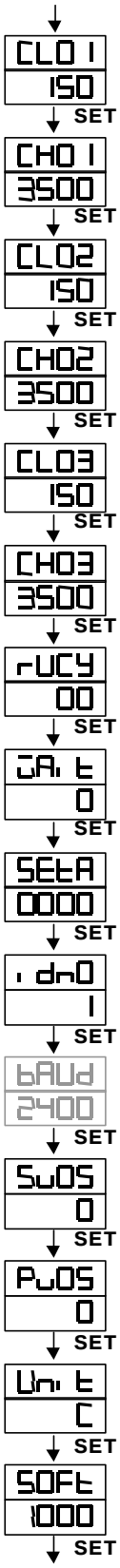
LCK=0101, Nothing allowed except to change LCK.

Return to 'P1'

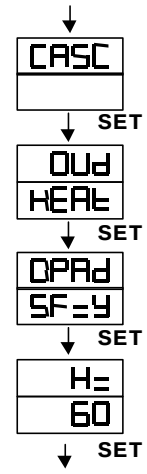
4.3 Level 3

When LCK=0000, press the SET key and SHIFT key for 5 seconds to enter level 3.

	Main Control Input Selection	Select the input range. Refer to 5.1 Input selection on P.13~P.14
SET		
	Main Control Analog Zero set	Used as input code which are AN1 to AN5 Range: LSPL~USPL
SET		
	Main Control Analog Span set	Same as ANL1
SET		
	Decimal point	To set the position of decimal point
SET		
	Lower Set-point limit	To set the lowest point within INP1
SET		
	Upper Set-point limit	To set the highest point within INP1
SET		
	Sub Control Analog Zero set	Used as input code which are AN1 to AN5 Range: LSPL~USPL
SET		
	Sub Control Analog Span set	Same as ANL2
SET		
	Alarm mode of AL1	Range: 00~19 Refer to '6.1 Alarm Function Selection' on P.15
SET		
	Time set of Alarm 1	Used in program function (Range: 0~99.59 min.) 0=switching, 99.59=continuous, others = on delay time
SET		
	Alarm mode of AL2	Range: 00~19
SET		
	Time set of Alarm 2	Same as ALT 1
SET		
	Alarm mode of AL3	Range: 00~19
SET		
	Time set of Alarm 3	Same as ALT 1
SET		
	Hysterisis of Alarm	Range: 0~1000
SET		



Main Control Calibration	To calibrate the low value of output	Range: LSPL~USPL (Current output only)
Main Control Calibration high	To calibrate the high value of output	Range: 0~9999 (Current output only)
Sub control Calibration low	Same as CL01	
Sub Control Calibration high	Same as CH01	
Transmitter control Calibration low	Same as CL01	
Transmitter control Calibration high	Same as CH01	
Timer for Motor valve control	Full run time of proportional motor (without potentiometer)	Range: 5~200 sec
To use in program for waiting continued operation	0=No wait	Others = Wait time
Relay Contact & Program RUN & End ALM	0= “a” contact, 1= “b” contact	SET A.4=0 RUN alarm, SET A.4=1 END alarm
ID number (please skip this step)	Communication ID number	
Baud rate (please skip this step)	UART band rate selection	Range: 110~9600 BIT/sec
Compensate SP	Range: -1000~1000	
Compensate PV	Range: LSPL~USPL	
Unit of PV & SP	Range: C, F, A (analog)	
Soft filter (please skip this step)	Adjust the response time of PV (the bigger, the faster)	Range: 0.05~1.00



Please skip this step

Action mode — Alternative: heat, cool

Control action — Alternative: PID, Fuzzy

Frequency — Alternative: 50, 60Hz

* Check if the frequency is right. If not, change it, please.

Return to 'INP1'

4.4 Level 4 (LOCK FUNCTION)

4.4.1 Functions of LCK

LCK=0100, To enter Level 1 & 2 and to change their parameters allowed.

LCK=0110, To enter Level 1 & 2 and to change the parameters on Level 1 allowed.

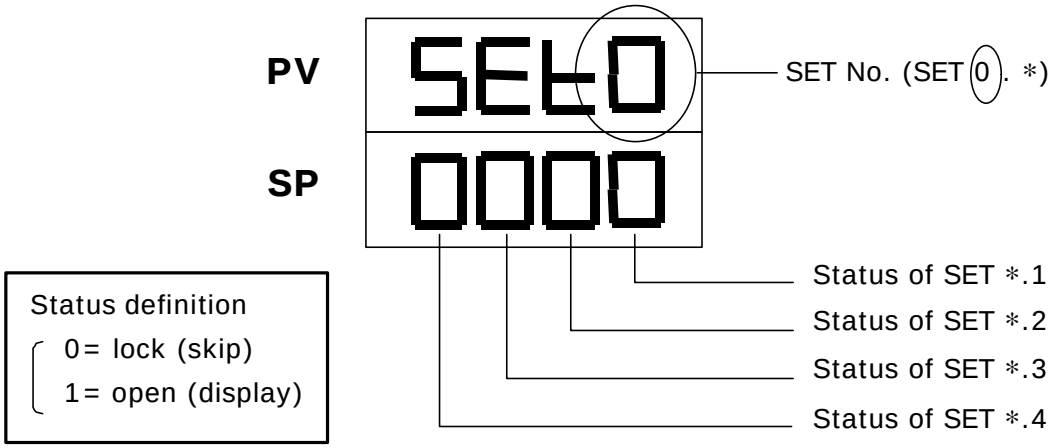
LCK=0001, To enter Level 1 only and to change SP allowed.

LCK=0000, To enter Level 3 allowed then press SET + SHIFT key (◁)

LCK=1111, To enter Level 4 allowed then press SET + SHIFT key (◁)

LCK=0101, Nothing allowed except to change LCK.

4.4.2 Let the display go to "LCK" in level 2, and set "1111" in LCK, then press SET key and SHIFT key (◁) for 5 seconds to enter "SET" status. There are SET0.1 to SET9.4 for use.



