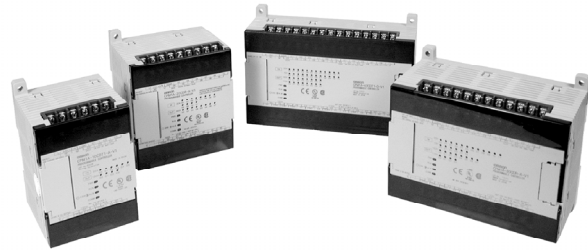


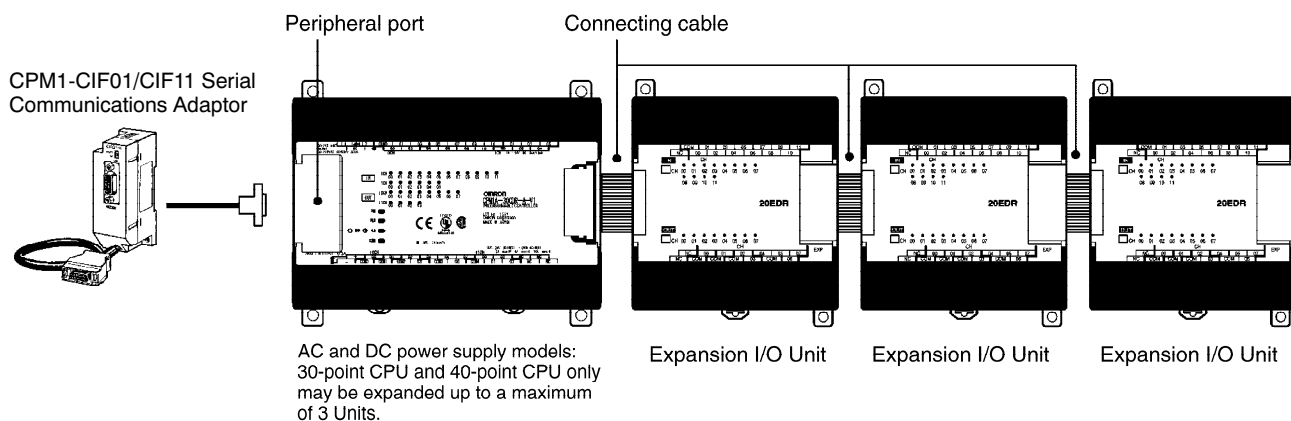
Micro Programmable Controller CPM1A

The CPM1A series micro controllers solve both basic and semi-complex applications. The brick style models include DC inputs/transistor or relay outputs to meet your design requirements. The base I/O for the CPUs ranges from 10, 20, 30, and 40 I/O points with maximum expansion to 100 I/O. Specialized expansion modules include mixed analog I/O, temperature sensor inputs and serial communications.



- 10, 20, 30 and 40 point I/O CPUs
- Expandable up to 100 I/O points
- Peripheral communications port built in
- DC input models
- Analog expansion modules available
- Temperature sensor input expansion modules available
- Auxiliary 24 VDC supply (AC type only)
- Relay or Transistor outputs
- UL, CSA, CE approvals

Basic Configuration



Ordering Information

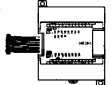
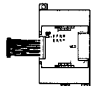
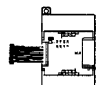
■ CPU

Stock Note: Shaded models are normally stocked.

| Number of I/O terminals | Inputs | Outputs | Power supply | Part number | | |
|-------------------------|--------------|-----------|--------------|------------------|-------------------|-------------------|
| | | | | Relay output | Transistor output | |
| | | | | | Sink type | Source type |
| 10 | 6 DC points | 4 points | AC | CPM1A-10CDR-A-V1 | CPM1A-10CDT-A-V1 | CPM1A-10CDT1-A-V1 |
| | | | DC | CPM1A-10CDR-D-V1 | CPM1A-10CDT-D-V1 | CPM1A-10CDT1-D-V1 |
| 20 | 12 DC points | 8 points | AC | CPM1A-20CDR-A-V1 | CPM1A-20CDT-A-V1 | CPM1A-20CDT1-A-V1 |
| | | | DC | CPM1A-20CDR-D-V1 | CPM1A-20CDT-D-V1 | CPM1A-20CDT1-D-V1 |
| 30 | 18 DC points | 12 points | AC | CPM1A-30CDR-A-V1 | CPM1A-30CDT-A-V1 | CPM1A-30CDT1-A-V1 |
| | | | DC | CPM1A-30CDR-D-V1 | CPM1A-30CDT-D-V1 | CPM1A-30CDT1-D-V1 |
| 40 | 24 DC points | 16 points | AC | CPM1A-40CDR-A-V1 | CPM1A-40CDT-A-V1 | CPM1A-40CDT1-A-V1 |
| | | | DC | CPM1A-40CDR-D-V1 | CPM1A-40CDT-D-V1 | CPM1A-40CDT1-D-V1 |

■ EXPANSION I/O MODULES




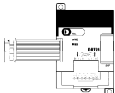

Stock Note: Shaded models are normally stocked.

| Description | Max. number of modules | Inputs | Outputs | Part number |
|---|------------------------|--------|----------------------|--------------|
| 20 I/O points 12 inputs, 8 outputs  | 3 max. (See Note.) | 24 VDC | Relays | CPM1A-20EDR1 |
| | | 24 VDC | Sinking transistors | CPM1A-20EDT |
| | | 24 VDC | Sourcing transistors | CPM1A-20EDT1 |
| 8 inputs  | 3 max. (See Note.) | 24 VDC | — | CPM1A-8ED |
| 8 outputs  | | — | Relays | CPM1A-8ER |
| | | — | Sinking transistors | CPM1A-8ET |
| | | — | Sourcing transistors | CPM1A-8ET1 |

Note: A maximum of 3 expansion modules can be used with the following CPUs: 30-point and 40-point with DC inputs.

■ DEDICATED I/O MODULES

Stock Note: Shaded models are normally stocked.

| Description | | Max. number of modules | Inputs | Outputs | Part number |
|---|--|------------------------|---|----------------------------------|---------------------|
| Analog I/O Module 2 analog inputs (2 words) 1 analog output (1 word)  | | 3 max. | 2 analog inputs | 1 analog output | CPM1A-MAD01 |
| | | | | | CPM1A-MAD11 |
| Temperature Sensor Input Modules  | Thermocouple inputs | 3 max. | 2 inputs (Types J and K) | — | CPM1A-TS001 |
| | | 1 max. (See Note.) | 4 inputs (Types J and K) | — | CPM1A-TS002 |
| | Platinum resistance thermometer inputs | 3 max. | 2 inputs (Pt100, JPt100) | — | CPM1A-TS101 |
| | | 3 max. | 2 inputs (Pt100, JPt100) | 1 analog output | CPM1A-TS101-DA |
| | | 1 max. (See Note.) | 4 inputs (Pt100, JPt100) | — | CPM1A-TS102 |
| | | 1 max. (See Note.) | 4 inputs (Pt100, JPt100) | — | CPM1A-TS102 |
| CompoBus/S I/O Link Module 8 inputs and 8 outputs  | | 3 max. | 8 bits (Inputs from the Master.) | 8 bits (Outputs to the Master.) | CPM1A-SRT21 |
| | | | Flat cable, 4-core, 0.75 mm ² ; 100 m length | | SCA1-4F10 |
| | | | Twisted pair cable, 2-core, 0.75 mm ² ; available commercially | | Belden #9409 cable |
| DeviceNet I/O Link Module 32 inputs and 32 outputs  | | 3 max. | 32 bits (Inputs from the Master.) | 32 bits (Outputs to the Master.) | CPM1A-DRT21 |
| | | | Omron connector with screws (included with DeviceNet I/O Link Module). | | XW4B-05C1-H1-D |
| | | | Omron Connector for multidrop connections using thick cables. | | XW4B-05C4-TF-D |
| Profibus-DP Slave Module 16 inputs and 16 outputs  | | 3 max. | 16 bits (Inputs from the Master.) | 16 bits (Outputs to the Master.) | CPM1A-PRT21 |
| | | | Shielded twisted pair cable, available commercially | | Belden #3079A cable |

Note: Only one CPM1A-TS002/TS102 Temperature Sensor Input Module can be connected to the CPU. If a CPM1A-TS002/102 is connected to the CPU, only one additional Special I/O Module (other than a CPM1A-TS002/102) or one Expansion I/O Module can be connected to the CPU.

