**azbil**

# Single Loop Controller
## Model C1M

CE  UK CA

## Overview

The C1M is a multifunction controller with a 48 × 48 mm front panel. It features a large LCD display that makes the status of control visible at a glance.
The result of adding new functions for PID adjustment and engineering to Azbil's conventional model, the C1M is helpful for resolving various control issues that may arise.
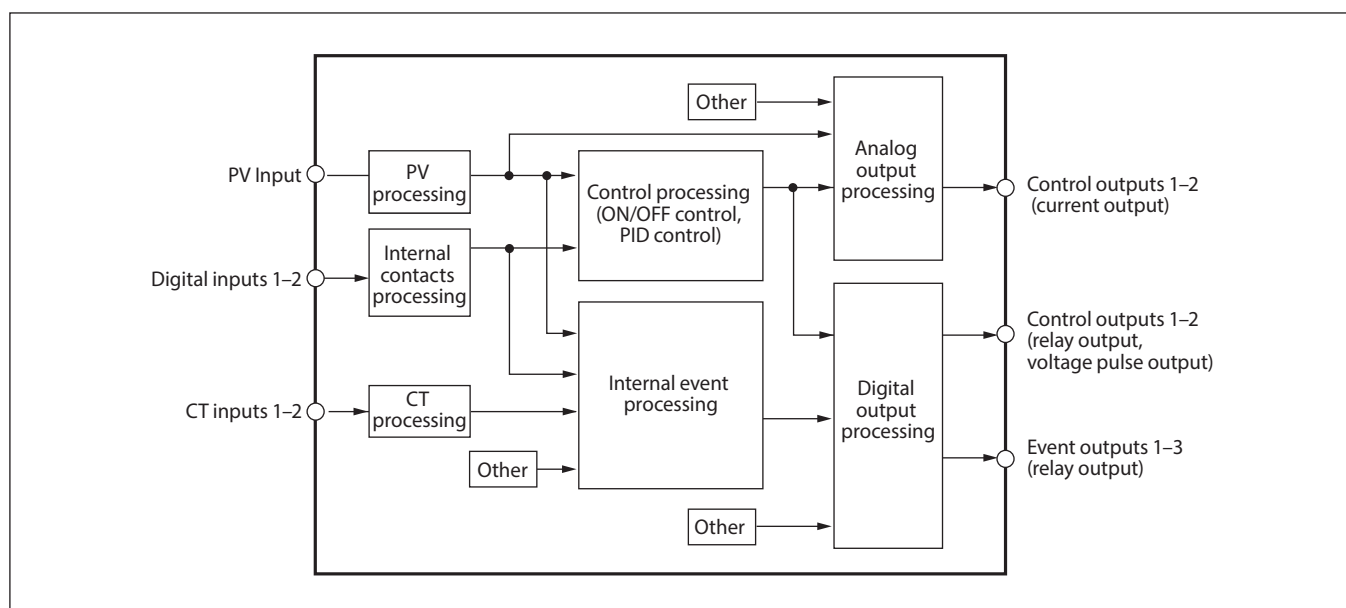
## Features

- LED display for excellent visibility
- Easy setting by [MODE], [PARA], and digit-change keys on the front panel.
- Input type: thermocouples (K, J, E, T, R, S, B, N, PLII, WRe5-26, PR40-20, DIN U, DIN L), resistance temperature detectors (Pt100, JPt100), current signals (4–20 or 0–20 mA DC), voltage signals (0–1, 1–5, 0–5, or 0–10 V DC).
- Control output type: relay, voltage pulse, current.
- Heating and cooling control using control output 2 and event output
- ON/OFF control and PID control
- According to the specified model number, the 3 event outputs, 2 event outputs with independent contacts, 2 CT inputs, 2 digital inputs, and RS-485 communication can be combined.



- Smart Loader Package model SLP-C1F can be used for easy reading and writing of parameters by connecting the included USB loader cable.
  With the SLP-C1F, the user can specify settings in a table format, operate this device, and monitor the control situation on the trend screen. There is no need to create programs for communicating with a host device.
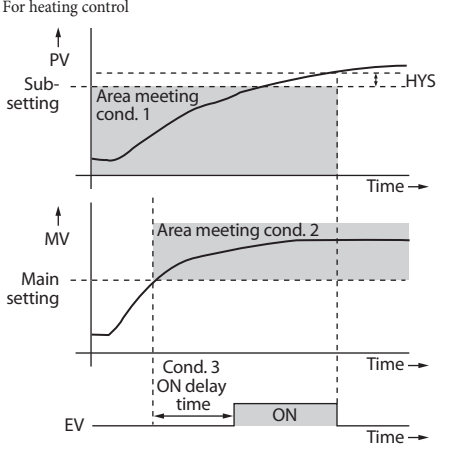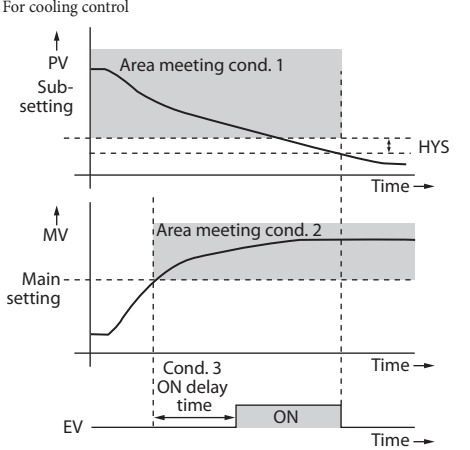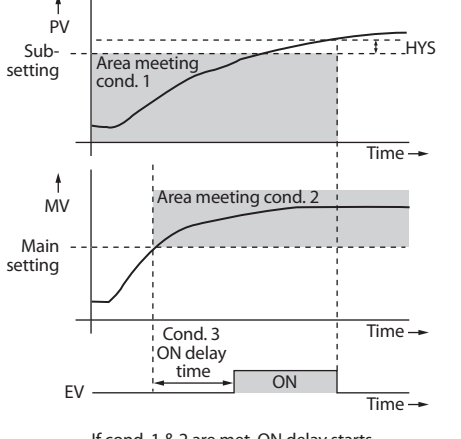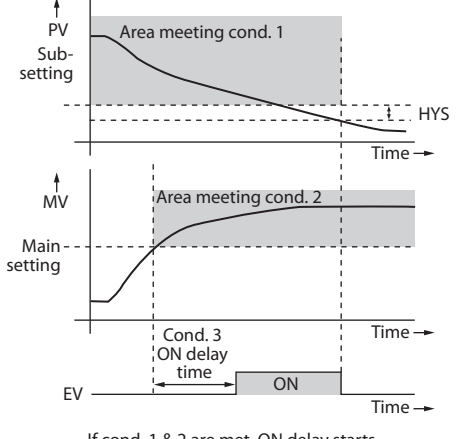
### Input/Output Configuration