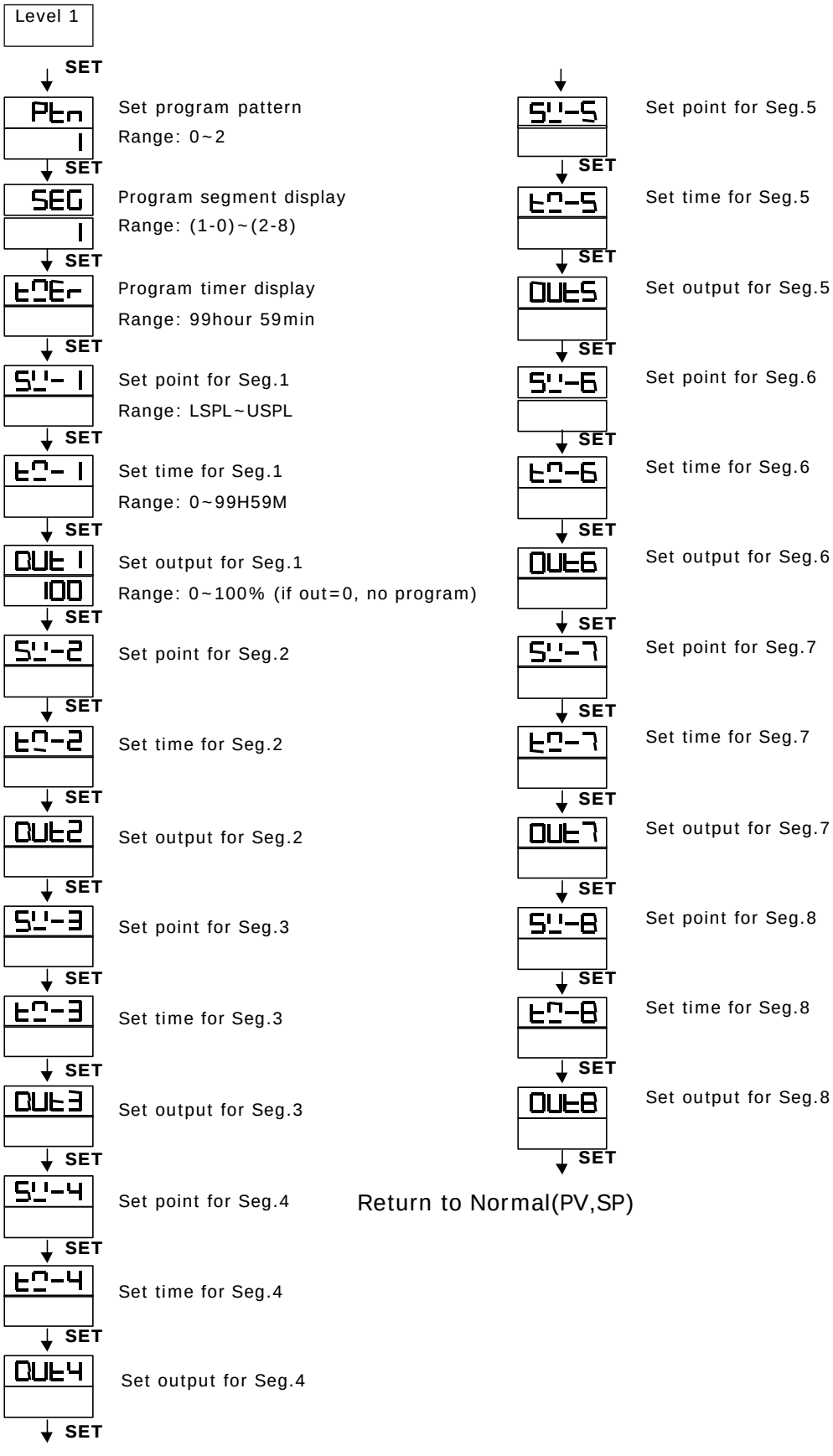
4.4.3 Functions of SETs

SET	Function	SET	Function
1.1	OUTL	5.1	CL02, CH02
1.2	AT	5.2	CL03, CH03
1.3	AL1	5.3	Rucy, WAIT, HYSM
1.4	AL2	5.4	IDNO, BAUD
2.1	AL3	6.1	SVOS
2.2	ANL1, ANH1, DP	6.2	PVOS
2.3	LSPL, USPL	6.3	UNIT
2.4	ANL2, ANH2	6.4	SOFT
3.1	ALD1	7.1	CASC
3.2	ALT1	7.2	OUD
3.3	ALD2	7.3	OPAD
3.4	ALT2	7.4	Hz
4.1	ALD3		
4.2	ALT3		
4.3	HYSA		
4.4	CL01, CH01		

SET	Function	Remarks
8.1	0= No Repeat	Program Use
	1= Program Repeat	
8.2	0= No Power Failure	
	1= With Power Failure	
8.3	0= Start from 0	
	1= Start from PV	
9.3	TRS SP	Auxiliary Output Use
9.4	TRS PV	
0.3	0= No Remote SP	
	1= Remote SP	

* Caution: Please don't operate SET8.4, otherwise the process of the controller will be in confusion.

4.5 Program Level



4.5.1 This program has 2 patterns, each pattern contains 8 segments. The segment can be arranged a period of RAMP status or SOAK status.

4.5.2 Terminologies

Pattern : A program consists of some segments

Step : A RAMP status + a SOAK status

RAMP status : The status with changing SP

SOAK status : The status with fixed SP

4.5.3 Operating

1) Key functions (No changing parameters)

△ (START) : To start program procedure, PRO in panel flicker

▽ (WAIT) : To suspend program procedure, PRO in panel will stop flicker but light

△+SET (JUMP) : To jump segment

▽+SET (RESET) : To reset program procedure, PRO in panel will be "off"

2) Alarm function

If ALD1 to be set 07 (*refer to the selection),

AL1 to be set 2 (AL1=2, it means alarm in segment 2 end),

ALT1 to be set 00.10 (alarm time 10 sec.).

*In this case, when program proceeds to segment 2 end, ALM1 relay will be on 10 sec.

3) End function

If ALD to be set 17 (* refer to the selection), this program will be end in segment 8 or 16.

* In this case, PV and END will flicker in display window, and the alarm relay acts.

This controller does not have END order if program procedure are less than 8 segments. In this case, please set next segment's out=0, then this program will be end in last set segment. Otherwise, it will proceed 8 or 16 segments.

4) Linking function

PTN=1, Proceed pattern1, which contains 8 segments

PTN=2, Proceed pattern2, which contains 8 segments

PTN=0, linking proceed pattern 1 and 2 ,totally 16 segments

(Set PTN1 and PTN2 first, then set PTN=0)

5) Other function (*refer to level 4)

SET8.1=1 Program repeat

SET8.2=0 No power failure

SET8.2=1 With power failure function

(If power suspended, the controller will keep the memory)