■ PERIPHERAL DEVICES

Stock Note: Shaded models are normally stocked.

| Product | Description | Part number |
|---------------------|--|---------------|
| Programming console | Hand-held programming console with cable attached, 2 m length | CQM1-PRO01-E |
| | Hand-held programming console with back light (cable not included) | C200H-PRO27-E |
| Connecting cable | Connects C200H programming console to peripheral port, 2 m length | C200H-CN222 |
| | Connects C200H programming console to peripheral port, 4 m length | C200H-CN422 |


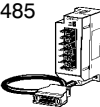
■ SUPPORT SOFTWARE

Stock Note: Shaded models are normally stocked.

| Product | Functions | Part number |
|-------------------|--|-------------------|
| CX-Programmer Jr. | Windows-based programming software; reduced instruction set and networking commands. | WS02-CXPC1-EJ-V__ |
| CX-Programmer | Full programming software package programs micro, small and larger controllers. | WS02-CXPC1-E-V__ |

■ COMMUNICATIONS ADAPTERS AND CABLES

Stock Note: Shaded models are normally stocked.

| Description | Function | Part number |
|--|--|----------------|
| RS-232C adapter  | Converts data communications from peripheral port for RS-232C devices. | CPM1-CIF01 |
| RS-232C cable | RS-232C to RS-232C; PC connection for program download; cable length 2 m | C200H-CN229-EU |
| | | CBL-202* |
| | RS-232C to RS-232C for PLC communication; cable length 2 m | C200H-CN320-EU |
| | | CBL-804* |
| Communication cable for NT31C (port B only) | 50 cm | NT31C-CN510-EU |
| | 3 m | NT31C-CN320-EU |
| | 5 m | NT31C-CN520-EU |
| RS-422/RS-485 adapter  | Converts data communications from peripheral port for RS-422/RS-485 devices. | CPM1-CIF11 |

* Available in Canada only.

■ PROGRAM TRANSFER EQUIPMENT

Stock Note: Shaded models are normally stocked.

| Product | Description | Part number |
|-----------------------|--|-------------------|
| Expansion Memory Unit | Uploads and downloads program and setup memory areas to and from the controller. | CPM1-EMU01-V1 |
| EEPROM (256 kbits) | Used with the Expansion Memory Unit | EEPROM-CPM1-EMU01 |

■ MANUALS

| Product | Description | Part number |
|--------------------|---|-------------|
| Operation manual | CPM1A programmable controllers operation manual | W317 |
| Programming manual | CPM1/CPM1A/CPM2A/CPM2C/SRM1(-V2) programming manual | W353 |

Specifications

■ GENERAL SPECIFICATIONS

| | | | | | |
|---------------------------------|------------------------------|--|--------------|--------------|--------------|
| Input type | | DC input | | | |
| CPU type | | 10-point I/O | 20-point I/O | 30-point I/O | 40-point I/O |
| Power supply voltage/frequency | AC power supply | 100 to 240 VAC, 50/60 Hz | | | |
| | DC power supply | 24 VDC | | | |
| Operating voltage range | AC power supply | 85 to 264 VAC | | | |
| | DC power supply | 20.4 to 26.4 VDC | | | |
| Power consumption | AC power supply | 30 VA max. | | 60 VA max. | |
| | DC power supply | 6 W max. | | 20 W max. | |
| Inrush current | | 30 A max. | | 60 A max. | |
| External power supply (AC only) | Power supply voltage | 24 VDC | | | |
| | Power supply output capacity | 200 mA | | 300 mA | |
| Insulation resistance | | 20 MΩ min. at 500 VDC between the AC terminals and the protective earth terminal. | | | |
| Dielectric strength | | 2,300 VAC at 50/60 Hz for one minute with a leakage current of 10 mA max. between all the external AC terminals and the protective earth terminal. | | | |
| Noise resistance | | Conforms to IEC61000-4-4, 2 kV (power lines) 1500 Vp-p, pulse width 0.1 to 1 μs, rise time: 1 ns (via noise simulation) | | | |
| Vibration resistance | | 10 to 57 Hz with an amplitude of 0.075 mm, and 57 to 150 Hz with an acceleration of 1.5 G in the X, Y, and Z directions for 10 sweeps of minutes each. | | | |
| Shock resistance | | 147 m/s ² in the X, Y and Z directions 3 times each. | | | |
| Ambient temperature | Operating | 0°C to 55°C (32°F to 131°F) | | | |
| | Storage | -20°C to 75°C (-4°F to 167°F) | | | |
| Ambient humidity | Operating | 10% to 90% RH no condensation | | | |
| Ambient environment | Operating | With no corrosive gas | | | |
| Terminal screw size | | M3 | | | |
| Power supply holding time | | 10 ms min. for AC models, and 2 ms min. for DC models | | | |
| CPU Weight | AC models | 400 g max. | 500 g max.. | 600 g max.. | 700 g max. |
| | DC models | 300 g max. | 400 g max. | 500 g max. | 600 g max. |
| Expansion Weight | | Units with 20 I/O points: | | 300 g max. | |
| | | Units with 8 output points: | | 250 g max. | |
| | | Units with 8 input points: | | 200 g max. | |
| | | MAD01 Analog I/O unit: | | 150 g max. | |
| | | MAD11 Analog I/O unit: | | 250 g max. | |
| | | Temperature sensor units: | | 250 g max. | |
| | | CompoBus/S I/O link unit: | | 200 g max. | |
| | | DeviceNet I/O link unit: | | 200 g max. | |
| | | Profibus-DP slave unit: | | 125 g | |

