SHIMAX

DIGITAL CONTROLLER

CE

(Applied by Dec.2015)

MAC10 SERIES

MAC10A
(W96×H96mm)

MAC10B
(W48×H96mm)

MAC10C
(W72×H72mm)

MAC10D
(W48×H48mm)

Compact & Low cost Digital Controller

Feature

- Space-saving Design : Panel depth is 62～65 mm
  Vertical & Horizontal Plural Proximity Attachment is Possible
- Accuracy : ± (0.5% FS +1digit)
- Sampling Period : 0.25s
- Additional Functions : Event output, Communication

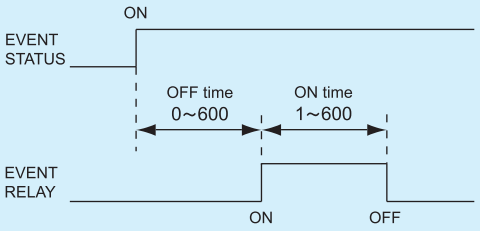
Event Output

Table of Allotment Function

Function	Character	Remark
No allotment	non	
Upper limit absolute value alarm	HA	
Lower limit absolute value alarm	LA	
Scaling over alarm	So	Operates when signals such as HHHH, LLLL, B, are shown
Upper limit deviation alarm	Hd	
Lower limit deviation alarm	Ld	
Within deviation alarm	Id	
Out deviation alarm	od	
RUN signal	run	Operates while FIX in operation.

Output rating: Contact Normal open (1a) 240V AC 2A (Resistance load) EV 1- EV 2 in common

Event Timer function



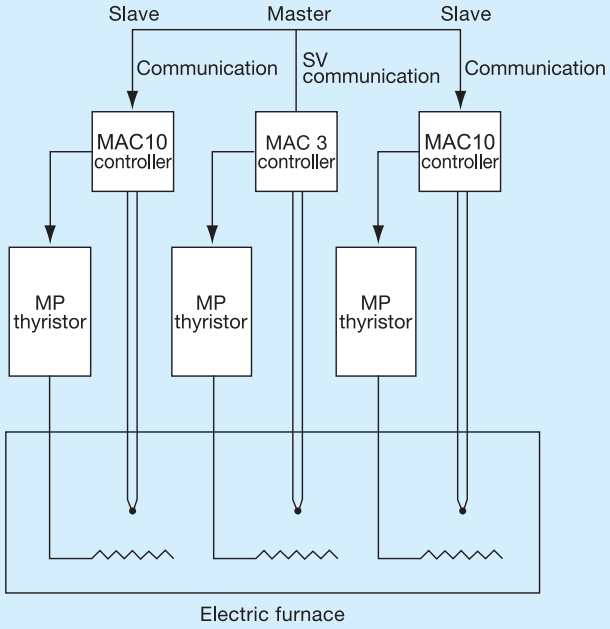
Unit : min,sec

Input range

Input Type			Code	Measuring Range (Unit : °C)
Multi Input	Thermo Couple	K	P1	0 ～ 1300
		K	P2	-50.0 ～ 999.9
		J	J1	0 ～ 600
		J	J2	0.0 ～ 600.0
	Resistance Bulb Pt100		P1	-100.0 ～ 200.0
			P2	-100 ～ 200
			P3	-199.9 ～ 300.0
			P4	-200 ～ 300
	Voltage(mV)	0～ 50	A1	Scaling Range : -1999～9999 Digit Span : 10～10000Digit Change of decimal point's position is possible (no decimal pont, 0.1, 0.01, 0.001)
	Current(mA)	4～ 20	AA1	
		0～ 20	AA2	

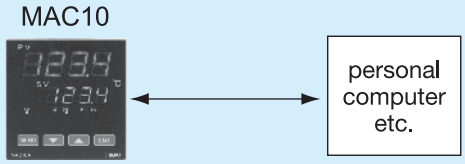
thermo couple K, J : JIS/IEC resistance bulb Pt100 : JIS/IEC

Example: Tunnel kiln Program temperature control



Communication

Serial communication to a personal computer/ sequence can be performed by RS-485.



Specification

Display

■Display accuracy : ± (0.5%FS +1 digit) CJ error is not included.

■Accuracy maintenance range : 23 ± 5℃

■Display range : -10%～110% of measuring range But, 0～1300℃ of TC-K is -30～1320℃
-50.0～999.9℃ of TC-K is -80.0～1030.0℃

■Display resolution : depends on measuring range and scaling.

■Input scaling : possible at the time of electric current and Voltage input -1999～9999
(Span 10～10000 count, No decimal point at the position of decimal 0.1, 0.01, 0.001)

Setup

■Setting system : by four front keys (MENU ▽ △ ENT).