SET8.3=0 Program start from 0

SET8.3=1 Program start from PV

5. Input

5.1 Input selection (INP 1)

TYPE	CODE	RANGE	HEX
K	K1	0.0~200.0°C/0.0~392.0°F	01H
	K2	0.0~400.0°C/0.0~752.0°F	02H
	K3	0.0~600.0°C/0.0~1112.0°F	03H
	K4	0.0~800.0°C/0.0~1472.0°F	04H
	K5	0.0~1000.0°C/0.0~1832.0°F	05H
	K6	0.0~1200.0°C/0.0~2192.0°F	06H
J	J1	0.0~200.0°C/0.0~392.0°F	07H
	J2	0.0~400.0°C/0.0~752.0°F	08H
	J3	0.0~600.0°C/0.0~1112.0°F	09H
	J4	0.0~800.0°C/0.0~1472.0°F	0AH
	J5	0.0~1000.0°C/0.0~1832.0°F	0BH
	J6	0.0~1200.0°C/0.0~2192.0°F	0CH
R	r1	0.0~1600.0°C/0.0~2912.0°F	0DH
	r2	0.0~1769.0°C/0.0~3216.0°F	0EH
S	S1	0.0~1600.0°C/0.0~2912.0°F	0FH
	S2	0.0~1769.0°C/0.0~3216.0°F	10H
B	b1	0.0~1820.0°C/0.0~3308.0°F	11H
E	E1	0.0~800.0°C/0.0~1472.0°F	12H
	E2	0.0~1000.0°C/0.0~1832.0°F	13H
N	n1	0.0~1200.0°C/0.0~2192.0°F	14H
	n2	0.0~1300.0°C/0.0~2372.0°F	15H
T	t1	-199.9~400.0°C/-199.9~752.0°F	16H
	t2	-199.9~200.0°C/-199.9~392.0°F	17H
	t3	0.0~350.0°C/0.0~662.0°F	18H
W	W1	0.0~2000.0°C/0.0~3632.0°F	19H
	W2	0.0~2320.0°C/0.0~2372.0°F	1AH
PLII	PL1	0.0~1300.0°C/0.0~2372.0°F	1BH
	PL2	0.0~1390.0°C/0.0~2534.0°F	1CH
U	U1	-199.9~600.0°C/-199.9~999.9°F	1DH
	U2	-199.9~200.0°C/-199.9~392.0°F	1EH
	U3	0.0~400.0°C/0.0~752.0°F	1FH
L	L1	0.0~400.0°C/0.0~752.0°F	20H
	L2	0.0~800.0°C/0.0~1472.0°F	21H

* The initial set in factory mode is K2 without any certain requirement.

TYPE	CODE	RANGE	HEX
JIS Pt100	JP 1	-199.9~600.0℃/-199.9~999.9℉	22H
	JP2	-199.9~400.0℃/-199.9~752.0℉	23H
	JP3	-199.9~200.0℃/-199.9~392.0℉	24H
	JP4	0.0~200.0°C/0.0~392.0°F	25H
	JP5	0.0~400.0°C/0.0~752.0°F	26H
	JP6	0.0~600.0°C/0.0~1112.0℉	27H
DIN Pt100	dP 1	-199.9~600.0℃/-199.9~999.9℉	28H
	dP2	-199.9~400.0℃/-199.9~752.0℉	29H
	dP3	-199.9~200.0℃/-199.9~392.0℉	2AH
	dP4	0.0~200.0°C/0.0~392.0°F	2BH
	dP5	0.0~400.0°C/0.0~752.0°F	2CH
	dP6	0.0~600.0°C/0.0~1112.0℉	2DH
JIS Pt50	JP. 1	-199.9~600.0℃/-199.9~999.9℉	2EH
	JP.2	-199.9~400.0℃/-199.9~752.0℉	2FH
	JP.3	-199.9~200.0℃/-199.9~392.0℉	30H
	JP.4	0.0~200.0°C/0.0~392.0°F	31H
	JP.5	0.0~400.0°C/0.0~752.0°F	32H
	JP.6	0.0~600.0°C/0.0~1112.0℉	33H
AN1	An 1	-10~10mV/-1999~9999	34H
AN2	An2	0~10mV/-1999~9999	35H
AN3	An3	0~20mV/-1999~9999	36H
AN4	An4	0~50mV/-1999~9999	37H
AN5	An5	10~50mV/-1999~9999	38H

6. Alarm

6.1 Alarm function selection

CODE	DESCRIPTION	Hold-On
00/ 10	None	
01	Deviation high limit alarm	Yes
11	Deviation high limit alarm	No
02	Deviation low limit alarm	Yes
12	Deviation low limit alarm	No
03	Deviation high/low alarm	Yes
13	Deviation high/low alarm	No
04/ 14	Deviation high/low range alarm	No
05	Absolute value high limit alarm	Yes
15	Absolute value high limit alarm	No
06	Absolute value low limit alarm	No
16	Absolute value low limit alarm	Yes
07	Segment end alarm (use for program only)	-
17	Program run alarm (use for program only)	-
08	System error alarm-on	-
18	System error alarm-off	-
19	On delay timer alarm	-

* Note : “Hold-On” means the alarm does not work at the first time.

6.2 Alarm action description

6.1.1 CODE 00/10 : None

6.1.2 CODE 01 : Deviation high alarm inhibit

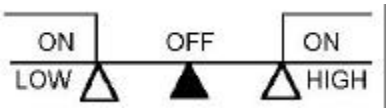
▲: SP
▲: Alarm set value
△

6.2.3 CODE 11 : Deviation high alarm no inhibit

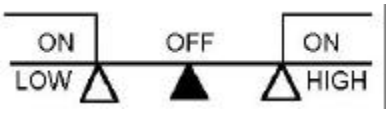
6.2.4 CODE02 : Deviation low alarm inhibit

6.2.5 CODE12 : Deviation low alarm no inhibit

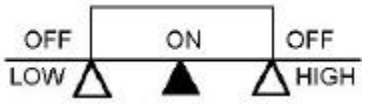
6.2.6 CODE03 : High/low alarm inhibit



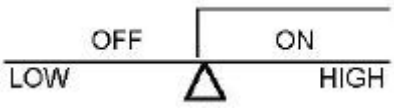
6.2.7 CODE13 : High/low alarm no inhibit



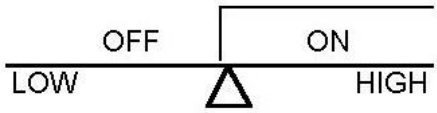
6.2.8 CODE04/14 : Band alarm



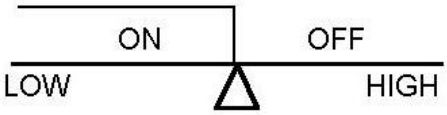
6.2.9 CODE05 : Absolute high alarm inhibit



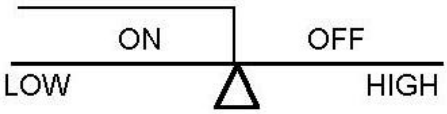
6.2.10 CODE15 : Absolute high alarm no inhibit



6.2.11 CODE06 : Absolute low alarm inhibit



6.2.12 CODE16 : Absolute low alarm no inhibit



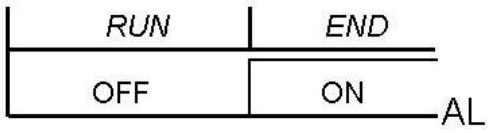
6.2.13 CODE07 : Segment end alarm (program only)

i) ALD 1~3, set 07

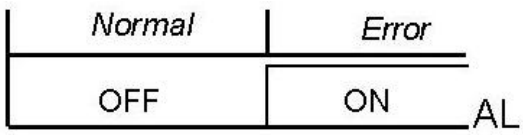
ii) AL1~3, alarm segment no. set

iii) ALT1~3, if set 0 = flicker alarm
set 99.59 = alarm continued
set others = on delay time