# Specifications

| Display and settings | Display format | Segment LCD (VA method) | |
|---|---|---|---|
| | Status display | Upper display: | Shows the PV or various settings (4 digits) |
| | | Lower display: | Shows various settings such as the SP (4 digits) |
| | | MAN: | Lights up in MANUAL mode (off in AUTO mode). |
| | | RDY: | Lights up in READY mode (off in RUN mode). |
| | | EV1 to EV3: | Lights up when event outputs 1 to 3 are ON (off when they are OFF). |
| | | OT1 to OT2: | Lights up when control outputs 1 and 2 are ON (off when they are OFF). Always lights up when current is output. |
| | | ○ (status display): | DDepends on the setting (blinks when sending or receiving data by RS-485 communication; shows OR [logical sum] of all DI states.) |
| | | ○ (AT display): | Blinks during auto tuning |
| | | ▲■▼ (slope display): | Shows operation status during a step operation. |
| | Keys | MODE key: | For operation display, changing the setting display mode, function operation based on settings |
| | | PARA key: | For changing the display |
| | | <, v, >: | For incrementing/decrementing numerical values and shifting between digits of a number. |
| PV input | Number of inputs | 1 | |
| | Sampling cycle | 50, 100, 300, 500 ms (user settable) | |
| | PV ratio | 0.001 to 9.999 | |
| | PV bias | −1999 to +9999 U | |
| | PV filter | 0.1 to 120.0 s (0.0: no filter) | |
| | Thermocouple input | | |
| | | Thermocouple type | K, J, E, T, R, S, B, N (JIS C 1602: 2015) PLII, PR40-20 (ASTM E1751/E1751M-20) WRe5-26 (ASTM E988-96 (Reapproved 2002) * JIS C 1602:2015 (C thermocouple)) DIN U, DIN L (DIN 43710:1985) |
| | | Indication accuracy (under standard conditions) | ±0.3 % FS ±1 digit (excluding the reference junction compensation point) (Negative range: ±0.6 % FS ± 1 digit. For other exceptions see table 1, "Input Types and Ranges," on p. 10.) |
| | | Reference junction (cold junction) compensation accuracy | ±0.5 °C (under standard conditions) (For every 1 °C outside the temperature range of the standard conditions, add ±0.05 °C.) |
| | | Reference junction (cold junction) compensation method | 0: Internal compensation (by this device). 1: External compensation (by another device) |
| | | Allowable input | −0.5 to +12 V |
| | | Input bias current | +0.2 µA max. (from the positive (+) terminal, under standard conditions) |
| | | Wiring resistance effect | 0.2 µV/Ωmax. |
| | | Thermocouple/ compensating lead wire diameter | 0.3 to 0.65 mm |
| | | Operation upon input wire burnout | See table 2, "Behavior if a PV Input Error Occurs" (p. 12). |
| | RTD | | |
| | | RTD type | Pt100 (JIS C 1604:2013) JPt100 (JIS C 1604:1989) |
| | | Indication accuracy (under standard conditions) | ±0.2 % FS ±1 digit |
| | | Allowable input | −0.5 to +12 V |
| | | Measuring current | 1.0 mA (typical), from terminals 5 and 6 |
| | | Wiring resistance effect | ±0.05 % FS/Ω max. |
| | | Allowable wiring resistance | 85 Ω max. |
| | | Operation upon input wire burnout | See table 2, "Behavior if a PV Input Error Occurs" (p. 12). |
| | DC voltage | | |
| | | DC voltage type | 0–1 V, 1–5 V, 0–5 V, 0–10 V |
| | | Indication accuracy (under standard conditions) | ±0.2 % FS ±1 digit |
| | | Allowable input | −0.5 to +12 V |
| | | Input impedance | 1 MΩ min. |
| | | Operation upon input wire burnout | See table 2, "Behavior if a PV Input Error Occurs" (p. 12). |

| PV input (continued) | DC current | | |
| --- | --- | --- | --- |
| | DC current type | 0–20 mA, 4–20 mA | |
| | Indication accuracy (under standard conditions) | ±0.2 % FS ±1 digit | |
| | Allowable input | 30 mA or less, or 4 V or less | |
| | Input impedance | 100 Ω max. (with 20 mA input) | |
| | Operation upon input wire burnout | See table 2, "Behavior if a PV Input Error Occurs" (p. 12). | |
| Digital input (DI1–2) (optional) | Number of inputs | 2 | |
| | Input type | Non-voltage contacts or open collector (sink type) | |
| | Open terminal voltage | 5.5 V DC ±1 V | |
| | Terminal current while ON | Approx. 7.5 mA (when shorted) / approx. 5.0 mA (at a contact resistance of 250 Ω) | |
| | Allowable ON contact resistance | 250 Ω max. | |
| | Allowable OFF contact resistance | 100 kΩ min. | |
| | Allowable ON residual voltage | 1.0 V max. | |
| | Minimum hold time | Sampling cycle + 10 ms | |
| | Parallel connection circuit voltage | 24 V DC max. | |
| | DI assignment | Supported (see DI assignment on p. 9) | |
| Current transformer inputs (CT1–2) (optional) | Number of inputs | 2 | |
| | Input object | Current transformer with 100–4000 turns (availability is in 100-turn units) Recommended current transformers (not UL-certified)  QN206A (hole diameter 5.8 mm, 800 turns)  QN212A (hole diameter 12 mm, 800 turns) | |
| | Measurement current | 0.4–50.0 A AC, 50/60 Hz (peak current: 71 A max. with 800 turns and 1 pass of the power wire) | |
| | Allowable measured current | AC 0.0–70.0 A and peak current of 110 A max. (with 800 turns and 1 pass of the power wire) | |
| | Allowable input voltage | AC 0.0–100 mA and peak current of 141.4 mA max. (at the CT input terminal of this device) | |
| | Indication accuracy | ±5 % FS ±1 digit (CT accuracy is not included) | |
| | Indication resolution | 0.1 A AC | |
| | Precautions when using a CT | Pass the wire carrying the heater current through the CT. Do not use CT input for phase control. | |
| Control output (selectable by model No.) | Relay output | | |
| | Number of inputs | 1 max. | |
| | Contact configuration | 1c (SPDT) | |
| | Contact rating | 250 V AC / 30 V DC, 3 A (resistive load) | |
| | Service life | N.O. side: 100,000 cycles or more N.C. side: 100,000 cycles or more | |
| | Minimum switching specifications | 5 V, 100 mA (reference value) | |
| | Minimum open/close time | 50 ms | |
| | Output type | ON/OFF output, time proportional output | |
| | Time proportional cycle | 5 to 120 s | |
| | DI assignment / Operation type | Can be selected from ON/OFF control output, time proportional output, time proportional heating/cooling output for heating, time proportional heating/cooling output for cooling, and four types of logical operations. | |
| | Output update cycle for DO assignment | Same as sampling cycle | |
| | Voltage pulse output (for SSR drive) | | |
| | Input type | 2 max. | |
| | Open terminal voltage | 19 V DC ±15 % | |
| | Internal resistance | 18 Ω | |
| | Allowable current | 24 mA DC max. | |
| | OFF-state leak current | 100 µA max. | |
| | Short-circuit protection function | Yes | |
| | Minimum OFF/ON time | In time proportional cycle shorter than 10 s: 1 ms In time proportional cycle of 10 s or longer: 250 ms | |
| | Output type | ON/OFF output, time proportional output | |
| | Time proportional cycle | 0.1 s, 0.25 s, 0.5 s, 1 to 120 s | |
| | DI assignment / Operation type | Can be selected from ON/OFF control output, time proportional output, time proportional heating/cooling output for heating, time proportional heating/cooling output for cooling, and four types of logical operations. | |
| | Output update cycle for DO assignment | Same as sampling cycle | |