■ CHARACTERISTICS

| | | | | | |
|--|---------------------------|---|--|--|--|
| Input type | | DC input | | | |
| CPU type | | 10-point I/O | 20-point I/O | 30-point I/O | 40-point I/O |
| Control method | | Stored program method | | | |
| I/O control method | | Combination of the cyclic scan and immediate refresh processing methods. | | | |
| Programming language | | Ladder diagram | | | |
| Instruction word | | 1 step per instruction, 1 to 5 words per instruction | | | |
| Types of instructions | Basic instructions | 14 types | | | |
| | Special instructions | 79 types, 139 instructions | | | |
| Instruction execution time | Basic instructions | 0.72 to 16.2 μs | | | |
| | Special instructions | MOV instruction = 16.3 μs | | | |
| Program capacity | | 2,048 words | | | |
| User data memory | | 1,024 words | | | |
| Maximum I/O points | CPU only | 10 points (6 input/ 4 output points) | 20 points (12 input/ 8 output points) | 30 points (18 input/ 12 output points) | 40 points (24 input/ 16 output points) |
| | With Expansion I/O Module | — | — | Up to 90 points (54 input/ 36 output points) | Up to 100 points (60 input/ 40 output points) |
| Memory protection | | Maintains the contents of the HR, AR, Counter and Data Memory Areas. | | | |
| Memory backup | | Flash memory: User program, data memory (Read only) and PLC setup area are backed up without a battery. Super capacitor: Data memory (Read/Write), holding bits, auxiliary memory bits, counter values, error log area are backed up by a capacitor for 20-days at an ambient temperature of 25°C. | | | |
| Self-diagnostic function | | CPU error (watchdog timer), memory errors, I/O bus errors | | | |
| Program check | | No END instruction programming errors (constantly checked during operation) | | | |
| Pulse output | | 1 point: 2 kHz | | | |
| High-speed counter | | 1 point: Single phase at 5 kHz or two-phase at 2.5 kHz (linear counting method) Incremental mode: 0 to 65535 (16-bit) Decremental mode: -32767 to 32767 (16-bit) | | | |
| Quick-response inputs | | Together with the external interrupt input (minimum pulse width of 0.2 ms) | | | |
| Input time constant | | Can be set at 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, or 128 ms. | | | |
| Interrupt processing: External interrupt | | 2 points (Response time of 0.3 ms max.) | 4 points (Response time of 0.3 ms max.) | | |
| Analog settings | | 2 points: (0 to 200 BCD) | | | |

■ I/O ALLOCATION

| | | |
|--------------------------|------------|---|
| Input bits | | 00000 to 00915; words not used for input or output bits can be used for work bits. |
| Output bits | | 01000 to 01915; words not used for input or output bits can be used for work bits. |
| Work bits (IR Area) | | 512: IR 20000 to IR 23115 (IR 200 to IR 231) |
| Special bits (SR Area) | | 384: SR 23200 to SR 25515 (SR 232 to SR 255) |
| Temporary bits (TR Area) | | 8: TR 0 to TR 7 |
| Holding bits (HR Area) | | 320: HR 0000 to HR 1915 (HR 00 to HR 19) |
| Auxiliary bits (AR Area) | | 256: AR 0000 to AR 1515 (AR 00 to AR 15) |
| Link bits (LR Area) | | 256: LR 0000 to LR 1515 (LR 00 to LR 15) |
| Timers/Counters | | 128: TIM/CNT 000 to 127 100-ms timer: TIM 000 to TIM 127 10-ms timer: TIM 000 to TIM 127 Decremental counter, reversible counter |
| Data memory | Read/Write | 1,024 words (DM 0000 to DM 1023) |
| | Read only | 512 words (DM 6144 to DM 6655) |

■ I/O SPECIFICATIONS

CPU DC Input

| Item | Specifications | Circuit |
|-------------------------|--|---|
| Input voltage | 24 VDC +10%/-15% | <p>Note: The polarity of the input power supply can be either positive or negative.</p> |
| Input impedance | IN0000 to IN0002: 2 kΩ Others: 4.7 kΩ | |
| Input current (typical) | IN0000 to IN0002: 12 mA Others: 5 mA | |
| ON voltage | 14.4 VDC min. | |
| OFF voltage | 5.0 VDC max. | |
| ON delay (See Note 1) | 1 to 128 ms max. (default: 8 ms) (See Note 1) | |
| OFF delay (See Note 1) | 1 to 128 ms max. (default: 8 ms) (See Note 1) | |

- Note: 1. The actual ON/OFF delay includes an input constant of 1, 2, 4, 8, 16, 32, 64, or 128 ms (default: 8 ms).
 2. When IN0000 to IN0006 are used for the high-speed counter inputs, the delays are as shown below:

| Input | Increment mode | Differential phase mode |
|------------------|---|-------------------------|
| IN0000 (A-phase) | 5 kHz | 2.5 kHz |
| IN0001 (B-phase) | Normal input | |
| IN0002 (Z-phase) | ON: 100 μs max. OFF: 500 μs max. | |
| IN0003 to IN0006 | 0.3 ms max. (From the time of input ON until the interrupt subroutine is executed.) | |

Expansion I/O Unit

| Item | Specifications | Circuit |
|-------------------------|--|---|
| Input voltage | 24 VDC, +10%/-15% | <p>Note: The polarity of the input power supply can be either positive or negative.</p> |
| Input impedance | 4.7 kΩ | |
| Input current (typical) | 5 mA | |
| ON voltage | 14.4 VDC min. | |
| OFF voltage | 5.0 VDC max. | |
| ON delay | 1 to 128 ms max. (default: 8 ms) (See Note) | |
| OFF delay | 1 to 128 ms max. (default: 8 ms) (See Note) | |

Note: The actual ON/OFF delay includes an input constant of 1, 2, 4, 8, 16, 32, 64, or 128 ms (default: 8 ms).

■ OUTPUT SPECIFICATIONS (CPU AND EXPANSION I/O MODULES)

Relay Output

| Item | Specifications | Circuit | | |
|----------------------------|---|---|-----------------|------------------|
| Maximum switching capacity | 2 A, 250 VAC (cos φ = 1) 2 A, 24 VDC (4 A/common) | <p>Maximum 250 VAC: 2 A 24 VDC: 2 A</p> | | |
| Minimum switching capacity | 10 mA, 5 VDC | | | |
| Relay service life | Electrical | | Resistance load | 150,000 times |
| | | | Inductive load | 100,000 times |
| | Mechanical | | | 20 million times |
| ON delay | 15 ms max. | | | |
| OFF delay | 15 ms max. | | | |

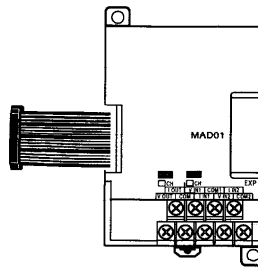
Transistor Outputs (Sinking)

| Item | Specifications | | | | | |
|-------------------------|---|----------------------------|----------------------------|----------------------------|---|---|
| | CPM1A-10CDT-□(-V1) | CPM1A-20CDT-□(-V1) | CPM1A-30CDT-□(-V1) | CPM1A-40CDT-□(-V1) | CPM1A-20EDT | CPM1A-8ET |
| Max. switching capacity | 24 VDC $+10\%/-15\%$, 0.3 A/point (See note) | | | | | 4.5 to 30 VDC 0.2 A (See note 2.) 0.3 A (See note 3.) |
| | 0.9 A/Unit | 0.9 A/common 1.8 A/Unit | 0.9 A/common 2.7 A/Unit | 0.9 A/common 3.6 A/Unit | 0.9 A/common 1.8 A/Unit | |
| Leakage current | 0.1 mA max. | | | | | |
| Residual voltage | 1.5 V max. | | | | | |
| ON delay | 0.1 ms max. | | | | | |
| OFF delay | OUT01000/01001: 0.2 ms max. (load current: 100 to 300 mA) 0.5 ms max. (load current: 5 to 100 mA) Other than OUT01000/01001: 1 ms max. (load current 5 to 300 mA) | | | | 1 ms max. (24 VDC $+10\%/-15\%$, 5 to 300 mA) | |
| Fuse | V1 CPUs: No fuse Expansion I/O Units and Pre-V1 CPUs. 1.25 A/common (cannot be replaced by the user) | | | | | |
| Circuit configuration | | | | | | |

