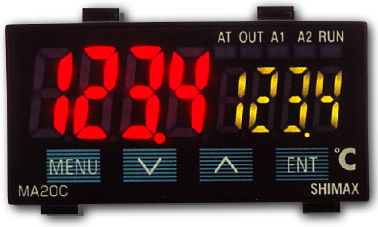
SHIMAX

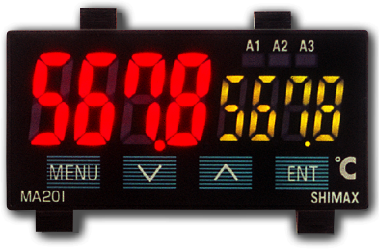
DIGITAL CONTROLLER
DIGITAL INDICATION ALARM METER

CE

MA20C CONTROLLER
48×24mm



MA20I
INDICATION ALARM METER
48×24mm



MA20 SERIES

Special Features

- Big display (Character height PV 11.6mm, SV 8.4mm)
- Vertical/horizontal close mounting (Applicable to IP66)
- Quick (one-touch) mounting method
- Option (analogue output, external control input, alarm output)
- Dust-proof and drip-proof structure. (Equivalent to IP66)

Specification

Display

(1) Display method : Digital display PV 7-segment red LED 4 digits (Character height 11.6mm)
SV 7-segment yellow LED 4 digits (Character height 8.4mm)

Status display Controller	AT, OUT, RUN	yellow
	A1, A2	red
Indicating alarm	A1, A2, A3	red

(2) Display accuracy : ±(0.3%FS+1 digit) {CJ compensation excluded}
No guarantee (the index value of B thermocouple is below 400℃)

(3) Display accuracy rang : 23℃±5℃

(4) Display resolution : Depending on measuring range and scaling (Refer to Measuring range code table)

(5) Measured value display range : −10%～110% of measuring range
(−240～680℃ in case of the measuring range of Pt−240～680℃)

(6) Input scaling : Scaling is practicable in voltage/current inputting −1999～9999
(span 10～10000 The place of decimal point is changeable)

Setting

(1) Setting method : Four key-switches on the front panel

(2) SV setting range : Same as measuring range

(3) Key lock : Key setting
OFF No condition
1 Executed SV+ key lock level alone can be changed on the basic screen
2 Key lock level alone can be changed
3 SV display blanking + key lock level alone can be changed
DI setting No screen shift (fixation of the basic screen)

(4) SV setting limit : Same as measuring range (lower limit ＜ higher limit)

(5) Unit setting : ℃ ℉

Input

(1) Input type : Multiple input (thermocouple, R.T.D., voltage mV) voltage (V), current (mA)

(2) Thermocouple : K, J, T, E, R, S, U, N, B

Input impedance : 500kΩ min.

External resistance range : 100Ω max.

Burnout : Standard feature (upscale)

Cold junction temperature : ±1℃ (ambient temperature of 18～28℃ range)

Compensation accuracy : ±2℃ (ambient temperature of 0～50℃ range)
±0.5%FS (the index value of K, T, U, thermocouple is between −100 and 0℃)
±1.0%FS (the index value of K, T, U, thermocouple is below −100℃)

Cold junction temperature Follow-up : Cold junction temperature compensation accuracy ±1℃
(the change of ambient temperature is below 0.5℃ / min)

(3) R. T. D. : Pt100 3-wire type

Standard current : approx. 0.25 mA

Lead wire tolerable resistance : 5Ω max. (The 3 lead wires should have the same resistance.)

Influence of lead wire resistance : 5Ω max. / wire 0.3℃

(4) Voltage : 0～10mVDC, 0～100mVDC
1～5VDC, 0～5VDC

Input impedance : 500kΩ min.

(5) Current : 4～20mA, 0～20mA DC

Receiving impedance : 250Ω (external mounting)

(6) Input scaling : Scaling is practicable in Voltage (mV, V) or current (mA) inputting

(7) Sampling cycle : 0.5 sec.

(8) PV filter : 0～100 sec.

(9) PV bias : ±200 unit

Control (An indicating alarm does not have this function)

(1) Control mode : Automatic tuning PID control / ON-OFF action

(2) Proportional band (P) : OFF, 0.1～999.9% of measuring range (OFF setting : ON-OFF action)

(3) Integral time (I) : OFF, 1～5000 sec. (OFF setting : P or PD action)

(4) Derivative time (D) : OFF, 1～3600 sec. (OFF setting : P or PI action)

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

(6) Proportional cycle : 1～120 sec. (setting resolution 1)

(7) Manual output : 0～100% (setting resolution 1)

(8) Control output characteristics : RA (heating) DA (cooling)

(9) Manual reset : ±50.0% (effective in I-OFF setting)

(10) Output limit : 0～100% (setting resolution 1)

Control output

(1) Control type / rating : Contact 1 a / 240V AC 2A (resistive load)
SSR drive voltage / 12V DC + 1.0～−1.5V maximum load current 20mA
Current 4-20mA DC Maximum load resistance 500Ω

Alarm output 1 (A controller has this function as an option. An indicating alarm has this function as a standard future.)