| Control output (selectable by model No.) (continued) | Current output | | |
|---|---|---|---|
| | | Number of inputs | 2 max. |
| | | Output type | 0–20 mA DC or 4–20 mA DC |
| | | Allowable load resistance | 600 Ω max. |
| | | Output accuracy | ±0.3 % FS (However, ±1 % FS at 0–1 mA) (under standard conditions) |
| | | Output resolution | 1/12500 (0–20 mA DC), 1/10000 (4–20 mA DC) |
| | | Output update cycle | Same as sampling cycle |
| | | Output type | Can be selected from MV, heating MV (for heating/cooling control), cooling MV (for heating/cooling control), PV, PV (before ratio, bias, filter), SP, deviation (PV – SP), CT1 current, CT2 current, SP + MV, and PV + MV. |
| Event relay (EV1–3) (optional) | Number of inputs | | 3 (for models with 3 EV outputs), 2 (for models with 2 EV outputs with independent contacts) |
| | Contact configuration | | 1a (SPST) |
| | Contact rating | | 250 V AC / 30 V DC, 2 A (resistive load) |
| | Service life | | 100,000 cycles or more |
| | Minimum switching specifications | | 5 V, 10 mA (reference value) |
| | Minimum open/close time | | 50 ms |
| | DI assignment / Operation type | | Can be selected from the result of an internal event, ON/OFF control output, time proportional output, time proportional heating/cooling output for heating, time proportional heating/cooling output for cooling, and four types of logical operations. |
| | Output update cycle for DO assignment | | Same as sampling cycle |
| RS-485 communication (optional) | Transmission line | | 3-wire system |
| | Transmission speed | | 4800, 9600, 19200, 38400 bps |
| | Data length | | 8 bits / 7 bits |
| | Parity bit | | Even parity, odd parity, no parity |
| | Stop bits | | 1 bit / 2 bits |
| | Communication protocol | | Host communication: CPL, Modbus™/RTU-compliant, Modbus/ASCII-compliant or PLC link |
| | Terminating resistor | | External resistor (120 Ω, 1/2 W or more) recommended |
| | Network | | Multidrop (up to 31 slave stations for 1 host station) |
| | Communications/synchronization type | | Half-duplex, start-stop synchronization |
| | Maximum cable length | | 500 m |
| Loader communication | Dedicated PC loader | | SLP-C1FJA0 (with USB loader cable), SLP-C1FJA1 (without USB loader cable) |
| | Cables | | Dedicated USB loader cable 81441177-001 (included with model SLP-C1FJA0) |
| General specifications | Standard conditions | | |
| | | Ambient temperature | 25 ±3 °C (provided there is a space of 2 cm below the product) |
| | | Ambient humidity | 60 ±5 % RH (without condensation or freezing) |
| | | Power | 105 V AC ±10 % |
| | | Power frequency | 50/60 Hz ±1 Hz |
| | | Vibration | 0 m/s² |
| | | Shock | 0 m/s² |
| | | Mounting angle | Reference plane ±3° |
| | Operating conditions | | |
| | | Ambient temperature | Main unit −10 to +55 °C (−10 to +45 °C for gang-mounting) |
| | | Ambient humidity | 10–85 % RH (without condensation or freezing) |
| | | Power | 85–264 V AC, 50/60 Hz ±2 Hz (Rated power: 100–240 V AC, 50/60 Hz) |
| | | Vibration | 0–5 m/s² (10–60 Hz for 2 h each in x, y, and z directions) |
| | | Shock | 0–100 m/s² |
| | | Mounting angle | Reference plane ±10° |
| | Transport and storage conditions | | |
| | | Ambient temperature | −20 to +70 °C |
| | | Ambient humidity | 10–85 % RH (without condensation or freezing, protected from humidity and dust) |
| | | Power | 0–10 m/s² (10–150 Hz for 2 h each in X, Y, and Z directions) |
| | | Vibration | 0–300 m/s² (vertically 3 times) |
| | | Drop test | Drop height 60 cm (free fall on 1 corner, 3 edges, 6 sides) |
| | Memory backup | | EEPROM (durability: 100,000 erase-write cycles) |
| | Power consumption | | 8 VA or less (6 VA at 100 V AC, 8 VA at 264 V AC) |
| | Power-on inrush current | | 18 A max. / 1.5 ms max. |
| | Allowable transient power loss | | 20 ms max. |
| | Insulation resistance | | 20 MΩ min. (Power terminals, and between power terminals and isolated I/O terminals) (with a 500 V DC insulation resistance tester) |

| General specifications (continued) | Dielectric strength | 1500 V AC for 1 minute (between power terminals, and between power terminals and isolated I/O terminals) |
|---|---|---|
| | Laws & regulations, certification | |

| | | Law/directive | Certificate/file No., etc. | Remarks |
|---|---|---|---|---|
| CE | LVD | | EN61010-1 |
| | EMC* | | EN61326-1 (For use in industrial locations) |
| | RoHS | | EN IEC63000 |
| UKCA | LVD | | EN61010-1 |
| | EMC* | | EN61326-1 (For use in industrial locations) |
| | RoHS | | EN IEC63000 |
| KC | Radio Waves Act (of Korea) | R-R-A2B-A146 | |

* During EMC testing, the indication or output may fluctuate by the equivalent of ±10 % FS.

| General specifications (continued) | Overvoltage category | II (IEC 60364-4-443, IEC 60664-1) |
|---|---|---|
| | Allowable pollution degree | Pollution degree2 |
| | Elevation | 2000 m max. |
| | Installation location | indoors |
| | Protection class | IP66 (device front side) (only when individually mounted in a panel using the included gasket) |
| | Installation | Panel mounting (with dedicated bracket) |
| | Mass | Approximately 130 g (including dedicated mounting bracket) |
| | Terminal screw tightening torque | 0.6 ±0.1 N·m |
| | Case material/color | Modified PPE/black |
| | Protective sheet material/color | PET/black |
| Control | Number of loops | 1 |
| | Control method | PID control, ON/OFF control |
| | Control action | Heating control (reverse action), Cooling control (direct action) |
| | heating/cooling control | Not used, Use (individual PID), Use (shared PID) |
| | Control output | Continuous proportional (when control output type is set to current), time proportional (when control output type is set to voltage pulse or relay) |
| | Control algorithm | PID (conventional PID), Ra-PID (high-performance PID) |
| | PID control | |
| | Proportional band (P) | 0.1 to 999.9 % |
| | Integration time (I) | 0 to 9999 (0 = no integral operation) (set the number of decimal places (0–3) for integral time and derivative time) |
| | Derivative time (D) | 0 to 9999 (0 = no derivative operation) (set the number of decimal places (0–3) for integral time and derivative time) |
| | MV low limit • MV high limit | −10.0 % to +110.0 % |
| | Manual reset | −10.0 % to +110.0 % |
| | Number of PID groups | 8 |
| | PID group selection | A PID group can be set for each SP group or can be selected by a function assigned to DI or by communication. |
| | Auto tuning method | PID automatic setting using the limit cycle method |
| | AT type | 0: Normal (regular control characteristics) 1: Immediate response (to disturbance) 2: Stable (minimal PV fluctuation) |
| | Auto tuning adjustment factor | 0.00 to 99.99 (for proportional band, integral time, and derivative time) |
| | Type of MV switching point at AT | 0: Default (2/3 of the deviation of the initial PV from the initial SP), 1: SP, 2: PV |
| | MV switching point PV in AT | −1999 to +9999 U |
| | Control cycle | Same as sampling cycle |
| | ON/OFF control | |
| | Differential | 0 to 9999 U |
| | Operating point offset | −1999 to +9999 U |
| | SP | |
| | Number of LSP groups | 8 max. |
| | SP ramp type | 0: Standard 1: Multi-ramp 2: Step operation enabled: Step operation does not resume when the power is turned back on (shifts to READY) 3: Step operation enabled: Step operation resumes when the power is turned back on |
| | SP ramp unit | 0: 0.1 U/s, 1: 0.1 U/min, 2: 0.1 U/h |
| | SP up ramp / SP down ramp | 0.1 to 999.9 U (0.0 U: no ramp) |