Transistor Outputs (Sourcing)

| Item | Specifications | | | | | |
|-------------------------|---|----------------------------|----------------------------|----------------------------|--|---|
| | CPM1A-10CDT1-□(-V1) | CPM1A-20CDT1-□(-V1) | CPM1A-30CDT1-□(-V1) | CPM1A-40CDT1-□(-V1) | CPM1A-20EDT1 | CPM1A-8ET1 |
| Max. switching capacity | 24 VDC $+10\%/-15\%$, 0.3 A/point (See note) | | | | | 4.5 to 30 VDC 0.2 A (See note 2.) 0.3 A (See note 3.) |
| | 0.9 A/Unit | 0.9 A/common 1.8 A/Unit | 0.9 A/common 2.7 A/Unit | 0.9 A/common 3.6 A/Unit | 0.9 A/common 1.8 A/Unit | |
| Leakage current | 0.1 mA max. | | | | | |
| Residual voltage | 1.5 V max. | | | | | |
| ON delay | 0.1 ms max. | | | | | |
| OFF delay | OUT01000/01001: 0.2 ms max. (load current: 100 to 300 mA) 0.5 ms max. (load current: 5 to 100 mA) Other than OUT01000/01001: 1 ms max. (load current 5 to 300 mA) | | | | 1 ms max. (24 VDC $+10\%/-5\%$, 5 to 300 mA) | |
| Fuse | V1 CPUs: No fuse Expansion I/O Units and Pre-V1 CPUs. 1.25 A/common (cannot be replaced by the user) | | | | | |
| Circuit configuration | | | | | | |

Note: When using the OUT01000 or OUT01001 as a pulse output, connect dummy resistors as required to set the load current to 0.1 to 0.2 A. If the load current is below 0.1 A, the ON-to-OFF response time will become longer and high-speed pulse will not be output. On the other hand, if the load current is above 0.2 A, the transistor may generate heat and components may be damaged.

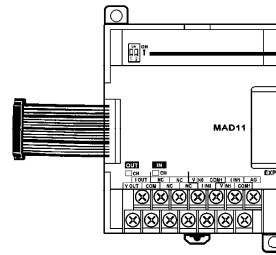


■ ANALOG I/O MODULE

CPM1A-MAD01 Specifications

| Item | | Specification | |
|--------------------------------|---|--|-------------|
| Model | | CPM1A-MAD01 | |
| I/O type | | Voltage | Current |
| Analog inputs | Number of inputs | 2 | |
| | Input signal range | 0 to 10 V or 1 to 5 V | 4 to 20 mA |
| | Maximum rated input | ±15 V | ±30 mA |
| | External input impedance | 1 MΩ min. | 250 Ω rated |
| | Resolution | 1/256 | |
| | Overall precision | 1.0% of full scale | |
| | Converted A/D data | 8-bit binary | |
| Analog output (See Note 1.) | Number of outputs | 1 | |
| | Output signal range | 0 to 10 V or -10 to 10 V | 4 to 20 mA |
| | External output max. current | 5 mA | — |
| | External output allowed load resistance | — | 350 Ω |
| | Resolution | 1/256 (1/512 when the output signal range is -10 to 10 V.) | |
| | Overall precision | 1.0% of full scale | |
| | Data setting | 8-bit binary with sign bit | |
| Conversion time (See Note 2.) | | 10 ms/Unit max. | |
| Isolation method | | Photocoupler isolation between I/O terminals and PC (There is no isolation between the analog I/O signals.) | |

- Note: 1. The voltage output and current output can be used at the same time, but the total output current cannot exceed 21 mA.
 2. The conversion time is the total time for 2 analog inputs and 1 analog output.

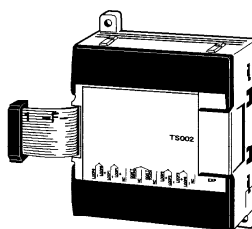


CPM1A-MAD11 Specifications

| Item | | Specification | | |
|---------------------------|---|--|--------------------------|-----------------|
| Model | | CPM1A-MAD11 | | |
| I/O type | | Voltage | Current | |
| Analog inputs | Number of inputs | 2 inputs (2 words allocated) | | |
| | Input signal range | 0 to 5 VDC, 1 to 5 VDC 0 to 10 VDC, -10 to 10 VDC | 0 to 20 mA or 4 to 20 mA | |
| | Maximum rated input | ±15 V | ±30 mA | |
| | External input impedance | 1 MΩ min. | 250 Ω | |
| | Resolution | 1/6000 (full scale) | | |
| | Overall accuracy | 25°C | 0.3% full scale | 0.4% full scale |
| | | 0 to 55°C | 0.6% full scale | 0.8% full scale |
| | Converted A/D data | 16-bit binary (4-digit hexadecimal) Full scale for -10 to 10 V: F448 to 0BB8 Hex Full scale for other ranges: 0000 to 1770 Hex | | |
| | Averaging function | Supported (Settable for individual inputs via DIP switch) | | |
| | Open-circuit detection function | Supported | | |
| Analog output | Number of outputs | 1 output (1 word allocated) | | |
| | Output signal range | 1 to 5 VDC, 0 to 10 VDC, or -10 to 10 VDC | 0 to 20 mA or 4 to 20 mA | |
| | Allowable external output load resistance | 1 kΩ min. | 600 Ω max. | |
| | External output impedance | 0.5 Ω max. | — | |
| | Resolution | 1/6000 (full scale) | | |
| | Overall accuracy | 25°C | 0.4% full scale | |
| | | 0 to 55°C | 0.8% full scale | |
| Set data (D/A conversion) | 16-bit binary (4-digit hexadecimal) Full scales for -10 to 10 V: F448 to 0BB8 Hex Full scale for other ranges: 0000 to 1770 Hex | | | |
| Conversion time | 2 ms/point (6 ms/all points) | | | |
| Isolation method | Photocoupler isolation between analog I/O terminals and internal circuits. No isolation between analog I/O signals. | | | |

■ TEMPERATURE SENSOR MODULES

By connecting a Temperature Sensor Module (CPM1A-TS001/TS002/TS101/TS101A/TS102) to the CPM1A, inputs can be received from thermocouples or temperature-resistance thermometers. Inputs converted to binary data (4-digit hexadecimal) and stored in the IR area.



Specifications

| Item | Specification | | |
|-----------------------------|---|---|---|
| Model | CPM1A-TS001/TS002 | CPM1A-TS101/TS102 | CPM1A-TS101-DA |
| Number of inputs | TS001: 2; TS002: 4 | TS101: 2; TS102: 4 | 2 |
| Input types (See Note 1) | Thermocouple types K or J, selectable | Platinum resistance thermometer types Pt100 and JPt100, selectable | |
| Input resolution | 0.1°C in 2's complement format | | |
| Input accuracy | ±0.5% or ±2% of the stored value whichever is larger ±1 digit max. (See Note 2) | ±0.5% or ±1% of the stored value whichever is larger ±1 digit max. (See Note 2) | 1.0% max. full scale |
| Number of outputs | None | None | 1 |
| Output types | — | — | Voltage or current output |
| Output resolution | — | — | 1/256 (0 to 10 V) 1/512 (-10 to +10 V) 1/256 (4 to 20 mA) |
| Output accuracy | — | — | 1.0% max. full scale |
| Conversion cycle | 250 ms for all points | | 60 ms max. for all points |
| Converted temperature data | Binary data (4-digit hexadecimal) | | Binary data (8-digit hexadecimal) |
| Isolation method | Photocoupler isolation between I/O terminals and the PLC | | |

Note: 1. The same input type must be used for all inputs.

