SHIMAX

MAC5 series DIGITAL CONTROLLER

CE

Feature

- **Space-saving Design :** Panel depth is 62-65mm
- **Accuracy :** ±(0.3%FS+1digit)
- **Sampling Period :** 0.25s

Order code table

	Item	Code		Specifications
1	Series	MAC5A-		96×96mm size Digital Controller
		MAC5B-		48×96mm size Digital Controller
		MAC5C-		72×72mm size Digital Controller
		MAC5D-		48×48mm size Digital Controller
2	Input		M	Thermocouple (K, J, T, E, R, S, U, N, B, PLII, WRe5-26) R.T.D. (Pt100,JPt100) Voltage (0-10mV, 0-20mV, -10-10mV, 0-50mV, 0-100mV)
3	Control output 1		C	Contact 1a 240V AC 2A (Resistance load)
			S	Voltage pulse 12V+1～-1.5V 20mA DC (SSR drive voltage)
			I	Current 4-20mA DC Load resistance : 500Ω max
4	Power supply		F-	100-240V ±10%AC
5	Event output		E	Event output 1,2 (2points) 1a 240V AC 2A (Resistance load)
6			N	None
	Control output 2		C	Contact 1a 240V AC 2A
			S	Voltage pulse 12V+1～-1.5V 20mA DC (It can not be installed with Out out1 Voltage pulse "S" or Current "I")
	Event output		E	Event output 3 (1point) Contact 1a 240V AC 2A (Resistance load)
	DI		D	DI (1point) 5V DC 0.5mA (It can not be installed with Out put 1 Voltage pulse "S")

Measuring Range Character table

Input type		Character	Measuring Range	
			unit code ℃ (℃)	unit code ℉ (℉)
Thermocouple	R	r 1	0 ～1700	0 ～3100
	K	K 1	-199.9～400.0	-300 ～ 700
	K	K 2	0 ～1200	0 ～2200
	K	K 3	0.0～300.0	0 ～ 600
	K	K 4	0.0～800.0	0 ～1500
	J	J 1	0 ～600	0 ～1100
	J2	J 2	0.0～600.0	0 ～1100
	T	t 1	-199.9～200.0	-300 ～ 400
	E	E 1	0 ～700	0 ～1300
	S	S 1	0 ～1700	0 ～3100
*5	U	U 1	-199.9～200.0	-300 ～ 400
*1	N	n 1	0 ～1300	0 ～2300
*3	B	b 1	0 ～1800	0 ～3300
	Wre5-26	5_26	0 ～2300	0 ～4200
*4	PLⅡ	PL2	0 ～1300	0 ～2300

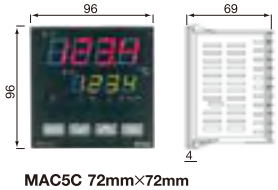
Input type	code	Measuring Range	
		unit code ℃ (℃)	unit code ℉ (℉)
Resistance bulb Pt100	P1	-200 ～600	-300 ～1100
	P2	-100.0～200.0	-150.0～400.0
	P3	0.0～100.0	0.0～200.0
	P4	-50.0～ 50.0	-60.0～120.0
	P5	-100.0～300.0	-150.0～600.0
	P6	-199.9～300.0	-300.0～600
	P7	-199.9～600.0	-300.0～1100
	P8	0 ～230	0 ～450
	JP1	-200 ～500	-300 ～900
	JP2	-100.0～200.0	-150.0～400.0
	JP3	0.0～100.0	0.0～200.0
	JP4	-50.0～ 50.0	-60.0～120.0
	JP5	100.0～300.0	150.0～600.0
	JP6	-199.9～300.0	-300 ～600
	JP7	-199.9～500.0	-300 ～900
	JP8	0 ～230	0 ～450
0-10mV 0-100mV -10-100mV 0-20mV 0-50mV	A 1 A 2 A 3 A 4 A 5	Scaling range : -1999～9999 count Span : 10～10000 count Possible to change decimal point position (No Decimal point, 0.1, 0.01, 0.001)	

Thermo couple B, R, S, K, E, J, T, N : JIS／IEC
Resistance bulb Pt100 : JIS／IEC
JPt100 : former JIS

*1 thermo couple Accuracy is not guaranteed below B:400℃ (752℉)
*2 thermo couple In K, T, U, accuracy is ±0.5%FS for 0～-100℃ (-148) and ±1.0%FS if it is below -100℃
*3 thermo couple Wre 5-26 : Product of Hoskins Mfg. co
*4 thermo couple PLⅡ : Platinel
*5 thermo couple U : DIN43710
*Setup of factory shipment is Multi input : thermo couple