■SV setting range : the same as a measuring range.

■Setting lock : communication and a key setup (five - level)

Operation classification	Level	Content of lock
Communication & key setup	OFF	no lock
	1	execution SV, manual numerical change, and change of key lock level are possible
	2	manual numerical change as well as change of key lock level are possible
	3	change of key lock level is possible
	4	(same as 3)
	5	change of key lock level and basic screens are possible

■SV setting limiter : the same as measuring range (lower limit < upper limit).

■Setup of unit : possible to set up at the time of sensor input, ℃

Input

■Multi input

■Thermocouple

input resistance : 500kΩ and more, external resistance tolerance level 100Ω or less

Influence of lead resistance : 0.23μV/Ω (up scale), -0.34μV/Ω (down scale)

Burnout : Standard equipment (up scale or down scale)

Measuring range : See "Measuring range character table"

Reference junction Compensation accuracy : ±2℃ (ambient temperature 18～28℃)
At the time of vertical plural proximity attachment ±3℃
±3℃ (ambient temperature 0～50℃)
At the time of vertical plural proximity attachment ±4℃
＊Immediately after switching on a power supply, accuracy is not covered by warranty. It reaches in accuracy within 10 minutes after the power supply is switched on.

Tracking of reference junction : below the ambient temperature of 0.5℃ / min, compensation accuracy of reference junction ±1℃

■Resistance bulb

stipulated current : approx. 0.25 mA

Lead wire resistance tolerance level : 5Ω or less per wire (resistance of three lines should be equal)

Influence of lead resistance : per line less than 5Ω 0.2%FS
per line less than 10Ω 0.5%FS
per line less than 20Ω 1.0%FS

Measuring range : See "Measuring range character table"

■Voltage (mv)

Input resistance : more than 500kΩ

Input voltage range : See "Measuring range character table"

■Electric current input (mA)

Reception resistance : 60Ω or less (built-in)

Input current range : See "Measuring range character table"

■Sampling period : 0.25 second

■PV filter : 0～100 seconds

■PV offset compensation : ± 500 unit

■PV gain compensation : ± 5.00%

Control

■Control system : PID control with auto tuning function, or ON-OFF operation

■Proportional band (P) : OFF and 0.1～999.9% of measuring range
(ON-OFF operation by OFF setup)

■ON-OFF differential gap (DF) : 1～999 unit

■Integration time (I) : OFF, 1～6000 seconds
(PD operation by OFF setup)

■Derivative time (D) : OFF, 1～3600 seconds
(PI operation by OFF setup)

} P operation if both I and D are OFF

■Manual reset (MR) : ±50.0% (I = effective at the time of OFF setup)

■Output limiter (OL,OH) : 0.0～100.0% (OL< OH) (setting resolution 0.1)

■Soft start : OFF, 0.5～120.0 seconds (setting resolution 0.5)

■Proportional period : 0.5～120.0 seconds (setting resolution 0.5)

■Control output characteristic : RA (heating) or DA (cooling)

■Manual output : 0.0～100.0% (setting resolution 0.1)

Control Output 1

■Contact : Normal open (1a) 240V AC 2A (resistance load)

■Voltage pulse (SSR drive) : 13VDC ± 2V MAX 20mA

■Electric current : 4～20mA DC 500Ω or less of load resistance, display accuracy ±1% (23℃±5℃)
load regulation ±0.2%, resolution about 1/10000

Option

Event 1-2

: One or Two-point set

■output rating : contact normal open (1a) 240V AC 2A (resistance load)
(EV1,EV2 and common)

■Event type : See "Event output Allotment function table"

■Setting range : upper-limit absolute value alarm, lower limit absolute value alarm
within measuring range
upper limit deviation alarm, lower limit deviation alarm -1999～2000 unit
within deviation alarm, out deviation alarm 0～2000 unit

Communication function

■Communication type : EIA standard RS-485

■Communication method : Two-wire system half duplex multidrop (bus) system

■Transmission speed : 9600, 19200 bps

■Data format : Start 1bit, stop 1, 2bit, data length 8 bits, No parity, odd or even number

■Slave address : 1～255

■Parameter preservation mode : Choose from RAM, MIX, and EEP mode

■Protocol : SHIMAX standard or MODBUS ASCII, MODBUS RTU protocol

■The number of connection : A maximum of 32 equipments (depends on conditions. A host included)

General specification

■Data retention : Non-volatile memory (EEPROM)

■Momentary stop dead time : within 0.02 second. Should have no influence with 100% dip

■Environmental condition for use

Temperature : 0～50℃

Humidity : Below 90% RH (no condensation)