2. Accuracy for K thermocouples at temperatures less than -100°C: ±4°C ± 1 digit max.

Input Temperature Ranges for CPM1A-TS001/TS002

The rotary switch can be used to make of the following range and input type settings for CPM1A-TS001/002 models.

| Thermocouple input | Range (°C) | Range (°F) |
|--------------------|--------------|--------------|
| Type K | -200 to 1300 | -300 to 2300 |
| | 0.0 to 500.0 | 0.0 to 900.0 |
| Type J | -100 to 850 | -100 to 1500 |
| | 0.0 to 400.0 | 0.0 to 750.0 |

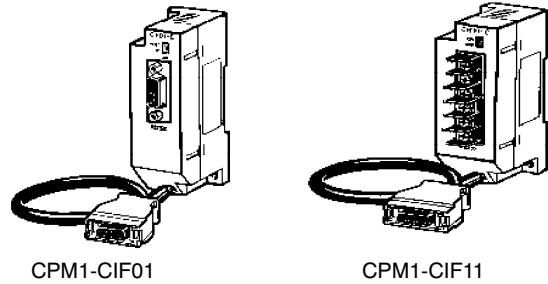
Input Temperature Ranges for CPM1A-TS101/TS101DA/TS102

The rotary switch can be used to make of the following range and input type settings for CPM1A-TS101/102 models.

| Platinum RTD input | Range (°C) | Range (°F) |
|--------------------|-----------------|----------------|
| Pt100 | -200.0 to 650.0 | -300 to 1200.0 |
| JPt100 | -200.0 to 650.0 | -300 to 1200.0 |

■ COMMUNICATIONS ADAPTER

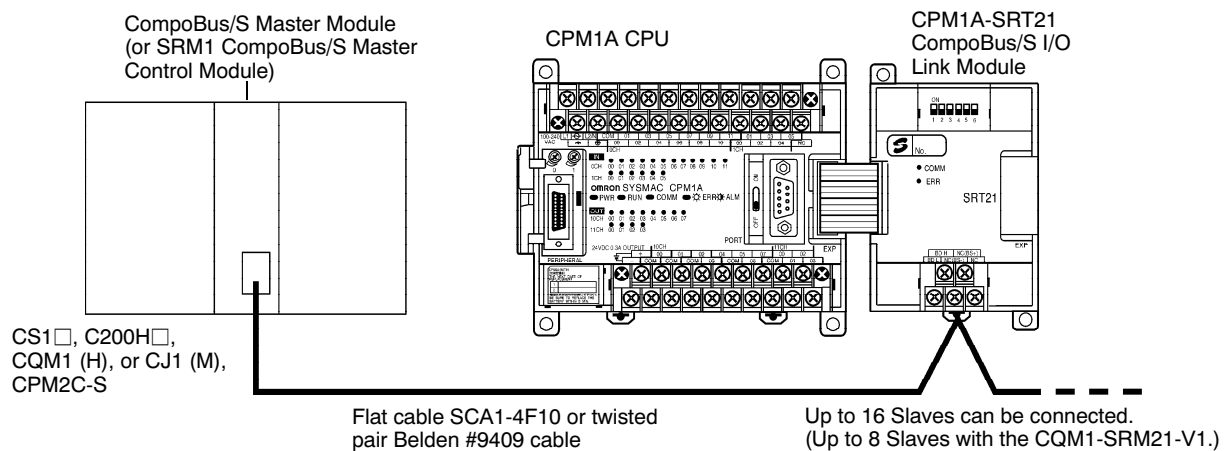
RS-232C Adapter and RS-422 Adapter



| | | | | |
|----------------------|---|--------------------------------------|--|-------------------------------|
| Model | CPM1-CIF01 | | CPM1-CIF11 | |
| Functions | Level conversion between the CMOS level (CPU side) and the RS-232C (peripheral device side) | | Level conversion between the CMOS level (CPU side) and the RS-422 (peripheral device side) | |
| Insulation | The RS-232C (peripheral device side) is insulated by a DC/DC converter and photocoupler. | | The RS-422 (peripheral device side) is insulated by a DC/DC converter and photocoupler. | |
| Power supply | Power is supplied by the CPU. | | | |
| Power consumption | 0.3 A max. | | | |
| Transmission speed | 38.4 kbits/s max. | | | |
| Vibration resistance | 10 to 57 Hz with an amplitude of 0.075 mm, and 57 to 150 Hz with an acceleration of 1 G in the X, Y and Z directions for 80 minutes each (i.e. for 8 minutes each, 10 times). | | | |
| Shock resistance | 1.5 G in the X, Y and Z directions 3 times each. | | | |
| Ambient temperature | Operating | 0°C to 55°C (32°F to 131°F) | | 0°C to 55°C (32°F to 131°F) |
| | Storage | -20°C to 75°C (-4°F to 167°F) | | -20°C to 75°C (-4°F to 167°F) |
| Ambient humidity | Operating | 10% to 90% RH (with no condensation) | | |
| Ambient environment | Operating | With no corrosive gas | | |
| Weight | 200 g max. | | | |

■ COMPOBUS/S I/O LINK MODULE

The CPM1A controller can function as a Slave to a CompoBus/S Master Module (or SRM1 CompoBus/S Master Control Module) when a CPM1A-SRT21 CompoBus/S I/O Link Module is connected. The CompoBus/S I/O Link Module establishes an I/O link of 8 inputs and 8 outputs between the Master Module and the CPM1A. Up to 3 Expansion I/O Modules or Expansion Modules can be connected to a CPM1A CPU.



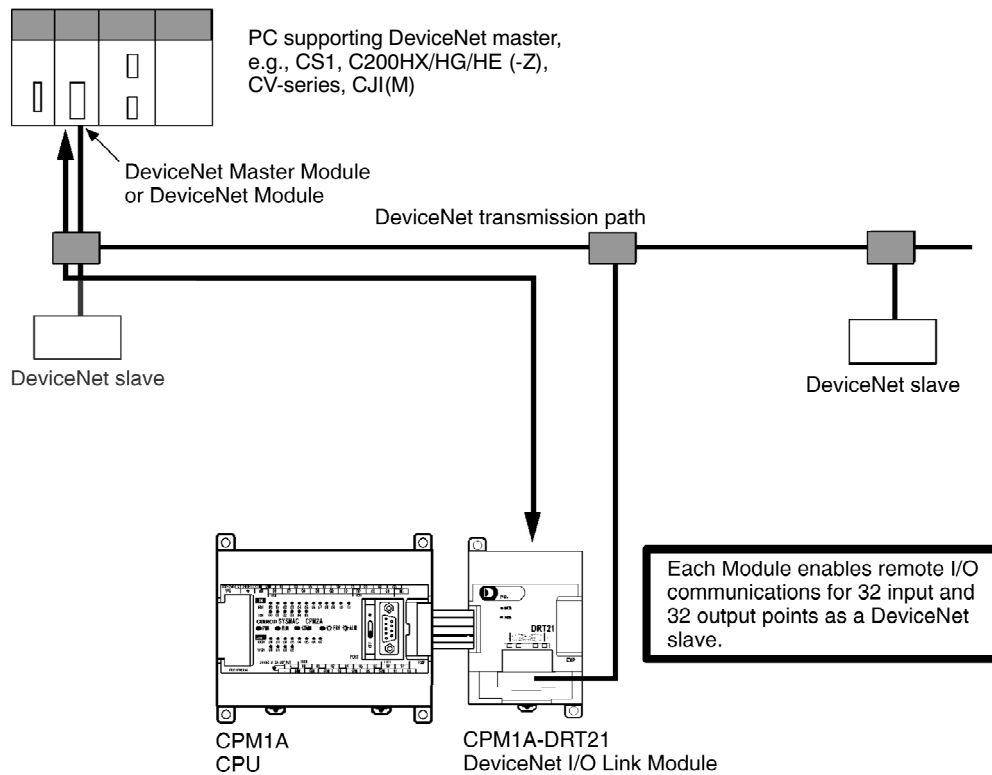
Specifications

| | |
|--|---|
| Model | CPM1A-SRT21 |
| Master/Slave | CompoBus/S Slave |
| Number of I/O bits | 8 input bits, 8 output bits |
| Number of words occupied in CPM2A I/O memory | 1 input word, 1 output word (Allocated in the same way as other Expansion I/O Modules or Expansion Modules) |
| Node number setting | Set using the DIP switch. |

Note: See the CompoBus/S section of Omron's *Remote I/O and Wiring Solutions Catalog (GC RIO1)* for more details on CompoBus/S communications.