| Control (continued) | Step operation | | |
|---|---|---|---|
| | | Number of steps | 8 max. |
| | | Step setup method | Specifying LSP, slope, and time for each step |
| | | Time unit | 0: 0.1 s, 1: 1 s, 2: 1 min |
| | | Function | PV start (up start / down start), loop (operation stops (no loop-back), loops back, continues SOAK with the final step's SP (no loop-back)) |
| | Control action (direct/reverse) | | Switchable |
| | Heating/cooling control deadband | | −100.0 to +100.0 % |
| | Output operation at PV alarm | | 0: Continue the control calculation 1: Output the value set for "Output at PV alarm" |
| | Output at PV alarm | | −10.0 to +110.0 % |
| | Output at READY | | −10.0 to +110.0 % |
| Event | Number of inputs | | 0 to 3 (depending on the model No.) |
| | Available internal events | | 5 |
| | Direct/reverse | | Event output ON/OFF polarity can be changed |
| | Event state in READY | | 0: Continues, 1: Forced OFF |
| | Alarm OR | | 0: None, 1: Alarm direct + OR operation, 2: Alarm direct + AND operation, 3: Alarm reverse + OR operation, 4: Alarm reverse + AND operation |
| | Special OFF | | 0: No special OFF, 1: If the main setting for the event is 0, the event is OFF. |
| | Main setting / Sub-setting | | −1999 to 9999 U (PV decimal point position determines the number of digits after the decimal point. Range is 0 to 9999 for some operation types.) |
| | Hysteresis | | 0 to 9999 U (PV decimal point position determines the number of digits after the decimal point.) |
| | ON delay time / OFF delay time | | 0.0 to 999.9 s, 0 to 9999 s, 0 to 9999 min (depending on the unit set for delay time) |

Event types
●: ON/OFF changes at the value
○: ON/OFF changes when the value is exceeded

| PV high limit | | PV low limit | |
|---|---|---|---|
| Direct action | Reverse action | Direct action | Reverse action |

| PV high and low limits | | Deviation high limit | |
|---|---|---|---|
| Direct action | Reverse action | Direct action | Reverse action |

| Deviation low limit | | Deviation high and low limits | |
|---|---|---|---|
| Direct action | Reverse action | Direct action | Reverse action |

| SP high limit | | SP low limit | |
|---|---|---|---|
| Direct action | Reverse action | Direct action | Reverse action |

| SP high and low limits | | MV high limit | |
|---|---|---|---|
| Direct action | Reverse action | Direct action | Reverse action |

| MV low limit | | MV high and low limits | |
|---|---|---|---|
| Direct action | Reverse action | Direct action | Reverse action |

| Heater burnout/overcurrent | | Heater short circuit | |
|---|---|---|---|
| Direct action | Reverse action | Direct action | Reverse action |

| Event | Event types | Loop diagnosis 1 |
|---|---|---|
| | ●: ON/OFF changes at the value<br>○: ON/OFF changes when the value is exceeded | Turns on if the PV does not change according to the increase or decrease of the MV.<br>Use this setting to detect a failure of the actuator, etc.<br>● Settings<br>　• Main setting:　　MV<br>　• Sub-setting:　　PV<br>　• ON delay time:　diagnosis time<br>● Operation specifications<br>　Turns ON if the PV set for the sub-setting is not reached within the diagnosis time (ON delay time) even though the MV greater than the main setting is retained.<br>● Note<br>　To set the ON delay time, the user level should be set to "Advanced configuration."<br>　The ON delay time is set to 0.0 s when the product is shipped. |

| Direct action | Reverse action |
|---|---|
| <br>If cond. 1 & 2 are met, ON delay starts | <br>If cond. 1 & 2 are met, ON delay starts |

| Loop diagnosis 2 |
|---|
| Turns on when the PV does not change according to the increase or decrease of the MV.<br>Use this setting to detect a failure of the actuator, etc.<br>● Settings<br>　• Main setting:　　MV<br>　• Sub-setting:　　the amount of the change in the PV from the time when the MV exceeds the value set for the main setting<br>　• ON delay time:　diagnosis time<br>● Operation specifications<br>　Turns ON if the PV does not reach the value obtained by adding (subtracting) the subsetting value to the PV when the MV exceeds the main setting (condition 1) within the diagnosis time (ON delay time) even though an MV greater than the main setting is retained (condition 2).<br>● Note<br>　To set the ON delay time, the user level should be set to "advanced configuration."<br>　The ON delay time is set to 0.0 s when the product is shipped. |

| Direct action | Reverse action |
|---|---|
| <br>If cond. 1 & 2 are met, ON delay starts | <br>If cond. 1 & 2 are met, ON delay starts |

| Event | Event types | Loop diagnosis 3 |
|---|---|---|
| | ●: ON/OFF changes at the value<br>○: ON/OFF changes when the value is exceeded | Turns on when the PV does not change according to the increase or decrease of the MV.<br>Use this setting to detect a failure of the actuator, etc. |

● Settings
- Main setting: the amount of a change in the PV from the time when the MV reaches the high limit (100 %) or the low limit (0 %)
- Sub-setting: the absolute value of deviation (PV–SP) that will turn off the event
- ON delay time: diagnosis time
- OFF delay time: time from power-on to event OFF

● Operation specifications
- In direct operation (heating control), the event turns ON if: (1) the amount of PV increase after the diagnosis time (the ON-delay time) elapses after the MV reaches the high limit is smaller than the main setting or (2) the amount of PV decrease after the diagnosis time (the ON-delay time) elapses after the MV reaches the low limit is smaller than the main setting.
- In reverse operation (cooling control), the event turns ON if: (1) the amount of PV decrease after the diagnosis time (the ON-delay time) elapses after the MV reaches the high limit is smaller than the main setting or (2) the amount of PV increase after the diagnosis time (the ON-delay time) elapses after the MV reaches the low limit is smaller than the main setting.
- If the absolute value of deviation (PV – SP) is smaller than the sub-setting, the event turns OFF regardless of the other conditions.
- If the time from the start of operation after power-on is less than the OFF delay time, the event turns OFF regardless of the other conditions.<br>However, after the absolute value of deviation exceeds the sub-setting, the event turns OFF if the absolute value of deviation becomes smaller than the value obtained by subtracting the hysteresis from the sub-setting.