External

MAC5A 96mm×96mm



MAC5B 48mm×96mm

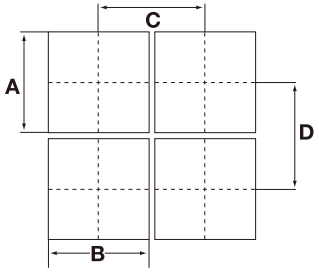
MAC5C 72mm×72mm

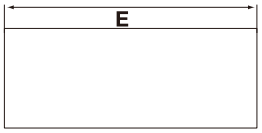
MAC5D 48mm×48mm

Panel Cutout

Unit : mm

	A	B	C	D	E
MAC5A	92 $^{+0.8}_{-0}$	92 $^{+0.8}_{-0}$	96min	96min	(96×N-4) $^{+0.8}_{-0}$
MAC5B	92 $^{+0.8}_{-0}$	45 $^{+0.6}_{-0}$	48min	96min	(48×N-3) $^{+0.6}_{-0}$
MAC5C	68 $^{+0.7}_{-0}$	68 $^{+0.7}_{-0}$	72min	72min	(72×N-4) $^{+0.7}_{-0}$
MAC5D	45 $^{+0.6}_{-0}$	45 $^{+0.6}_{-0}$	48min	48min	(48×N-3) $^{+0.6}_{-0}$





In the case of horizontal proximity attachment
By the single hole. N: Number

Note: Proximity attachment by a single hole is possible only in the case of horizontal direction
When an apparatus that was attached in vertical direction is removed, a dedicated detachment tool is required.

Specifications MAC5 series

Display

Display method Digital display :

MAC5A(96×96 size)	PV red 7 segment LED	4 figure (height of character about 20mm)
	SV green 7 segment LED	4 figure (height of character about 13mm)
MAC5B(48×96 size)	PV red 7 segment LED	4 figure (height of character about 12mm)
	SV green 7 segment LED	4 figures (height of character about 9 mm)
MAC5C(72×72 size)	PV red 7 segment LED	4 figure (height of character about 16mm)
	SV green 7 segment LED	4 figures (height of character about 11mm)
MAC5D(48×48 size)	PV red 7 segment LED	4 figure (height of character about 12mm)
	SV green 7 segment LED	4 figures (height of character about 9mm)

Status display : RUN (green), AT (green), OUT 1(green) EV1 (yellow), EV2 (yellow), OUT2／EV3 (yellow)

Display accuracy : ±(0.3%FS+1digit)
CJ errors not included, B thermo couple below 400℃ is not guaranteed.
Display accuracy during EMC examination is ±5%FS.

Accuracy maintenance range : 23±5℃

Display range : -10%-110% of measuring range, but Pt100's -200～600℃ is -240～680℃

Display resolution : Changes with measuring range and scaling .

Input scaling : Possible at the time of voltage input and current input -1999-9999
(span 10-10000 count, decimal point position no decimal point 0.1, 0.01, 0.001)

Setting

Setting system : By four front keys (▼ ▲ MENU ENT,)

SVSetting range : Same with measuring range

Setting lock

Key setting	OFF	No lock
	1	Execution SV and a manual numerical change are possible. And change of a key lock level is possible.
	2	Possible to change numerical value manually and key lock level.
	3	Possible to change key lock level.
	＊4	Same as 3

SV setting limiter : Same with measuring range (lower limit ＜ upper limit)

Unit setting : Settable at the time of sensor input ℃,°

Input

Thermocouple : 500Ω or more, external resistance tolerance level 100Ωor less input resistance
Influence of lead-wire 1.2μV/10Ω

Burnout : Standard equipment (Up Scale only)

Measuring range : Refer to measuring range code table

Compensation accuracy of reference junction :
±1℃(ambient temperature 18-28℃)
At the time of vertical plural proximity attachment ±2℃
±2℃(ambient temperature 0-50℃)
At the time of vertical plural proximity attachment ±3℃
Several minutes after power-on, accuracy is not guaranteed.
Reaches the accuracy level within 5 minutes after power-on.

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

Resistance bulb stipulated current resistance bulb : Approx. 0.25mA

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

Measuring range : Refer to measuring range code table

Voltage (mV) Input resistor : 500kΩ or more.

Input voltage range : Refer to measuring range code table.

Voltage input (V) Input resistor : 500kΩ or more

Input voltage range : Refer to measuring range code table

Current input (mA) reception Resistance : 250Ω(built-in)

Input range : Refer to measuring range code table.

Sampling period : 0.25 second

PV filter : 0-9999 second

PV offset compensation : ±500 unit

PV gain correction : ±5.00%

Control

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

Proportional band (P) : OFF and 0.1-999.9% of measuring range (ON-OFF operation by OFF setting)
(If both I and D are OFF, P operation)

ON-OFF Differential-gap (DF) : 1-999 unit

Integration Time (I) : OFF, 1-6000 seconds (PD operation by OFF setting)

Manual Reset (MR) : ±50.0% (effective when set as I = OFF)

Output limiter (OL,OH) : 0.0-100.0% (OL＜OH) (set resolution 0.1)

Soft start : OFF, 0.5-120.0 seconds (set resolution 0.5)

Proportional period : 0.5-120.0 seconds (set resolution 0.5)

Control output characteristic : Possible to choose either RA (heating) or DA (cooling).