■ DEVICENET I/O LINK MODULE

The CPM1A controller can function as slaves to a DeviceNet Master when a DeviceNet I/O Link Module is connected. The DeviceNet I/O Link Module establishes an I/O link of 32 inputs and 32 outputs between the master and the controller. A maximum of 3 DeviceNet I/O Link Modules can be connected to a CPM1A to create I/O Links for up to 192 points (96 inputs and 96 outputs).

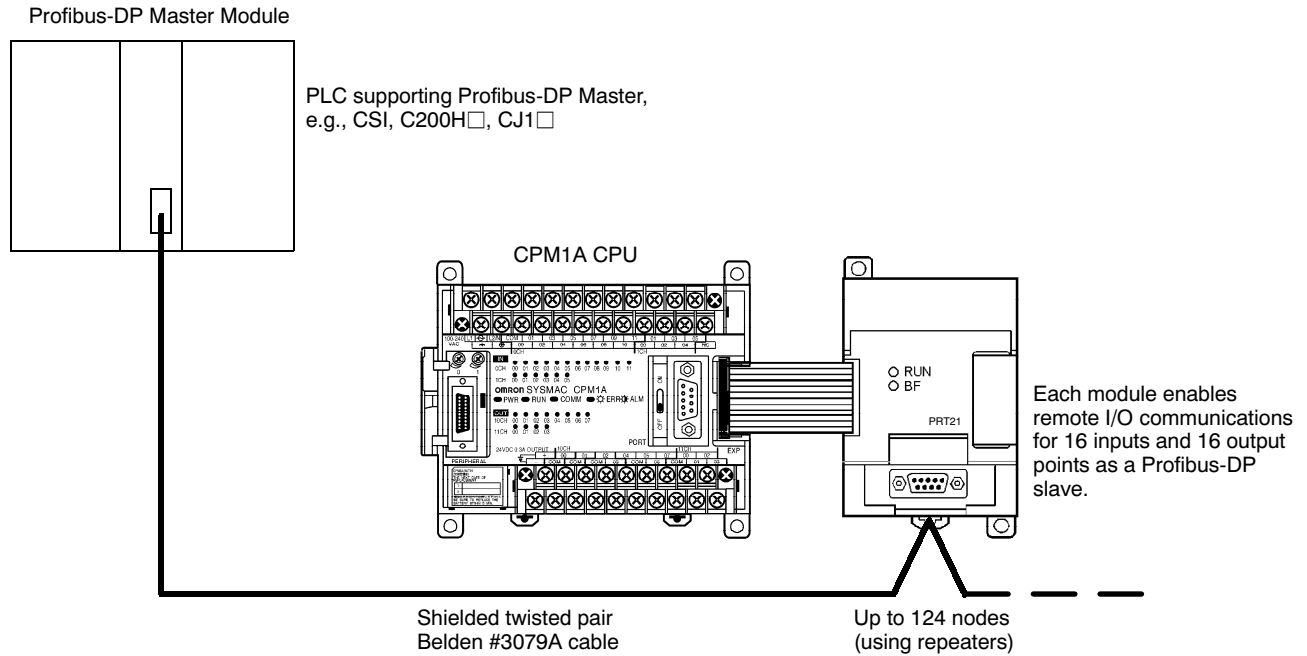


Specifications

| Item | Specification |
|--|---|
| Model number | CPM1A-DRT21 |
| Master/slave | DeviceNet Slave |
| Number of I/O points | 32 input points, 32 output points |
| Number of words allocated in CPU Unit I/O memory | 2 input words, 2 output words (Allocated in the same way as Expansion I/O Units and other Expansion Units) |
| Node number setting | Set using the rotary switches (Set before turning ON the CPU's power supply.) |

■ PROFIBUS-DP SLAVE MODULE

The CPM1A-V1 controller can function as a slave to a Profibus-DP Master Module when a CMP1A-PRT Profibus-DP Slave Module is connected. The Profibus-DP Slave Module establishes an I/O link of 16 inputs and 16 outputs between the master and the controller. A maximum of 3 Profibus-DP Slave Modules can be connected to a CPM1A or CPM2A to create I/O links for up to 96 points (48 inputs and 48 outputs).



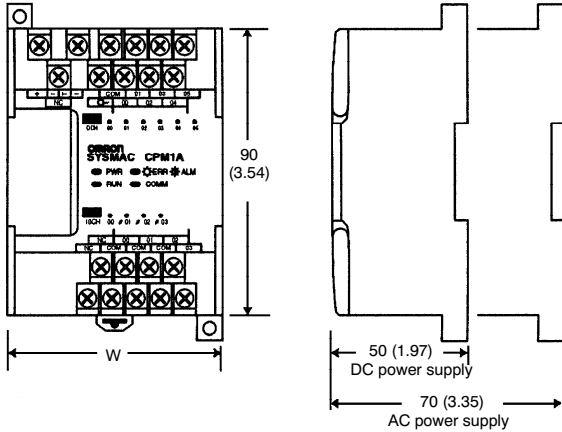
Specifications

| | |
|---------------------|-------------------------------|
| Storage temperature | -20 to +75°C |
| Ambient temperature | 0 to +55°C |
| Ambient humidity | 10 to 90% (non-condensing) |
| EMC compliance | EN 50081-2, EN 61131-2 |
| Current consumption | 100 mA from the PLC I/O bus |
| Weight | 125 g (typical) |
| Control data | From CPU to unit: none |
| Status data | From unit to CPU: none |
| I/O data (in bytes) | 2 bytes input, 2 bytes output |

Dimensions

Unit: mm (inch)

■ CPU, EXPANSION I/O AND SPECIAL I/O MODULES

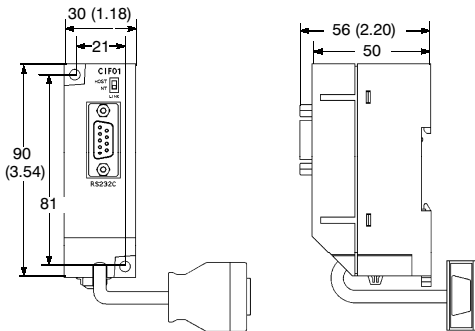


| Model | W |
|--------------------|------------|
| CPM1A-10CD□-A/D-V1 | 66 (2.60) |
| CPM1A-20CD□-A/D-V1 | 86 (3.39) |
| CPM1A-30CD□-A/D-V1 | 130 (5.12) |
| CPM1A-40CD□-A/D-V1 | 150 (5.91) |
| CPM1A-20ED□ | 86 (3.39) |
| CPM1A-8E□ | 66 (2.60) |
| CPM1A-SRT21 | 66 (2.60) |
| CPM1A-MAD01 | 66 (2.60) |
| CPM1A-TS□□□ | 86 (3.39) |
| CPM1A-MAD11 | 86 (3.39) |
| CPM1A-DRT21 | 66 (2.60) |
| CPM1A-PRT21 | 66 (2.60) |