● Note

To set the ON and OFF delay times, the user level should be set to "advanced configuration."
The ON and OFF delay times are set to 0.0 s when the product is shipped.

| Direct action | Reverse action |
|---|---|



If cond. 1 & 2 are met, ON delay starts      If cond. 1 & 2 are met, ON delay starts

| Alarm (status) | |
|---|---|
| Direct action | Reverse action |
| ON when an alarm (alarm code AL01 to AL99) occurs, OFF otherwise | OFF when an alarm (alarm code AL01 to AL99) occurs, ON otherwise |

| READY (status) | |
|---|---|
| Direct action | Reverse action |
| ON in READY mode<br>OFF in RUN mode | OFF in READY mode<br>ON in RUN mode |

| MANUAL (status) | |
|---|---|
| Direct action | Reverse action |
| ON in MANUAL mode<br>OFF in AUTO mode | OFF in MANUAL mode<br>ON in AUTO mode |

| AT in execution | |
|---|---|
| Direct action | Reverse action |
| ON when AT is running<br>OFF when AT stopped | OFF when AT is running<br>ON when AT stopped |

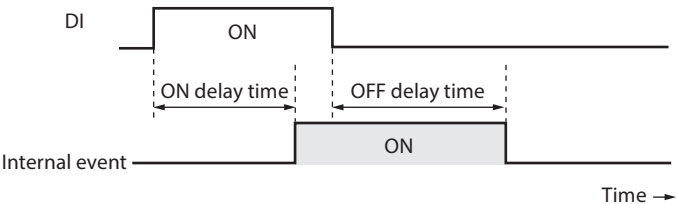| During SP ramp | |
|---|---|
| Direct action | Reverse action |
| ON during SP ramp<br>OFF when there is no SP ramp or it is completed | OFF during SP ramp<br>ON when there is no SP ramp or it is completed |

| Event | Event types ●: ON/OFF changes at the value ○: ON/OFF changes when the value is exceeded | Control action (status) | |
|---|---|---|---|
| | | **Direct action** | **Reverse action** |
| | | ON during direct action (cooling) OFF during reverse action (heating) | OFF during direct action (cooling) ON during reverse action (heating) |

| | | Timer (status) |
|---|---|---|
| | | The direct and reverse action settings are disabled for timer events. To use timer events, set the operation type to "timer stop/start" in the DI assignment bank. Multiple timer events can be controlled by a single internal contact (DI) by setting "internal event No. assignment" in the DI assignment bank. ● Settings  • ON delay time: Time until the event changes from OFF to ON after the DI changes from OFF to ON  • OFF delay time: Time until the event changes from ON to OFF after the DI changes from ON to OFF ● Operation specifications  • Turns ON when DI ON continues for the ON delay time or longer.  • Turns OFF when DI OFF continues for the OFF delay time or longer.  • In other cases, the current status is retained.  ● Note  To set the ON and OFF delay times, the user level should be set to "advanced configuration."  The ON and OFF delay times are set to 0.0 s when the product is shipped.  "Internal event No. assignment" in the DI assignment bank is set to 0 when the product is shipped.  With this setting, a timer can be started or stopped for all internal events by a single internal contact (DI).  If the setting is changed to 1 or more, a timer can be started or stopped for one specified internal event by one internal contact (DI).  To change the setting, the user level should be set to "advanced configuration."  • Setting of direct/reverse operation, standby, and READY mode operation   These operations can be set at the time when the event (E1.C1 to E5.C2) is set up. |

| DI assignment | Operation type | LSP group selection (0/+1), LSP group selection (0/+2), LSP group selection (0/+4), PID group selection (0/+1), PID group selection (0/+2), PID group selection (0/+4), RUN/READY selection, AUTO/MANUAL selection, AT execution/stop instructions, Control action direct/reverse, SP Ramp enabled/disabled, PV Hold, PV Maximum value hold, PV Minimum value hold, Timer Stop/Start, Release/continue all DO latches, Advance, SP Step Hold |
|---|---|---|
| | Input bit operation | 0: Not used (Default input) 1: Function 1 ((A and B) or (C and D)) 2: Function 2 ((A or B) and (C or D)) 3: Function 3 (A or B or C or D) 4: Function 4 (A and B and C and D) |
| DI assignment | Operation type | 0: Default output (output data differs depending on the output terminal) 1: MV1 2: MV2 3: Function 1 ((A and B) or (C and D)) 4: Function 2 ((A or B) and (C or D)) 5: Function 3 (A or B or C or D) 6: Function 4 (A and B and C and D) |
| Current transformer (CT) operation (depending on model No.) | Operation | 0: Heater burnout detection, 1: Current measurement |
| | Measurement wait time | 30 to 300 ms |
| | Number of turns | 100–4000 turns (set in increments of 100 turns) |
| | Number of power wire loops | 1 to 6 passes |
| PLC link | Supported protocol | Mitsubishi Electric Corporation MC protocol / QnA-compatible 3C frame format 4, Omron Corporation FINS (host link), Modbus/RTU |
| | Connections | 31 units max. |
| | Number of transfer sheets | 4 max. |
| | Number of data records | 64 max. (total of sheets 1–4) |
| | Transfer type (set for each sheet) | Cyclic transfer (PLC→C1M), Cyclic transfer (C1M→PLC) Triggered data transfer (PLC → C1M), Triggered data transfer (C1M → PLC) |

**Table 1-1. Input Types and Ranges**
Indication accuracy (under standard conditions, excluding the reference junction compensation point)

| Input type | PV input range type | Sensor type | Range | Indication accuracy | Resolution |
|---|---|---|---|---|---|
| Thermocouple | 1 | K | −200 to +1200 °C | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 1 °C |
| | 2 | K | 0 to 1200 °C | ±0.3 % FS ± 1 digit | 1 °C |
| | 3 | K | 0.0 to 800.0 °C | ±0.3 % FS ± 1 digit | 0.1 °C |
| | 4 | K | 0.0 to 600.0 °C | ±0.3 % FS ± 1 digit | 0.1 °C |
| | 5 | K | 0.0 to 400.0 °C | ±0.3 % FS ± 1 digit | 0.1 °C |
| | 6 | K | −200.0 to +400.0 °C | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 0.1 °C |
| | 9 | J | 0.0 to 800.0 °C | ±0.3 % FS ± 1 digit | 0.1 °C |
| | 10 | J | 0.0 to 600.0 °C | ±0.3 % FS ± 1 digit | 0.1 °C |
| | 11 | J | −200.0 to +400.0 °C | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 0.1 °C |
| | 13 | E | 0.0 to 600.0 °C | ±0.3 % FS ± 1 digit | 0.1 °C |
| | 14 | T | −200.0 to +400.0 °C | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 0.1 °C |
| | 15 | R | 0 to 1600 °C | 200 °C to 1600 °C: ±0.3 % FS ± 1 digit<br>0 °C to less than 200 °C: ±9 °C ± 1 digit | 1 °C |
| | 16 | S | 0 to 1600 °C | 200 °C to 1600 °C: ±0.3 % FS ± 1 digit<br>0 °C to less than 200 °C: ±9 °C ± 1 digit | 1 °C |
| | 17 | B | 0 to 1800 °C | 1000 °C to 1800 °C: ±4.5 °C ± 1 digit<br>600 °C to less than 1000 °C: ±6 °C ± 1 digit<br>260 °C to less than 600 °C: ±12 °C ± 1 digit<br>0 °C to less than 260 °C: ±80 °C (reference value)<br>Temperatures below 20 °C are not displayed. | 1 °C |
| | 18 | N | 0 to 1300 °C | ±0.3 % FS ± 1 digit | 1 °C |
| | 19 | PLII | 0 to 1300 °C | ±0.3 % FS ± 1 digit | 1 °C |
| | 20 | WRe5-26 | 0 to 1400 °C | ±0.3 % FS ± 1 digit | 1 °C |
| | 21 | WRe5-26 | 0 to 2300 °C | ±0.3 % FS ± 1 digit | 1 °C |
| | 23 | PR40-20 | 0 to 1900 °C | 1100 °C to 1900 °C: ±12 °C ± 1 digit<br>400 °C to less than 1100 °C: ±40 °C ± 1 digit<br>0 °C to less than 400 °C: not specified | 1 °C |
| | 24 | DIN U | −200.0 to +400.0 °C | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 0.1 °C |
| | 25 | DIN L | −100.0 to +800.0 °C | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 0.1 °C |