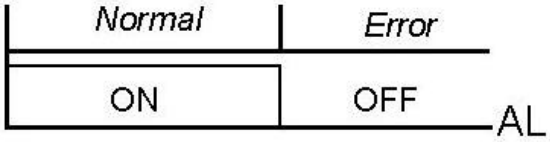
6.2.14 CODE17 : Program run alarm (program only)



6.2.15 CODE08 : System Error- ON



6.2.16 CODE18 : System Error-OFF

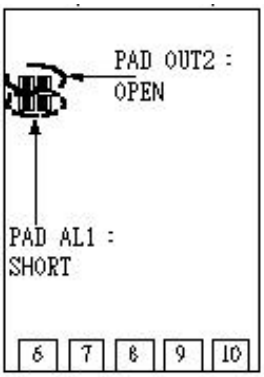


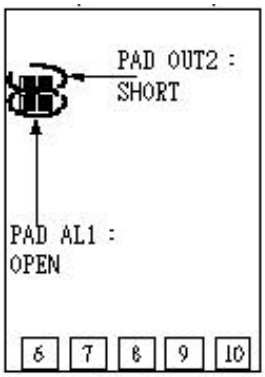
6.2.17 CODE19 : on delay timer

when PV=alarm SP, it keeps a certain period (set time) before alarm action (Range: 00H00M~99H59M)

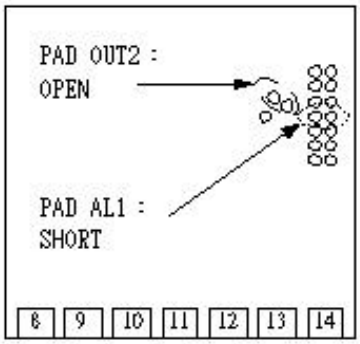
7. Modification of HEAT/ALARM →HEAT/COOL (on PC board)

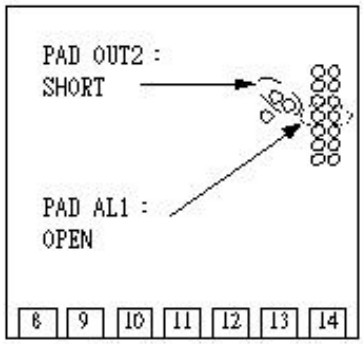
7.1 DC1010



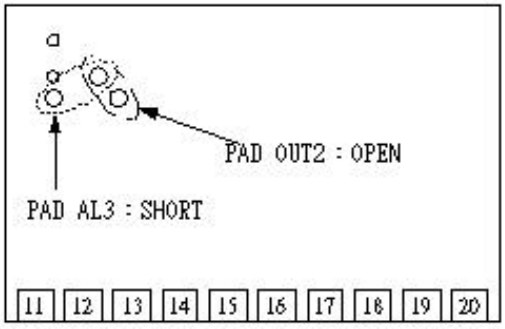


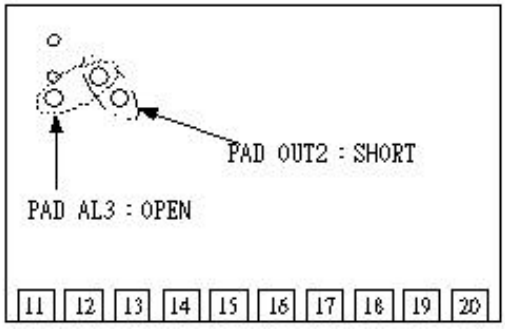
7.2 DC1030





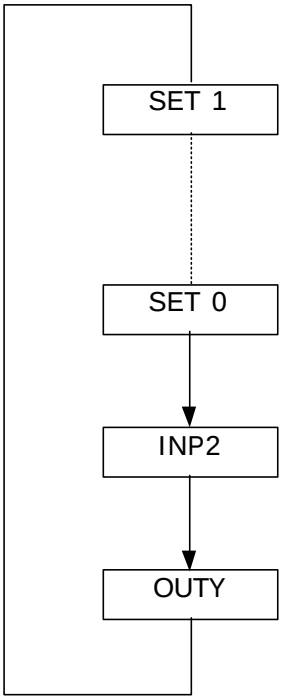
7.3 DC1020/1040





8. Special Function Description

8.1 Level set



* Input 2 mode setting as below

* Output mode setting as below

8.1.1 Second input mode

INP 2 = 0, Non

INP 2 = 1, 1~5V/4~20mA/2~10V

INP 2 = 2, 0~5V/0~20mA/0~10V

8.1.2 Output mode

OUTY = 0, Single output

OUTY = 1, Double output

OUTY = 2, Non

OUTY = 3, Motor Postion Control

OUTY = 4, Single phase SCR (Single phase control)

OUTY = 5, Three phase SCR (Three phase control)

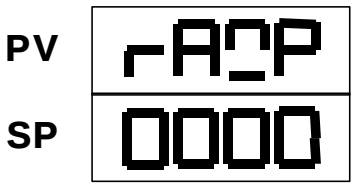
8.2 Ramp & Soak

8.2.1 RAMP

i) Set “SET2.1= 1”, “SET4.1= 1” at Set level

ii) Set “ALD 3 = 9” at Input level

iii) Then, “AL 3” menu will not be displayed



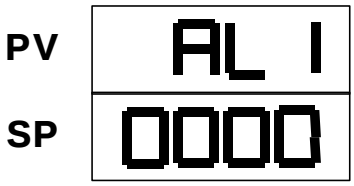
Range = 00.00~99.99 (°C/minute)

If RAMP not used, set ALD 3 = 0

8.2.2 SOAK

i) ALD1/ALD2 = 19

ii) Then, AL1/AL2 will be displayed



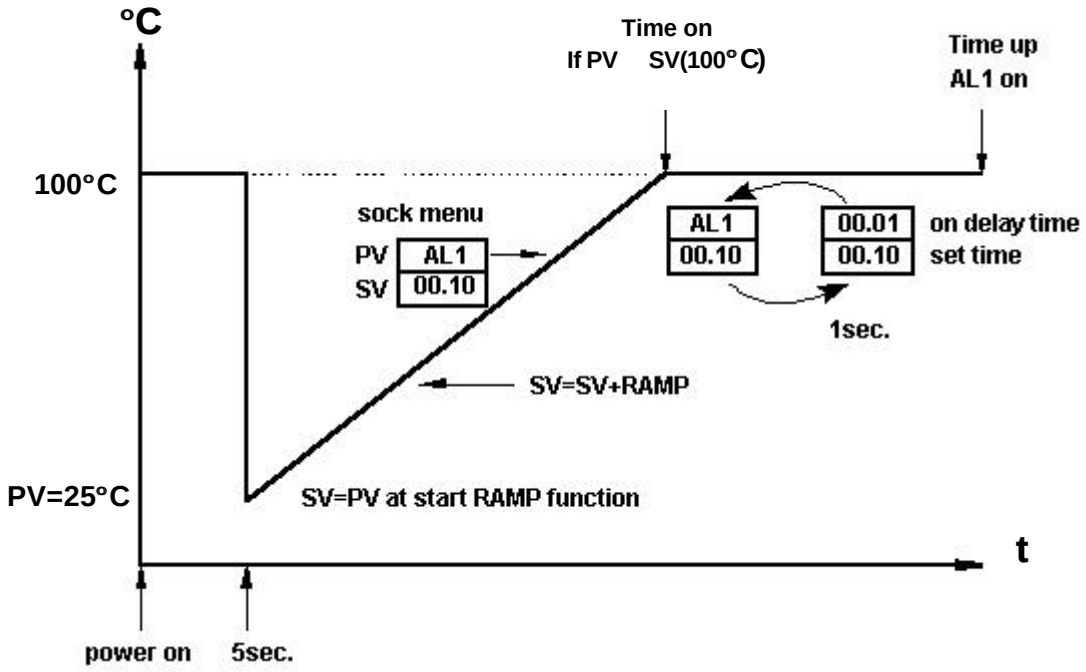
Range = 00.00~99.59 (hour/minute)