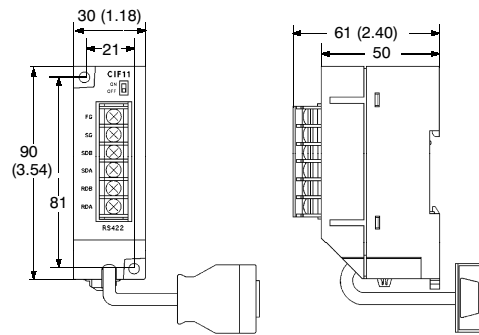
Unit: mm (inch)

■ COMMUNICATION ADAPTER MODULES

CPM1-CIF01

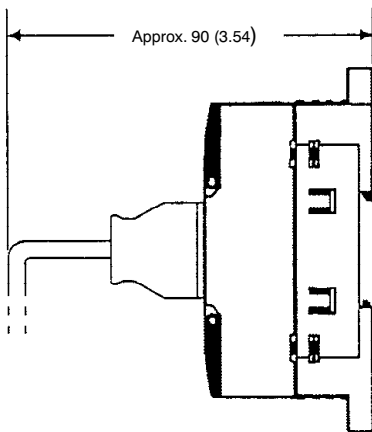


CPM1-CIF11

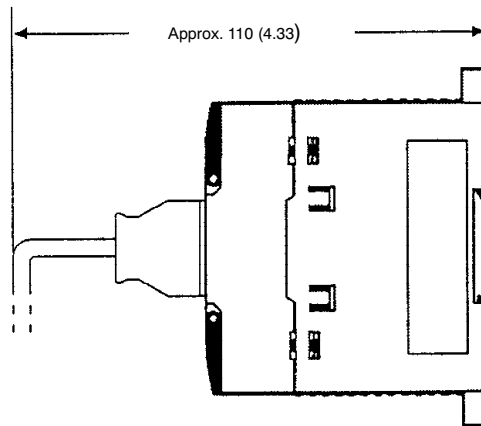


■ DIMENSIONS WITH PERIPHERAL DEVICES ATTACHED

CPU with DC Power Supply



CPU with AC Power Supply



Functions

■ CONFIGURATION

The CPM1A CPUs feature a compact, one-piece construction that includes 10, 20, 30 or 40 built-in I/O terminals. Three output models are available: Relay outputs, sinking (NPN) transistor output and sourcing (PNP) transistor output.

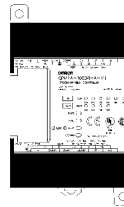
Expansion

Up to three Expansion I/O Modules can be connected to a 30-point or 40-point CPU to add an extra 8 or 20 I/O points for each, for a maximum of up to 100 I/O points.

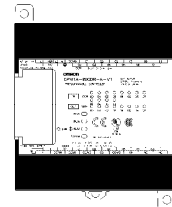
Dedicated I/O Modules

Up to 3 Analog I/O Modules or Temperature Sensor Input Modules can be used with 30-point and 40-point CPUs. Each analog I/O module provides 2 analog inputs and 1 analog output, so a maximum of 6 analog inputs and 3 analog outputs can be achieved by connecting 3 Analog I/O Modules. Each Temperature Sensor Module provides two temperature sensor inputs from either thermocouples or platinum resistance thermometers. Up to 6 inputs can be connected.

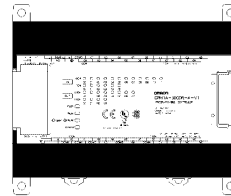
CPM1A-10CD□-□-V1
(10 I/O terminals)



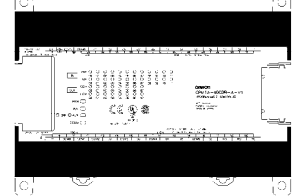
CPM1A-20CD□-□-V1
(20 I/O terminals)



CPM1A-30CD□-□-V1
(30 I/O terminals)



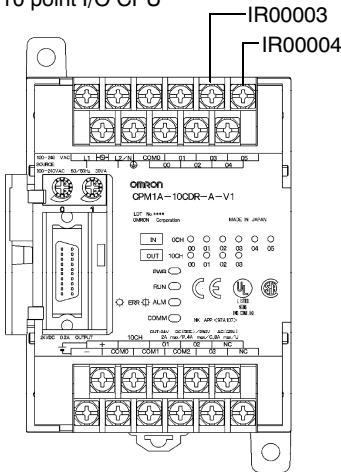
CPM1A-40CD□-□-V1
(40 I/O terminals)



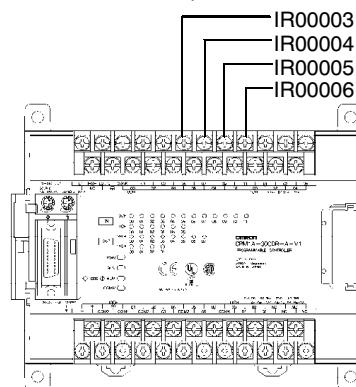
■ INTERRUPT INPUTS

There are two input interrupts in the CPM1A 10-point I/O CPU and four in the 20-, 30-, and 40-point I/O CPUs. Input interrupts are available in two modes. In addition to normal interrupt inputs, the CPM1A has a counter mode that counts high-speed input signals and triggers interrupts at fixed count multiples.

10 point I/O CPU



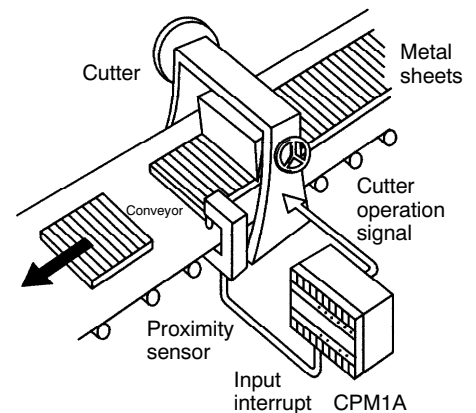
20, 30, and 40 point I/O CPU



Application Example:

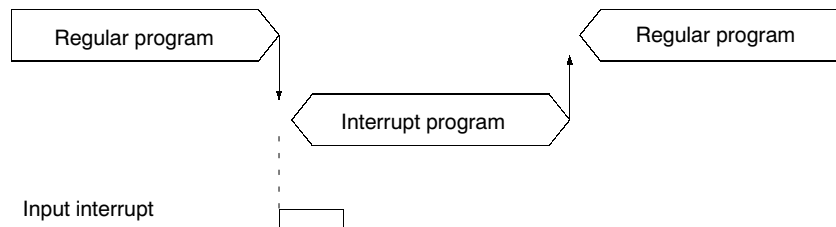
Cutting Metal Sheets to Specified Lengths

The proximity sensor detects the edge of a metal plate to operate the cutter. Metal sheets can be cut continuously to the specified lengths at a high speed.



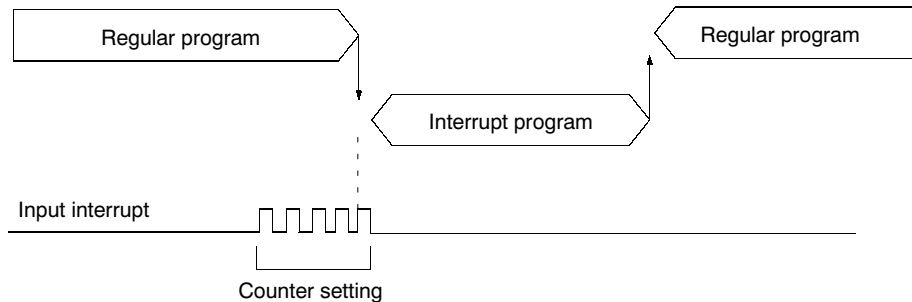
Input Interrupt Mode

If an input interrupt occurs, the regular program shuts down irrelevant of the cycle time, and the interrupt processing program is executed immediately.