| Input type | PV input range type | Sensor type | Range | Indication accuracy | Resolution |
|---|---|---|---|---|---|
| Resistance temperature detector | 41 | Pt100 | −200 to +500 °C | ±0.2 % FS ± 1 digit | 1 °C |
| | 42 | JPt100 | −200 to +500 °C | ±0.2 % FS ± 1 digit | 1 °C |
| | 43 | Pt100 | −200 to +200 °C | ±0.2 % FS ± 1 digit | 1 °C |
| | 44 | JPt100 | −200 to +200 °C | ±0.2 % FS ± 1 digit | 1 °C |
| | 45 | Pt100 | −100.0 to +300.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 46 | JPt100 | −100.0 to +300.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 51 | Pt100 | −50.0 to +200.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 52 | JPt100 | −50.0 to +200.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 53 | Pt100 | −50.0 to +100.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 54 | JPt100 | −50.0 to +100.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 63 | Pt100 | 0.0 to 200.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 64 | JPt100 | 0.0 to 200.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 67 | Pt100 | 0.0 to 500.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |
| | 68 | JPt100 | 0.0 to 500.0 °C | ±0.2 % FS ± 1 digit | 0.1 °C |

| Input type | PV input range type | Sensor type | Range | Indication accuracy | Resolution |
|---|---|---|---|---|---|
| Linear | 84 | DC voltage | 0 to 1 V | ±0.2 % FS ± 1 digit | The number of decimal places is changeable. (1, 0.1, 0.01, 0.001)<br><br>The scaling range is −1999 to +9999 U. |
| | 86 | | 1 to 5 V | ±0.2 % FS ± 1 digit | |
| | 87 | | 0 to 5 V | ±0.2 % FS ± 1 digit | |
| | 88 | | 0 to 10 V | ±0.2 % FS ± 1 digit | |
| | 89 | DC current | 0 to 20 mA | ±0.2 % FS ± 1 digit | |
| | 90 | | 4 to 20 mA | ±0.2 % FS ± 1 digit | |

**Table 1-2. Input Types and Ranges (°F)**
Indication accuracy (under standard conditions, excluding the reference junction compensation point)

| Input type | PV range No. | Sensor type | Range | Indication accuracy | Resolution |
|---|---|---|---|---|---|
| Thermocouple | 1 | K | −300 to +2200 °F | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 1 °F |
| | 2 | K | 0 to 2200 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 3 | K | 0 to 1500 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 4 | K | 0 to 1100 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 5 | K | 0.0 to 700.0 °F | ±0.3 % FS ± 1 digit | 0.1 °F |
| | 6 | K | −300 to +700 °F | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 1 °F |
| | 9 | J | 0 to 1500 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 10 | J | 0 to 1100 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 11 | J | −300 to +700 °F | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 1 °F |
| | 13 | E | 0 to 1100 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 14 | T | −300 to +700 °F | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 1 °F |
| | 15 | R | 0 to 3000 °F | 200 °C to 1600 °C: ±0.3 % FS ± 1 digit<br>0 °C to 200 °C: ±9 °C | 1 °F |
| | 16 | S | 0 to 3000 °F | 200 °C to 1600 °C: ±0.3 % FS ± 1 digit<br>0 °C to 200 °C: ±9 °C | 1 °F |
| | 17 | B | 0 to 3300 °F | 1000 °C to 1800 °C: ±4.5 °C<br>600 °C to 1000 °C: ±6 °C<br>260 °C to 600 °C: ±12 °C<br>0 °C to 260 °C: ±80 °C (reference value)<br>Temperatures below 20 °C are not displayed. | 1 °F |
| | 18 | N | 0 to 2300 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 19 | PL II | 0 to 2300 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 20 | WRe5-26 | 0 to 2400 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 21 | WRe5-26 | 0 to 4200 °F | ±0.3 % FS ± 1 digit | 1 °F |
| | 23 | PR40-20 | 0 to 3400 °F | 1100 °C to 1900 °C: ±12 °C<br>400 °C to 1100 °C: ±40 °C<br>0 °C to 400 °C: not specified | 1 °F |
| | 24 | DIN U | −300 to +700 °F | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 1 °F |
| | 25 | DIN L | −150 to +1500 °F | ±0.3 % FS (load range ± 0.6 % FS) ± 1 digit | 1 °F |

| Input type | PV range No. | Sensor type | Range | Indication accuracy | Resolution |
|---|---|---|---|---|---|
| Resistance temperature detector (RTD) | 41 | Pt100 | −300 to +900 °F | ±0.2 % FS ± 1 digit | 1 °F |
| | 42 | JPt100 | −300 to +900 °F | ±0.2 % FS ± 1 digit | 1 °F |
| | 43 | Pt100 | −300 to +400 °F | ±0.2 % FS ± 1 digit | 1 °F |
| | 44 | JPt100 | −300 to +400 °F | ±0.2 % FS ± 1 digit | 1 °F |
| | 45 | Pt100 | −150 to +500 °F | ±0.2 % FS ± 1 digit | 1 °F |
| | 46 | JPt100 | −150 to +500 °F | ±0.2 % FS ± 1 digit | 1 °F |
| | 51 | Pt100 | −50.0 to +400.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |
| | 52 | JPt100 | −50.0 to +200.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |
| | 53 | Pt100 | −50.0 to +200.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |
| | 54 | JPt100 | −50.0 to +200.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |
| | 63 | Pt100 | 0.0 to 400.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |
| | 64 | JPt100 | 0.0 to 400.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |
| | 67 | Pt100 | 0.0 to 900.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |
| | 68 | JPt100 | 0.0 to 900.0 °F | ±0.2 % FS ± 1 digit | 0.1 °F |

**Table 2. Behavior if a PV Input Occurs**

| Input type | PV input range type | Cause | Indication | Alarm |
|---|---|---|---|---|
| Thermocouple | 1–25 | Burnout | Upscale (110 % FS) | AL01 |
| | | Reference junction (cold junction) compensation error | PV with incorrect cold contact compensation | AL03 |
| Resistance temperature detector | 41–68 | Resistor burnout | Upscale (110 % FS) | AL01 |
| | | Line A burnout | | |
| | | Line B burnout | | AL01, AL03 |
| | | 2- or 3-wire burnout | | |
| | 41–42 | Short circuit, lines A and B | −235 °C (−5 % FS)/−235 °F | AL02 |
| | 43–44 | | −235 °C (−9 % FS)/−235 °F | |
| | 45–68 | | Downscale (−10 % FS) | |
| DC voltage | 84 | Burnout | Downscale (−3 % FS) | AL02 |
| | 86 | | Downscale (−10 % FS) | |
| | 87 | | Downscale (−3 % FS) | |
| | 88 | | Downscale (0 % FS) | None |
| DC current | 89 | | Unknown (around 0 % FS) | |
| | 90 | | Downscale (−10 % FS) | AL02 |