Example)

SP = 100°C, RAMP = 10.00 °C/minute

Time(minute) = 10 minute → AL1 = 00.10

PV = 25°C



8.3 Remote SP

8.3.1 Hardware must be mounted

8.3.2 Set 'INP2' to 1or 2 (ANL2, ANH2 used for Cal.)

8.3.3 SET 0.3 = 1 means Remote SP from Input 2 channel

(*SET 0.3 = 0 means Local SP)

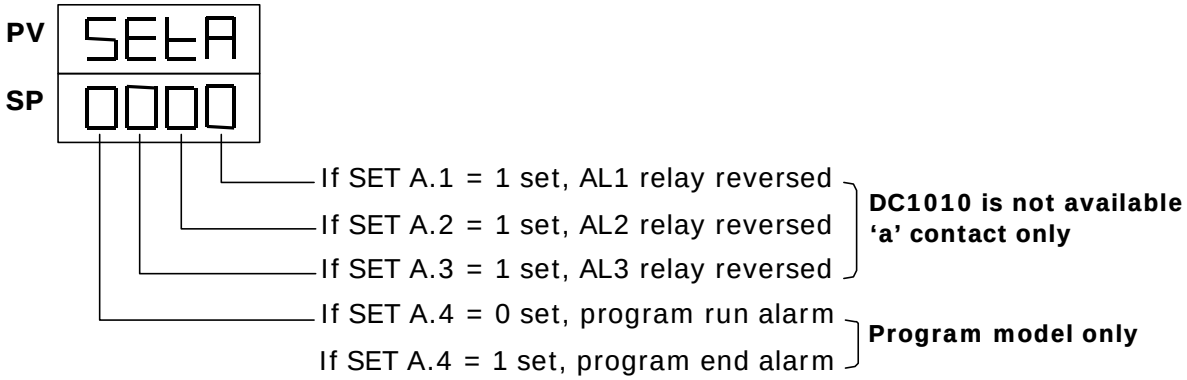
8.4 Alarm Timer ALT1/ALT2/ALT3 description

8.4.1 ALT 1 = 0 means Switching if AL 1 is ON

8.4.2 ALT 1 = 99.59 means 'continuous alarm' if AL 1 is ON

8.4.3 ALT 1 = 00.01~99.58 means AL 1 is on delay timer

8.5 Function SET A



8.6 Function SET 8

8.6.1 SET 8.1 = 0 Non

SET 8.1 = 1 Program Repeat

8.6.2 SET 8.2 = 0 Non (program model only)

SET 8.2 = 1 Power failure access

8.6.3 SET 8.3 = 0 Zero start (program model only)

SET 8.3 = 1 PV start

8.6.4 SET 8.4 = 0 Non

SET 8.4 = 1 Display will be transferred to single display.

(Don't change this digit)

* SET 8 = 0000 can make return to double display

8.7 Function SET 9

8.7.1 SET 9.1 = 0 Non

SET 9.1 = 1 PV/SP switching

* This is for the single display set (refer to SET 8.4)

8.7.2 SET 9.2 = 0 Non

SET 9.2 = 1 Non Program model : No display RAMP

Program model : Timer change from H.M to M.S

8.7.3 SET 9.3 = 0 Non

SET 9.3 = 1 Transmission SP

8.7.4 SET 9.4 = 0 Non

SET 9.4 = 1 Transmission PV

8.8 Function SET 0

8.8.1 SET 0.1 = 0 Non

SET 0.1 = 1 Non (function not available for DC1010/1020/1030/1040)

8.8.2 SET 0.2 = 0 Non

SET 0.2 = 1 Rate for AL3 (ALD 3 = 0)

8.8.3 SET 0.3 = 0 Non

SET 0.3 = 1 Remote SP

8.8.4 SET 0.4 = 0 Motor valve close = “b” out (contact normally close)

SET 0.4 = 1 Motor valve close = “a” out (contact normally open)

8.9 Input level wait

Wait = 0 means “no wait”. When used as a programmer, i the

Wait ≠ 0 means “wait”

8.10 Cycle Time

Range: 0~150 sec

CYT1= 0 (i) mA

(ii) Phase control(SCR)

CYT1= 1 (i) SSR

(ii) Phase zero control(SCR)

CYT1= over 10 Relay output.