(1) Alarm output rating : 1a 240V AC 2A (resistive load)

(2) Alarm action : ON-OFF action

(3) Alarm differential gap : 1～999 unit

(4) Alarm type

Controller : No assignment Higher limit absolute value Lower limit absolute value
Higher limit deviation Lower limit deviation
Within higher and lower limit deviation Beyond higher and lower limit deviation
Control loop / disconnection Scale over

Indicating alarm : No assignment Higher limit deviation Lower limit absolute value
Scale over

(5) Alarm setting range : Absolute value (the higher limit and lower limit) within measuring range
Deviation (the higher limit and lower limit) −1999～2000 unit
Higher and lower limit deviation (within and beyond) 0～2000 unit
Control loop / disconnection 1～9999 sec.

(6) Alarm stand-by action : Selectable from the following three
OFF No stand-by
1 Only at the time of power-on
2 At the time of power-on, when executed SV is changed, and when alarm level is changed

(7) Latching : Selectable between with or without alarm action retention

(8) Output characteristics : Normal open, normal close
Selectable from ON at the time of system power-on and ON in 10ms

Alarm output 2 (Option)

(1) Alarm output rating : 1a 240V AC 2A (resistive load)
A controller : Alarm output 1 An indicating alarm : Alarm output 3

(2)～(8) : Same as Alarm output 1

Alarm output 3 (Option for an indicating alarm)

(1) Alarm output rating : 1a 240V AC 2A (resistive load)
Alarm output 2

(2)～(8) : Same as Alarm output 2

External control input (DI) (Option)

(1) Point : Two

(2) Rating : 12V DC 2mA / input

(3) Assignment

Controller : Second SV, Third SV, RUN, Automatic tuning, Latching cancellation, Super key lock

Indicating alarm : Latching cancellation, Super key lock

(4) Min. retention time of input : 0.25 sec.

(5) Action input : No-voltage contact or open collector

(6) Isolation : Basic isolation to the other input / output

Analogue output

(1) Output type : Selectable from PV, SV, and OUT (PV alone for an indicating alarm)

(2) Output rating : 4～20mA DC maximum load resistance 300Ω

(3) Scaling : Depending to input range

(4) Limit : 0～100% (Reverse setting is practicable)

General specifications

(1) Data storage : Non-volatile memory (EEPROM)

(2) Immediate-stop action : Within 0.02 sec. There should be no influence on operation at 100% dip.

(3) Use environment

Temperature : 0～50℃

Humidity : Below 90%RH (no condensation)

Altitude : 2000m above sea level max.

Category : Ⅱ

Pollution degree : 2

(4) Storage temperature : −20～65℃

(5) Supply voltage : 90～264V AC 50 / 60Hz or 21.6～26.4V DC / AC

(6) Power consumption : 100V AC : below 4VA 200V AC : below 6VA 240V AC : below 7VA
24V AC : below 4VA 24V DC : below 3W

(7) Applicable standard

Safety : EN 61010-1

EMC : EN 61326-1

Protective structure : IEC 60529

Oscillation : IEC 60068

(8) Ratio of input noise rejection : Normal mode 50dB min.

(9) Impulse noise proof : Voltage normal 100ns / 1us ±1500V

(10) Protective structure : Only front panel has dust-proof and drip-proof structure. Equivalent to IP66
(Specified panel thickness 1.2, 1.6, 2.0, 2.3, 2.8, 3.2mm)

(11) Insulation resistance : Between input / output and power supply 20MΩmin. (DC500V)

(12) Dielectric strength : Between input / output and power supply 1500V / 1min or 1800V / 1s

(13) Case material : PPO

(14) Color of the case : Black

(15) External detention : W48×H24×D107mm (The depth detention of panel inside is 100mm)

(16) Panel thickness : 1.2～3.2mm (By using metal fittings, 1～4mm is also appreciable)

(17) Panel cutout : Single mounting W45mm H22.2mm

Plural vertical mounting W45 H(24×)mm (Extra metal fittings are needed)

Plural horizontal mounting W(48×) H22.2mm

Vertical mounting
Horizontal mounting
Vertical-horizontal mounting
} Refer to the panel-cut drawings

(18) Weight : Approx. 60g (metal fittings not included)