Manual output : 0.0-100.0% (set resolution 0.1)
＊Each parameter, (P, I, D, DF, MR, OL, and OH) belongs to 1～3 categories.

Control output 1 Contact : normal open (1a) 240V AC 2A (resistance load)
Voltage pulse (SSR drive) : 12V DC+1.0--1.5V MAX20mA
Current 4-20mA DC load resistance 500Ω or less
Display accuracy±1% (accuracy maintenance range 23℃±5℃)
Load regulation ±0.2%, resolution approx. 1／12000

Event 1・2 : 2 sets

Output rating : Contact Normal open (1a) 240V AC 2A (resistance load) EV1・EV2 and common Kind of event

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, without deviation alarm 0-2000unit
Standby operation :OFF No standby operation,1 Only at the Time of Power-on, standby operation,
2 At the Time of power switch on, each alarm operating point is changed, deviation alarm's execution SV is changed, and RUN／STBY(RST) is switched over standby operation, at the time of AUTO／MAN switchover.

Latching : Alarm operation maintenance function (Release is done by key operation, or power OFF. In the case of release power OFF, all alarms are called off simultaneously)

Differential gap : 1-999 unit

Output characteristic : Choose from normal open (NO) or normal closing (NC).
If NC is chosen and power is turned on, relay becomes ON about 1.8 seconds and becomes OFF at event power range.

Allotment Function : Upper limit absolute value Alarm, Lower limit absolute value alarm, scale over alarm, Upper limit deviation value alarm, lower limit deviation value alarm. Within deviation alarm, Without deviation alarm, Run signal.

Option

Control output 2 (Option) : Control output 2 is exclusive option of event 3 and DI 4.
Contact : normal open (1a) 240V AC 2A (resistance load)
Voltage pulse (SSR drive) : 12V DC+1.0--1.5V MAX20mA
Display accuracy±1% (accuracy maintenance range 23℃±5℃)
Load regulation±0.2%, resolution approx. 1／12000

Event 3 (Option) : Control output 2 is exclusive option of event 3 and DI 4.
Item and contents are same with event 1 and 2.

DI (option) : DI is exclusive selection option with control output 2, Event3
Input rating : 5V DC 0.5mA

Allotment function : 2nd SV, 3rd SV, 4th SV, Control RUN, Manual output, Auto tuning, Latching release, Super key lock.
Input minimum retention time : 0.25 second
Input of operation : Non-voltage contact or open collector

General specification

Temporary dead time : no influence within 0.02 second 100% dip

Use environmental condition : **Temperature** : -10～55℃
Humidity : Below 90%RH (no dew condensation)
Highs : Altitude of 2000m or less

Storage temperature Conditions : -20～65℃

Supply voltage : 90-264V AC 50／60Hz

Power consumption : 100VAC 6VA 200VAC 8VA 240VAC 9VA

Insulated class : Class I apparatus

Input noise removal ratio : Normal 50dB or higher

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

Insulation resistance : Between input／output terminal and power supply terminal 500VDC 20MΩ or higher.

Withstand voltage : Between input／output terminal and power supply terminal 1500V AC 1 minute or 1800V AC 1 second

Resistance to vibration : Frequency 10～55～10Hz, amplitude 0.75mm (one side amplitude)… 100m／S² Direction 3 directions
Sweep speed 1 octave／minute (about 5 minutes for both-way／cycle)
Number of sweep 10 times

Case material : PPO or PPE

Case color : Right Gray

Thickness of applied panel : 1.2-2.8mm

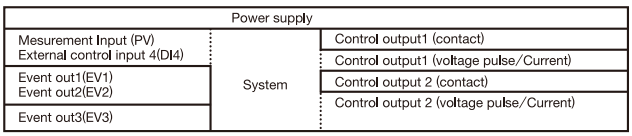
Weight **MAC5A** : About 200g
MAC5B : About 140g
MAC5C : About 140g
MAC5D : About 100g

Panel cut out : Refer to the front page

Isolation : Except for input, system and contact, all control output are no-isolation
Between event output EV1 and EV2 1 is not insulated
Others are basic insulation or functional insulation.
Refer to the following insulation block chart.

Insulation block chart

Not insulation ..... Basic insulation



⚠ WARNING
MAC5 is designed for controlling temperature, humidity, and other physical subjects in general industrial facilities. It must not be used in any way that may adversely affect safety, health, or working conditions.

⚠ CAUTION
To avoid damage to the connected equipment, facilities or the product itself due to a fault of this instrument, safety countermeasures must be taken before usage, such as proper installation of the fuse and the overheating protection device. No warranty, expressed or implied, is valid in the case of usage without having implemented proper safety countermeasures.

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