Application 1. Single Phase Control, Phase angle control

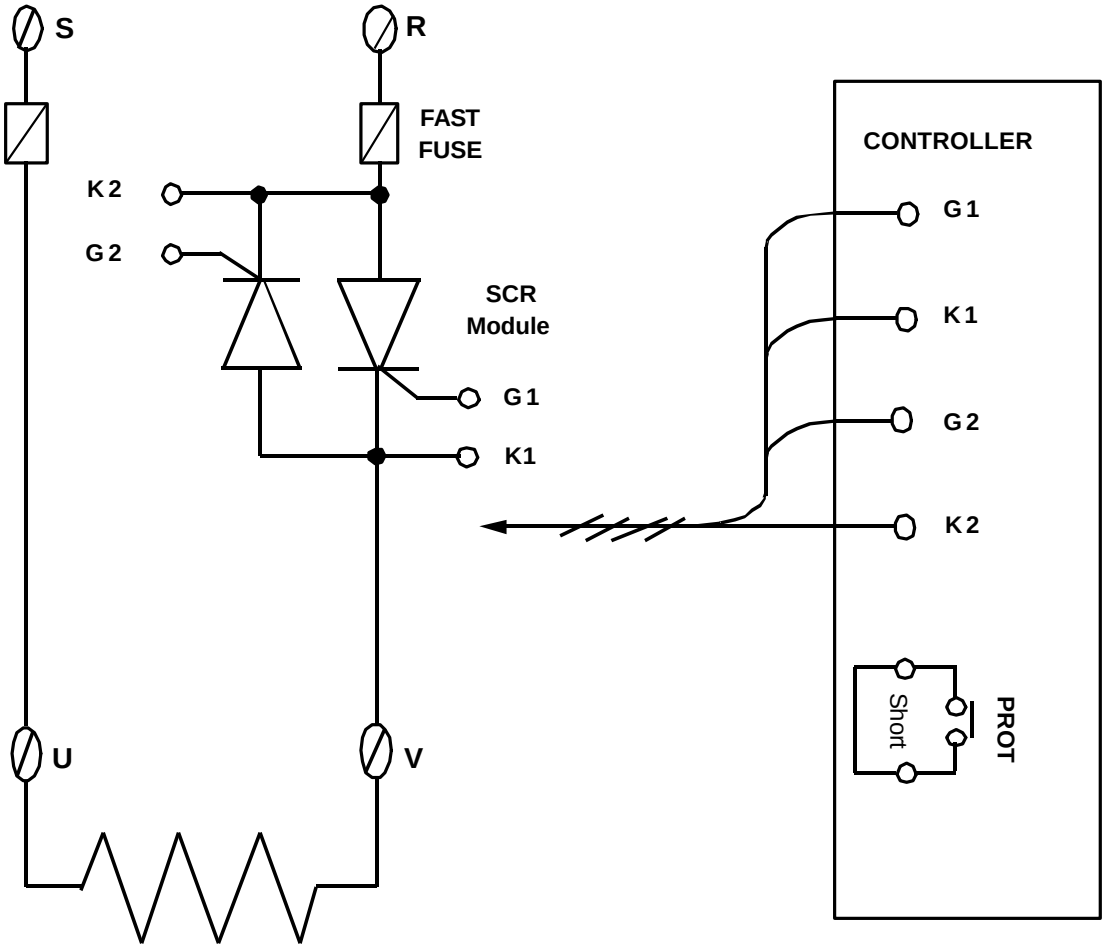
-. Avalable models: DC1030/1040, DC1030P/1040P

-. Data Change: OUTY = 4

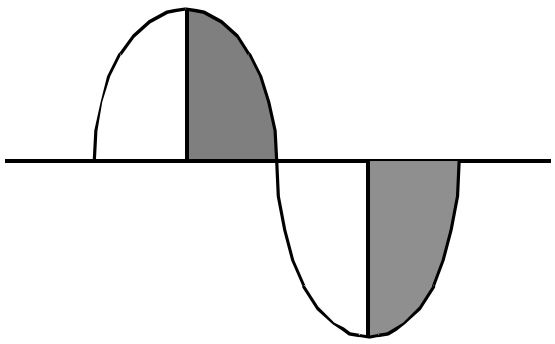
CYT = 0

CL01 = 0, CH01 = 5000 if used for resistance load

CL01 = 0, CH01 = 4000 if used for inductor load



** Controller source phase must be same as load source phase



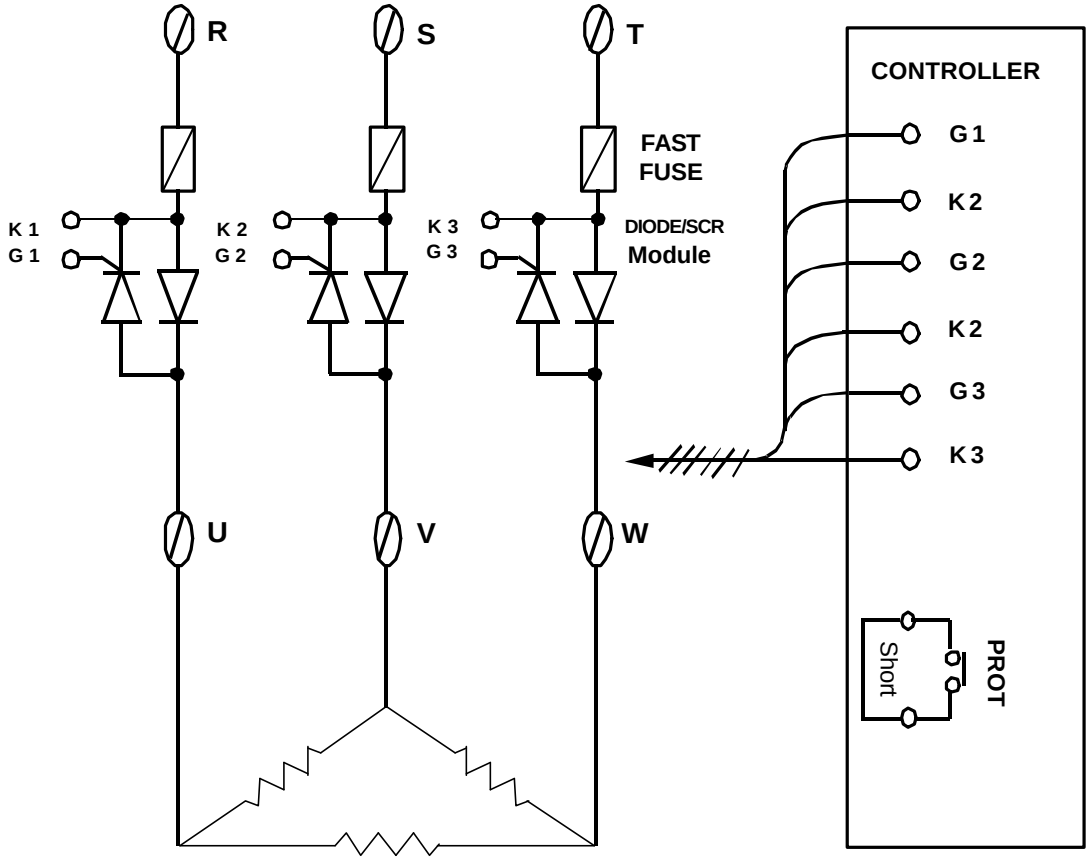
Application 2. Three Phase Control, Phase angle control