Order Code Table

Item	Code	Specifications
Series	MA20C−	Din 48×24㎜ Digital Controller
Input	M	Thermocouple : K, J, T, E, R, S, B, U, N R. T. D. : Pt100 Voltage : 0～10, 0～100mV DC
	V	Voltage : 1～5, 0～5V DC
	I	Current : 4～20mA, 0～20mA Receiving impedance:250Ω
Control output	C	Contact : 1a, Contact capacity : 240V AC 2A / resistive load
	S	Voltage pulse : 12V 2V 20mA DC
	I	Current : 4～20mA DC Load resistance : 500Ω max.
Power supply	F−	90～264V AC, 50/60Hz
	L−	21.6～26.4V AC/DC, 50/60Hz
Option	0N−	Without
	1N−	Alarm output 1 point
	2N−	Alarm output 2 points
	0D−	External control input (DI) 2 points
	1D−	Alarm output 1 point＋External control input (DI) 2 points
	0T−	Analog output : 4～20mA DC
	1T−	Alarm output 1 point＋Analog output : 4～20mA DC
Remarks	0	Without
	9	With (Please consult before ordering.)

Item	Code	Specifications
Series	MA20I−	Din 48×24㎜ Digital Indication Alarm meter
Input	M	Thermocouple : K, J, T, E, R, S, B, U, N R. T. D. : Pt100 Voltage : 0～10, 0～100mV DC
	V	Voltage : 1～5, 0～5V DC
	I	Current : 4～20mA, 0～20mA Receiving impedance:250Ω
Power supply	F−	90～264V AC, 50/60Hz
	L−	21.6～26.4V AC/DC, 50/60Hz
Option	1N−	Alarm output 1 point
	2N−	Alarm output 2 points
	3N−	Alarm output 3 points
	1D−	Alarm output 1 point＋External control input (DI) 2 points
	2D−	Alarm output 2 points＋External control input (DI) 2 points
	1T−	Alarm output 1 point＋Analog output : 4～20mA DC
	2T−	Alarm output 2 points＋Analog output : 4～20mA DC
Remarks	0	Without
	9	With (Please consult before ordering.)

Accessory

Item	Code
Metal fittings	ATT−01
Tool for demounting	ATT−02

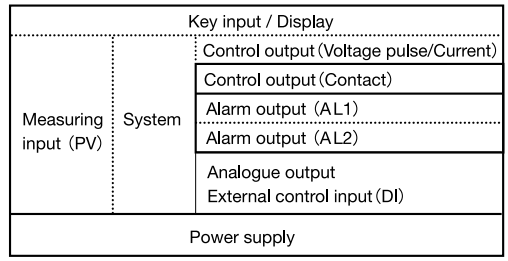
Measuring range code table

Input type		Code	Measuring range	
			Unit code C	Unit code F
	Thermo couple	K1	−199.9～400.0℃	−300～700°F
		K2	0～1200℃	0～2200°F
		J1	0～600℃	0～1100°F
		T1	−199.9～200.0℃	−300～400°F
		E1	0～700℃	0～1300°F
		R1	0～1700℃	0～3100°F
		S1	0～1700℃	0～3100°F
		U1	−199.9～200.0℃	−300～400°F
		N1	0～1300℃	0～2300°F
		B1	0～1800℃	0～3300°F
	R. T. D Pt100Ω	P1	−200～600℃	−300～1100°F
		P2	−100.0～200.0℃	−150.0～400.0°F
		P3	0.0～100.0℃	0.0～200.0°F
	0～10mV	M1	Scaling range : −1999～9999 count Span : 10～10000 count decimal point changeable	
	0～100mV	M2		
	1～5V	V1		
	0～5V	V2		
	4～20mA	V1	※At the time of current input Attached external resistance 250Ω at the V code	
	0～20mA	V2		

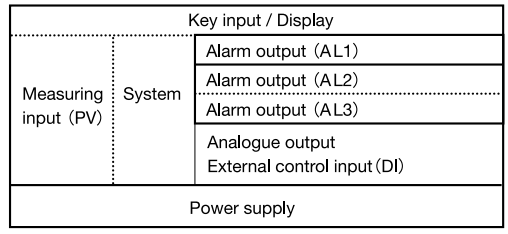
Insulation block chart

Controller

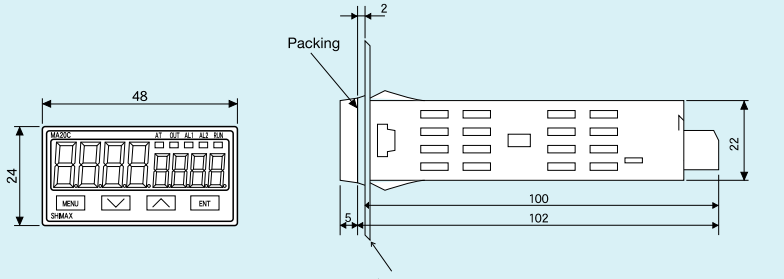
basic insulation　Functional insulation
No insulation