Height : Altitude 2000m or under

Category : II

Degree of contamination : 2

■Storage temperature conditions : -20～65℃

■Electric supply voltage : 100-240V(90-264V) AC 50/60Hz

■Power consumption : 100-240V AC Maximum 9 VA

■Insulation Class : Class I equipment

■Input noise cleaning ratio : Normal 40 dB or more

■Impulse-proof noise : Power supply Normal 100ns / 1μs ±1500V

■Insulation resistance : Between input and output, and power terminal 500V, DC 20MΩ

■Electric strength : Between input and relay output, and power supply terminal
1800V AC For1 minute
: Functional isolation 500V AC For 1 minute

■Material of case : PPE

■Case color : light gray

■Outside dimension

MAC10A : W96×H96×D69mm (Depth of panel is 65mm)
MAC10B : W48×H96×D66mm (Depth of panel is 62mm)
MAC10C : W72×H72×D69mm (Depth of panel is 65mm)
MAC10D : W48×H48×D66mm (Depth of panel is 62mm)

■Thickness of panel : 1.2～2.8mm

■Fitting hole size

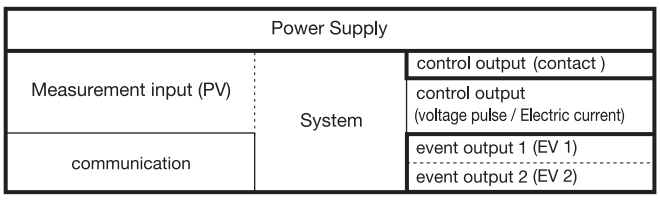
		Attachment hole size of horizontal plural proximity attachment N = the number of equipment
MAC10A :	W92×H92mm	W (96×N−4) mm H92
MAC10B :	W45×H92mm	W (48×N−3) mm H92
MAC10C :	W68×H68mm	W (72×N−4) mm H68
MAC10D :	W45×H45mm	W (48×N−3) mm H45

■Mass
MAC10A : About 220g
MAC10B : About 160g
MAC10C : About 160g
MAC10D : About 120g

■Isolation

——— is basic insulation. ——— is functional insulation.

---------- is un-insulating.

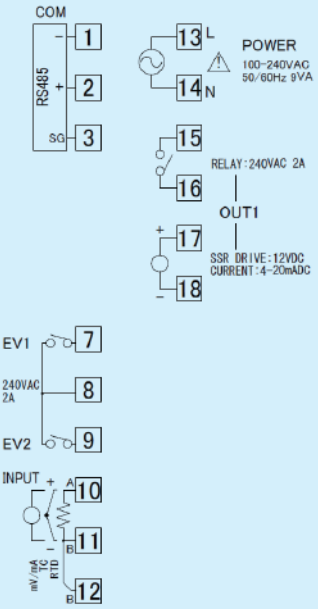


■Order code table

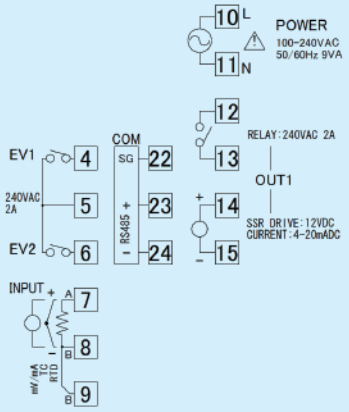
Item	Code		Specification
1. Series	MAC10A—		96×96mm size Digital controller
	MAC10B—		48×96mm size Digital controller
	MAC10C—		72×72mm size Digital controller
	MAC10D—		48×48mm size Digital controller
2. Input		M	Thermocouple (K, J) Resistance bulb (Pt 100) Specified current about 0.25mA Voltage (0～50mV)
		I	Current (4～20mA, 0～20mA) Reception resistance 60Ω or less
3. Control Output 1		C	Contact 1a 240V AC 2A (Resistance load)
		S	Voltage pulse (SSR drive voltage) 13±2V DC 20mA MAX
		I	Current 4～20mA DC Maximum load resistance 500Ω
4. Power Supply		F—	100～240V AC 50/60Hz
5. Event Output		N	None
		1	Event output 1 (one point) Contact 1a 240V AC 2A(Resistance load)
		2	Event output 1, 2 (two points) Contact 1a 240V AC 2A(Resistance load)
6. Communication		N	None
		R	RS485

■Terminal Arrangement Diagram

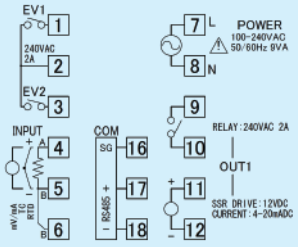
MAC10A
MAC10B



MAC10C



MAC10D



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