-. Available Models: DC1040/DC1040P

-. Data Change : OUTY = 5

CYT = 0

CL01 = 0, CH01 = 5000 only if used for resistance load

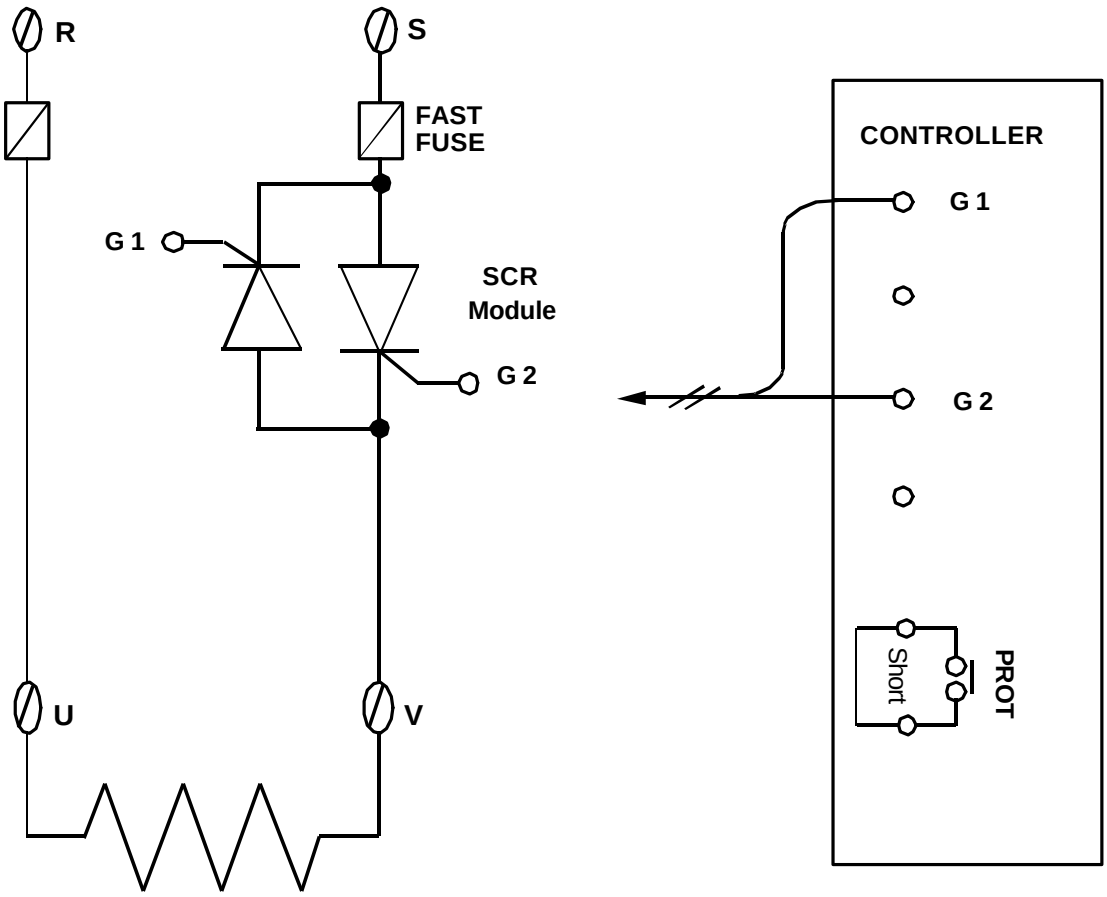


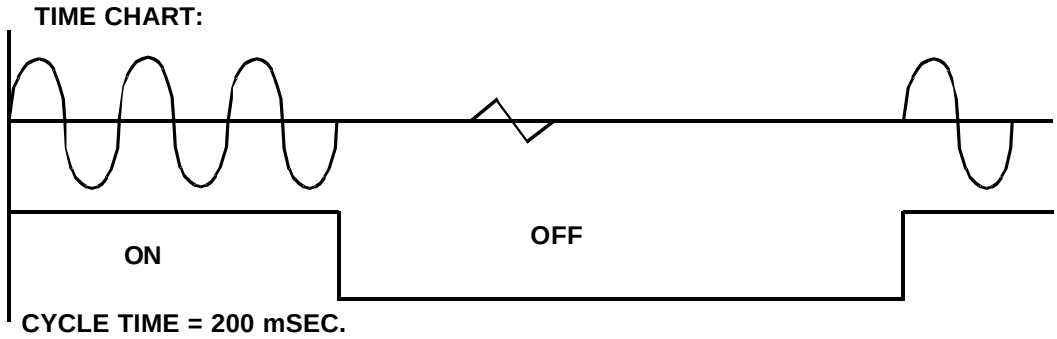
3ϕ LOAD

Application 3. Single Phase Zero crossover Control

-. Available Models: DC1030/1040
DC1030P/1040P

-. Data Change: OUTY = 0
CYT1 = 1



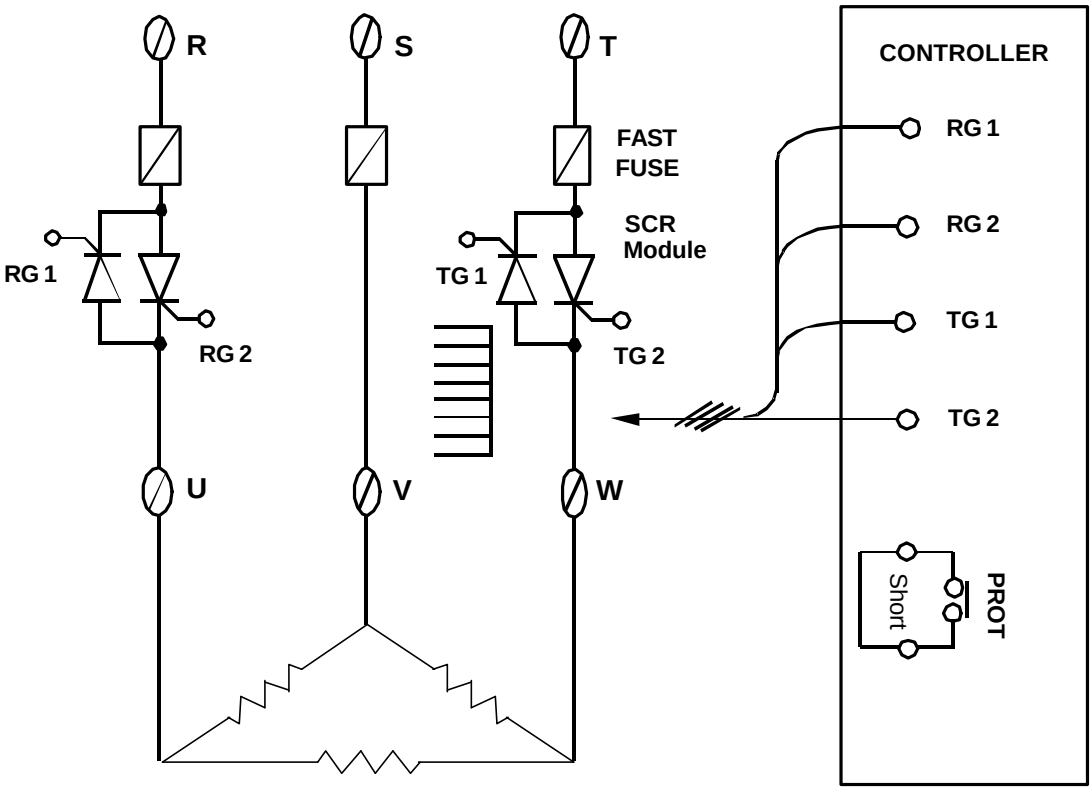


Application 4. Three Phase Zero crossover Control

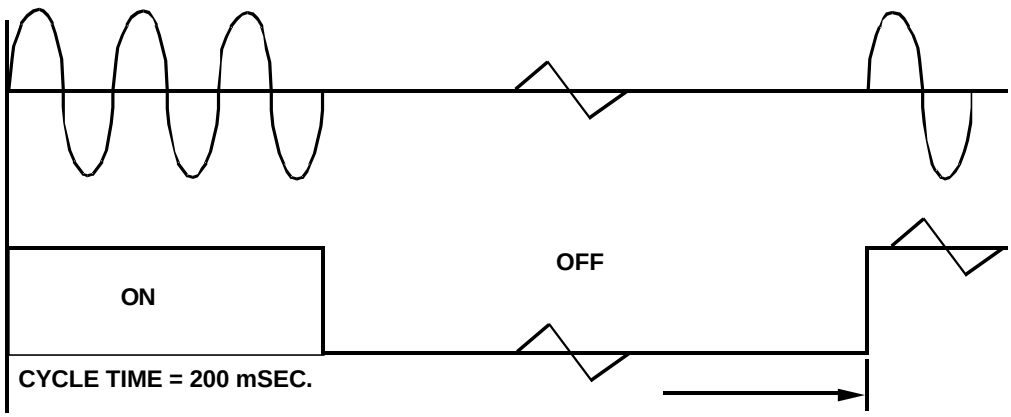
-. Available Models: DC1040/1040P

-. Data Change: OUTY = 0

CYT1 = 1



TIME CHART:



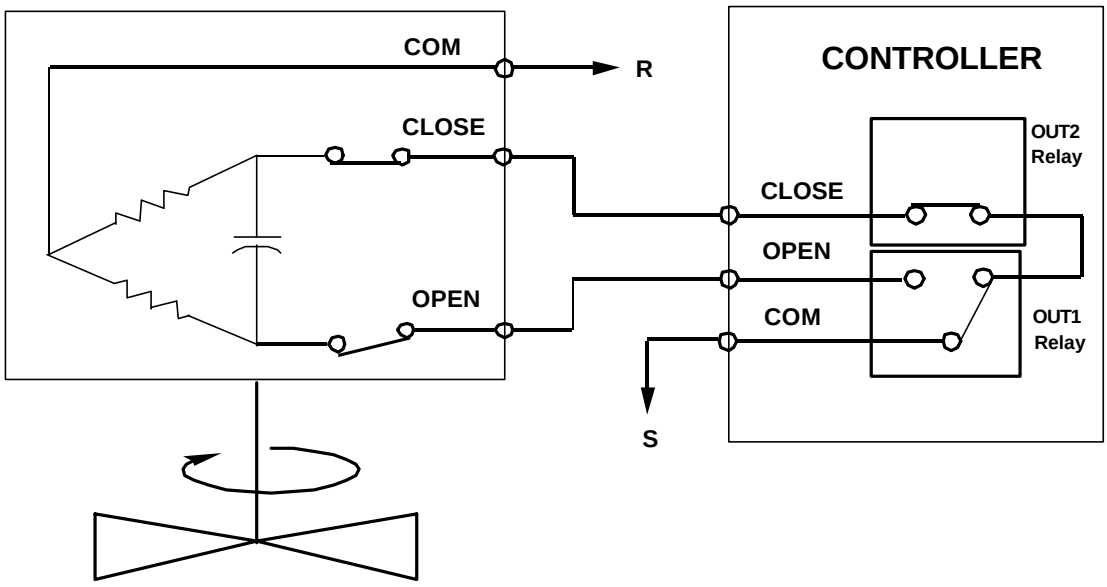