Indication Alarmmeter

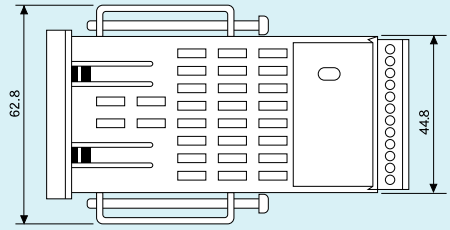


External dimension



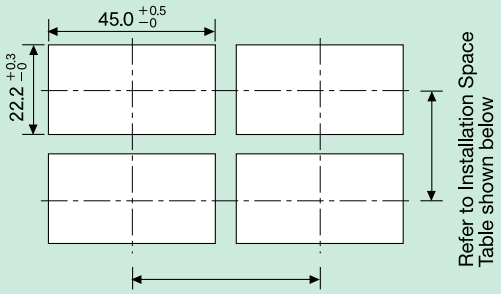
Panel (Thickness of applicable 1.2～3.2㎜, 1～4㎜ with metal fittings)

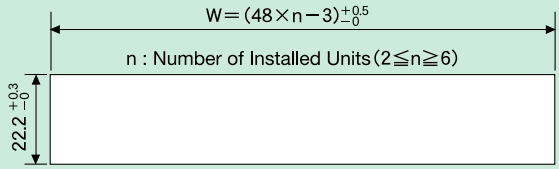
External View of Installation with Metal fittings



Panel Cutout (unit:mm)

Individual Installation for one unit and more than one unit closely mounted each in one hole





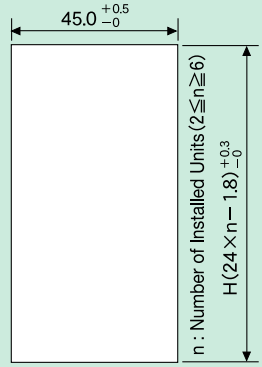
n	2	3	4	5	6
W	93	141	189	237	285

Vertically Consecutive Installation in One Hole (Max.6 units)
Non-application of IP66

Min. Installation Space According to Thickness of the Panel

Thickness of Panel	Installation Space (Vertical)	Thickness of Panel	Installation Space (Vertical)	Installation Space (Horizontal)
1.0	25.0	2.3	24.0	More than 48.0 as for horizontal direction More than 66.0 with metal fittings
1.2	25.0	2.8	24.0	
1.6	24.4	3.2	24.0	
2.0	24.0			

Horizontally Consecutive Installation in One Hole (Max.6 units) Non-application of IP66

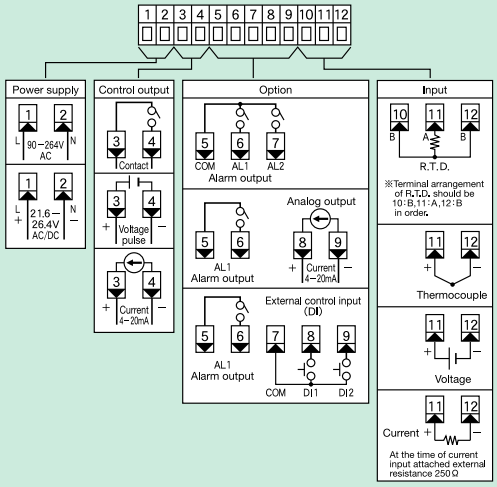


n	2	3	4	5	6
H	46.2	70.2	94.2	118.2	142.2

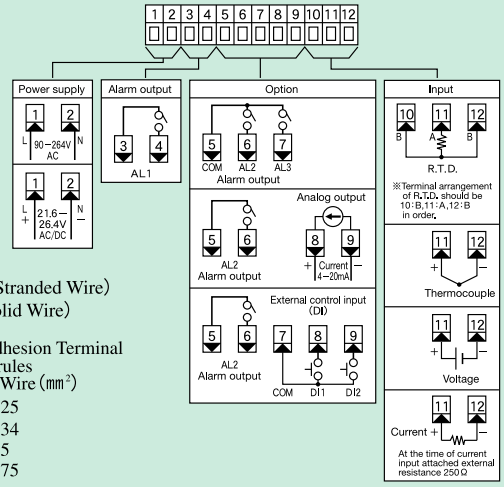
Metal fittings are needed for each unit in case of vertically consecutive installation in one hole.

Terminal Arrangement Plan

MA20C Controller



MA20I Indication Alarmmoter



Appropriate Wire
0.12～1.25mm² (Stranded Wire)
φ0.4～1.2mm (Solid Wire)

Recommended Adhesion Terminal
WAGO Color Ferrules
Type Appropriate Wire (mm²)

216-301	0.25
216-302	0.34
216-201	0.5
216-202	0.75

「⚠WARNING」

MA20 series is designed for measuring 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 the product, 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 counter measures.

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