# Model Selection Table

| I | II | III | IV | V | VI | VI | VII | VII | Example of C1MTR0TA0000 |
|---|---|---|---|---|---|---|---|---|---|

| I | II | III | IV | V | VI | VII | | Specifications |
|---|---|---|---|---|---|---|---|---|
| Basic model No. | Installation | Control output | PV input | Power | Options | Add'l proc. 1 | Add'l proc. 2 | |
| C 1 M | | | | | | | | Basic model No. |
| | T | | | | | | | Screw terminal block |
| | | | | | | | | **Control output 1 / Control output 2** |
| | | R 0 | | | | | | Relay output (C.O. contacts) / None |
| | | V 0 | | | | | | Voltage pulse output (for SSR drive) / None |
| | | V C | | | | | | Voltage pulse output (for SSR drive) / Current output |
| | | V V | | | | | | Voltage pulse output (for SSR drive) / Voltage pulse output (for SSR drive) |
| | | C 0 | | | | | | Current output / None |
| | | C C | | | | | | Current output / Current output |
| | | | T | | | | | Thermocouple input (K, J, E, T, R, S, B, N, PL II, WRe5/26, PR40/20, DIN U, DIN L) |
| | | | R | | | | | RTD input (Pt100, JPt100) |
| | | | L | | | | | DC voltage/current (0–1 V, 1–5 V, 0–5 V, 0–10 V DC; 0–20 mA DC, 4–20 mA DC) |
| | | | | A | | | | AC power supply (100–240 V) |
| | | | | | 0 0 | | | None |
| | | | | | 0 1 | | | 3 event relay outputs |
| | | | | | 0 2 | | | 3 event relay outputs, 2 current transformer inputs, 2 digital inputs |
| | | | | | 0 3 | | | 3 event relay outputs, 2 current transformer inputs, RS-485 comm. |
| | | | | | 0 4 | | | 2 event relay outputs (independent contacts) |
| | | | | | 0 5 | | | 2 event relay outputs (independent contacts), 2 current transformer inputs, 2 digital inputs |
| | | | | | 0 6 | | | 2 event relay outputs (independent contacts), 2 current transformer inputs, RS-485 comm. |
| | | | | | 0 9 | | | RS-485 communication |
| | | | | | | 0 | | None |
| | | | | | | D | | With inspection report |
| | | | | | | Y | | With traceability certificate |
| | | | | | | | 0 | None |
| | | | | | | | A | UL-compatible model (available soon) |

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## Accessories

| Name | Qty. | Notes |
|---|---|---|
| Mounting bracket | 1 | When replacing, use model 84515488-001. |
| Gasket | 1 | When replacing, use model 84515487-001. |
| User's manual | 1 | Document No. CP-UM-5964JEC |

## Optional parts

| Name | Model No. | Notes |
|---|---|---|
| Mounting bracket | 84515488-001 | For maintenance (qty.: 1) |
| Gasket | 84515487-001 | For maintenance (qty. 20) |
| Dedicated hard cover | 84515988-001 | |
| Dedicated terminal cover | 84515888-001 | |
| Current transformer | QN206A* | 800 turns, hole diameter: 5.8 mm |
| | QN212A* | 800 turns, hole diameter: 12 mm |
| Smart Loader Package | SLP-C1FJA0 | With USB loader cable |
| | SLP-C1FJA1 | Without USB loader cable |
| USB loader cable | 81441177-001 | |
| L-shaped plug adapter | 81441057-001 | |

* Not UL-certified

## External dimensions

Unit: mm
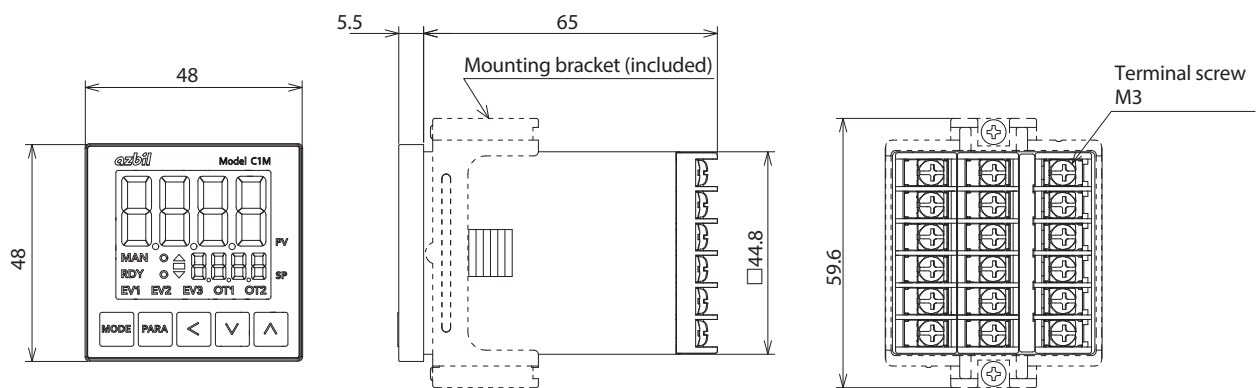


## ● Panel cutout dimensions

For a panel-mounted model, open a hole in the panel as shown below.

Unit: mm



Independent mounting                    Gang mounting
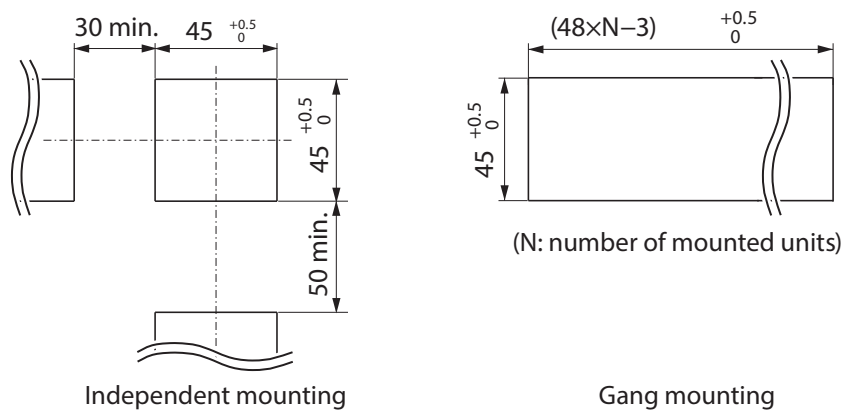
## ⚠ Handling Precautions

- When three or more units are gang mounted horizontally, the maximum allowable ambient temperature is 45 °C.
- When waterproofing and dust proofing are required, mount the units individually. If units are gang mounted, waterproofing and dust proofing performance cannot be maintained.
- Leave a space of at least 50 mm above and below this device.