Application 5. Motor Valve Control

-. Available Models: DC1020/1030/1040
DC1020P/1030P/1040P

-. Data Change: OUTY = 3
CYT1 = 1~100 sec. (Normally, set 5 sec.)
RUCY = 5~200 sec.

* 1. CYT1 is the cycle time of Open/Close
2. RUCY is the running time of motor valve 0~100%

MOTOR VALVE



Application 6. Single Phase Control (for TRIAC module)

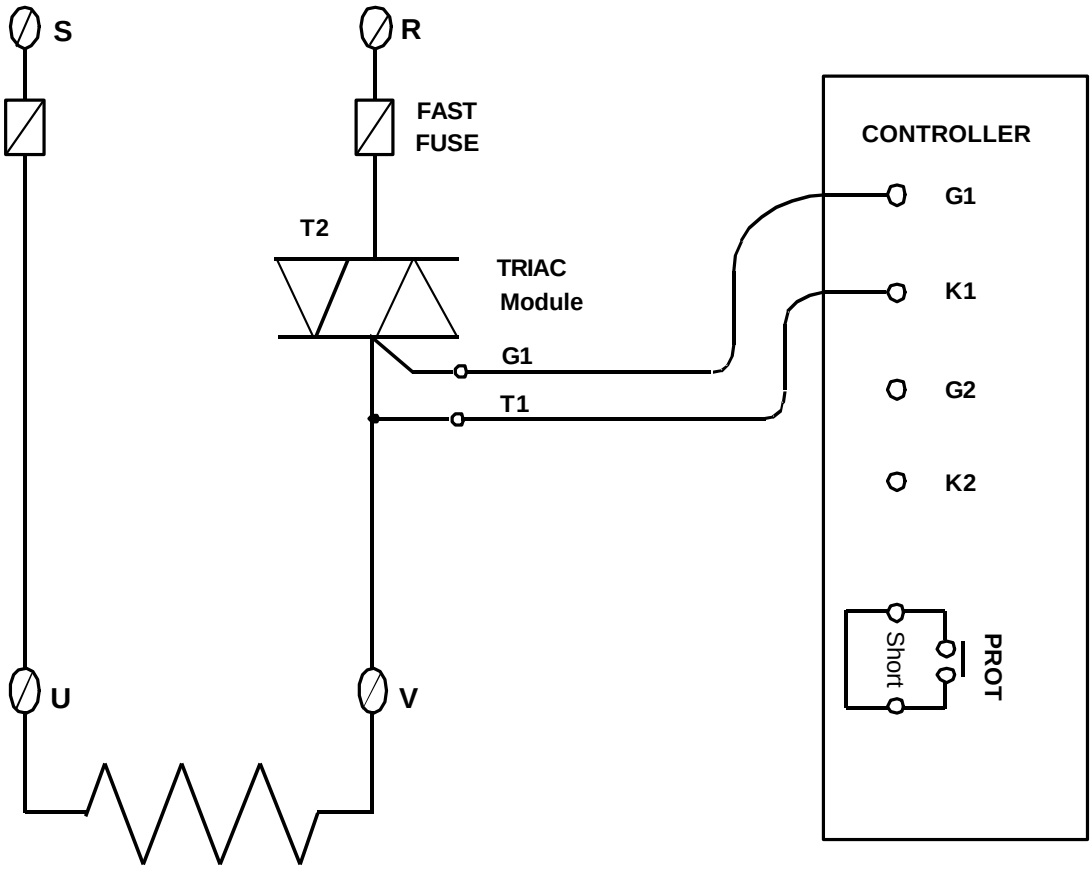
-. Available Models: DC1030/1040

DC1030P/1040P

-. Data Change: OUTY = 4

CLO1=0.CHO1=5000 if use for resistance load

CLO1=0.CHO1=4000 if use for inductor load



** Controller source phase must be same as load source phase