# Names and Functions of Parts
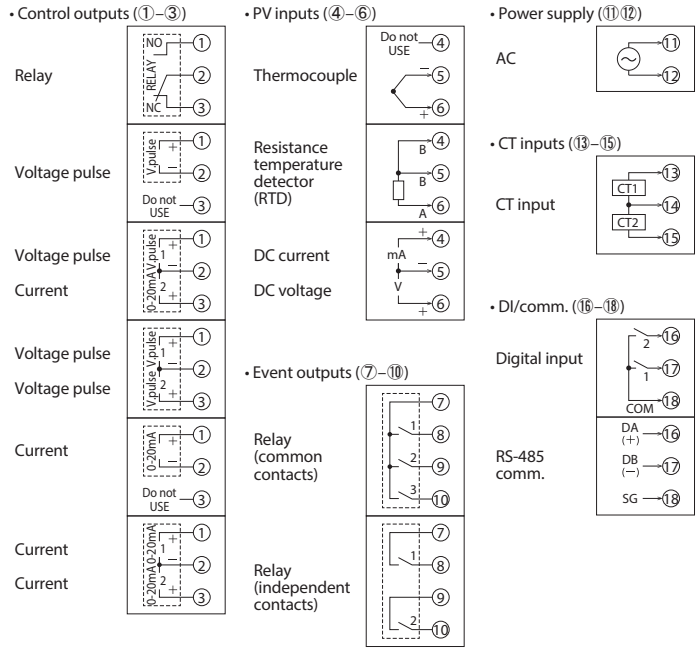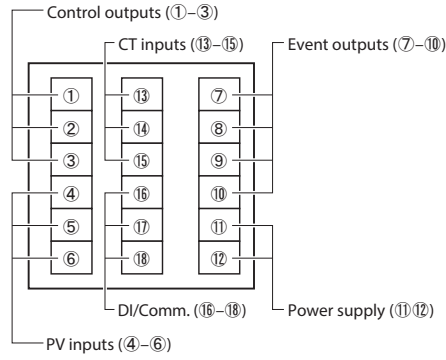
## ■ Model C1M and its console



Display

Operation panel



(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9) (10) (11)
(12)
(13)
(14)
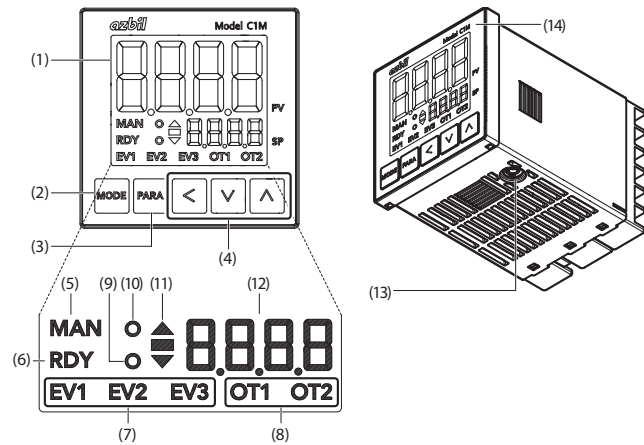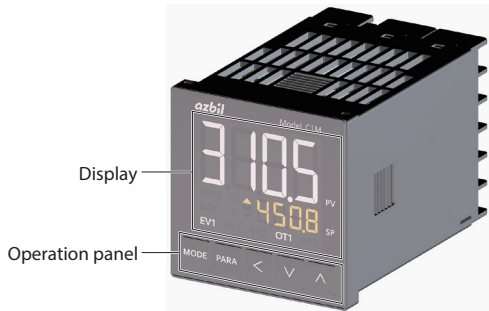
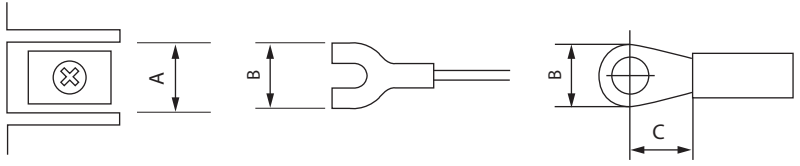| (1) | Upper display: | Shows PV (present temperature, etc.) or items that can be set. |
|---|---|---|
| (2) | [MODE] key: | Shows the operation display. If it is held down for 1 second or longer, the preset operation (initial setting: AUTO/MANUAL selection) can be executed. |
| (3) | [PARA] key: | Switches the display. |
| (4) | [<], [∨], and [∧] keys: | Used for incrementing/decrementing numeric values and shifting between digits of a number. |
| (5) | MAN mode indicator: | Lights up in MANUAL mode. |
| (6) | RDY mode indicator: | Lights up in READY (control stop) mode. |
| (7) | Event indicator: | Lights up when the corresponding event relay output is ON. |
| (8) | Control output indicator: | Lights up when the corresponding control output is ON. |
| (9) | Status indicator: | Lights up according to the setting of the status indicator (by default, not used). |
| (10) | AT indicator: | Flashes during AT execution. |
| (11) | Slope display | Shows the operation status during a step operation. |
| (12) | Lower display: | Shows the SP (set temperature, etc.) or other settings. |
| (13) | Loader connector: | Connected to the PC using the USB loader cable included with the Smart Loader Package. |
| (14) | Protective film: | Protects the surface. Remove the protective film before use. |

## ■ Terminals
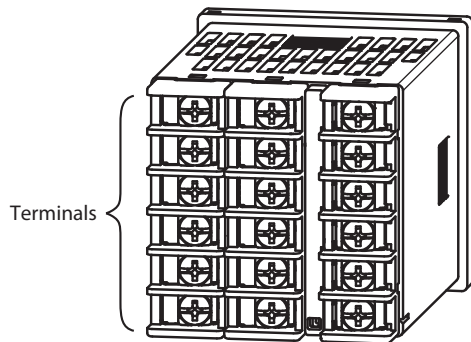


Terminals

Terminals: Used to connect the power, inputs, outputs, etc. M3 screws are used. For terminal connections, use crimp terminal lugs compatible with M3 screws.
The tightening torque of the terminal screws is 0.6 ± 0.1 N·m.

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# Terminal connections

Control outputs (①–③)
CT inputs (⑬–⑮)
Event outputs (⑦–⑩)
DI/Comm. (⑯–⑱)
Power supply (⑪⑫)
PV inputs (④–⑥)

• Control outputs (①–③)

Relay

Voltage pulse

Voltage pulse / Current

Voltage pulse / Voltage pulse

Current

Current / Current

• PV inputs (④–⑥)

Thermocouple

Resistance temperature detector (RTD)

DC current / DC voltage

• Event outputs (⑦–⑩)

Relay (common contacts)

Relay (independent contacts)

• Power supply (⑪⑫)

AC

• CT inputs (⑬–⑮)

CT input

• DI/comm. (⑯–⑱)

Digital input

RS-485 comm.

## ● Recommended crimp terminal lugs

Use crimp terminal lugs compatible with M3 screws.

| Mounting method | Compatible screw | Terminal dimensions (mm) | | | Compatible wire size | J.S.T. Mfg. Co., Ltd. Model No. (reference) |
|---|---|---|---|---|---|---|
| | | A | B | C | | |
| C1MT (for panel mounting) | M3 | 6.1 | 5.8 max. | 5.5–7.6 | 0.3–1.2 mm$^2$ 22–16 AWG | V1.25-MS3 (round terminals) V1.25 B3A (Y terminals) |

## ⚠ Handling Precautions

- If this device is installed where there is considerable vibration or shock, be sure to use round crimp terminal lugs to prevent wires from coming off the terminals.
- Be careful not to allow crimp terminal lugs to touch adjacent terminals.

## ● I/O Isolation

Items enclosed by solid lines are isolated from other signals. The presence or absence of input/output depends on the model. Thick solid lines indicate reinforced insulation.

| Power<br>DIs 1–2<br>RS-485 communication | Internal circuits | Event outputs 1–3<br>* On models with independent contacts, event outputs 1 and 2 have reinforced insulation. |
|---|---|---|
| CT inputs 1–2<br>PV input<br>Loader communication | | Control output 1 (relay) |
| | | Control outputs 1–2 (voltage pulse, current) |

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**https://www.azbil.com/products/factory/order.html**

*Specifications are subject to change without notice.*

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