Counter Mode

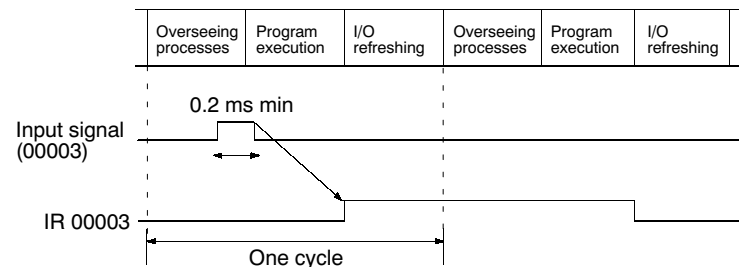
When the number of external signals counted at high speed reaches a specified number of counts, the regular program shuts down, and the interrupt processing program is executed at fixed counts. The count can be set between 0 and 65535.



■ QUICK-RESPONSE INPUTS

Quick-response inputs can detect input signals with a pulse width as short as 0.2 ms regardless of their timing during the scan cycle. Quick-response inputs and interrupt inputs use the same input terminals.

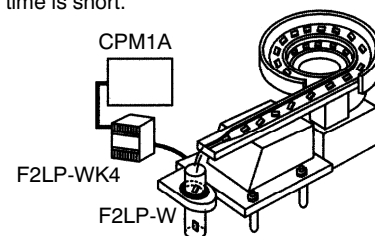
| CPU | Input no. | Minimum input pulse width |
|--------------------------------------|----------------|---------------------------|
| 10 point I/O CPU | 00003 to 00004 | 0.2 ms |
| 20 point, 30 point, 40 point I/O CPU | 00003 to 00006 | |



Application Example:

Calculating the Number of Chips

The metal sensor counts the number of parts that have passed. Steady counting can be achieved even when the input-ON time is short.

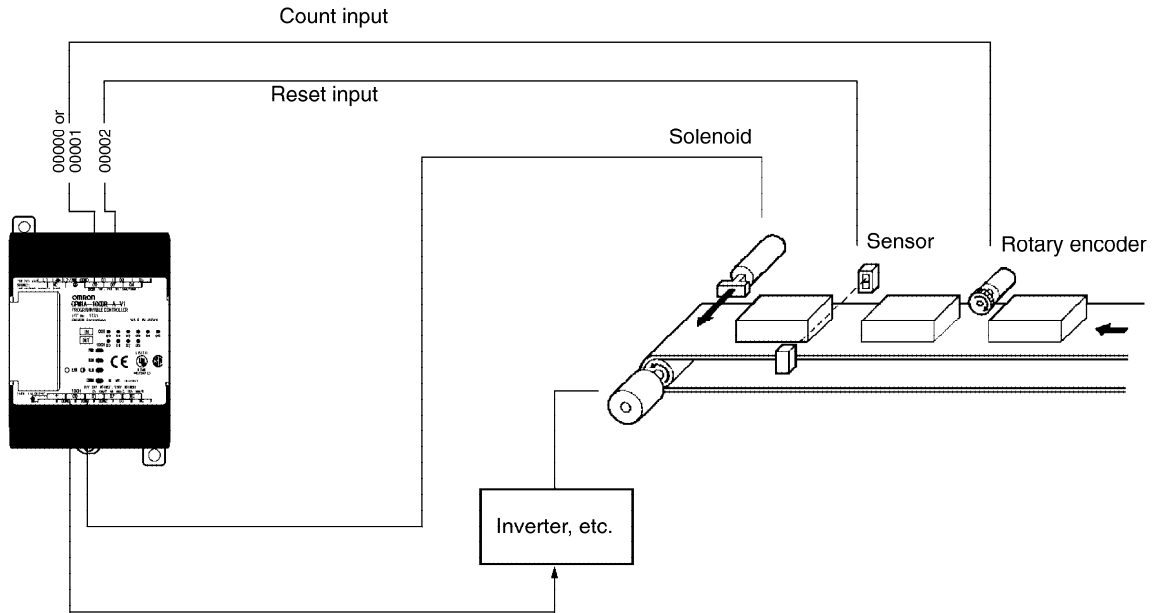


■ HIGH-SPEED COUNTER

The CPM1A has a high-speed counter function that can be used in the incrementing and up/down mode. Using this function together with the input interrupts enables zone comparison control or target value control irrelevant of the cycle time.

| Counting mode | Incrementing mode | Up/Down mode | |
|-----------------|--------------------|-----------------------------|---------------|
| Input no. | 00000 | Count input | A-phase input |
| | 00001 | — | B-phase input |
| | 00002 | Reset input | Z-phase input |
| Input method | Single-phase input | Phase-difference, 4× inputs | |
| Count frequency | 5.0 kHz | 2.5 kHz | |
| Count range | 0 to 65535 | -32767 to 32767 | |

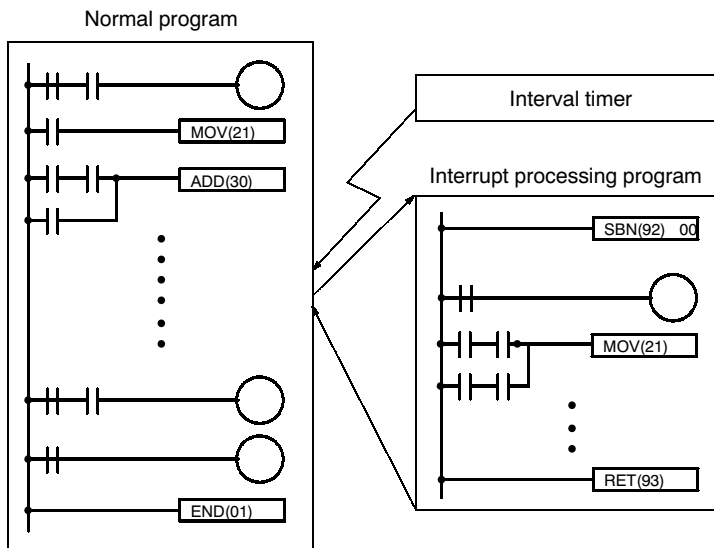
Note: When using in the incrementing mode, the input 00001 can be used as an input contact.



■ INTERVAL TIMER INTERRUPTS

The CPM1A has one interval timer. The interval timer shuts down the regular program regardless of the point in the cycle once the time is up, and immediately executes an interrupt processing program. Interval timers are used in the following two modes.

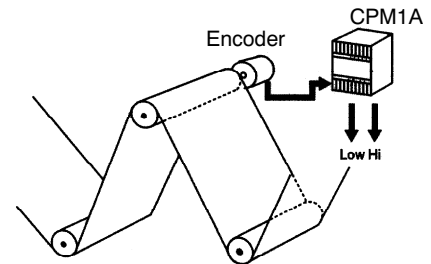
| Item | One-shot mode | Scheduled interrupt mode |
|--------------|---|--|
| Operation | An interrupt is executed only once when the time is up. | Interrupts are executed repeatedly at fixed periods. |
| Setting time | 0.5 ms to 319,968 ms (0.1-ms units) | |



Application Example:

Computing the Sheet Speed

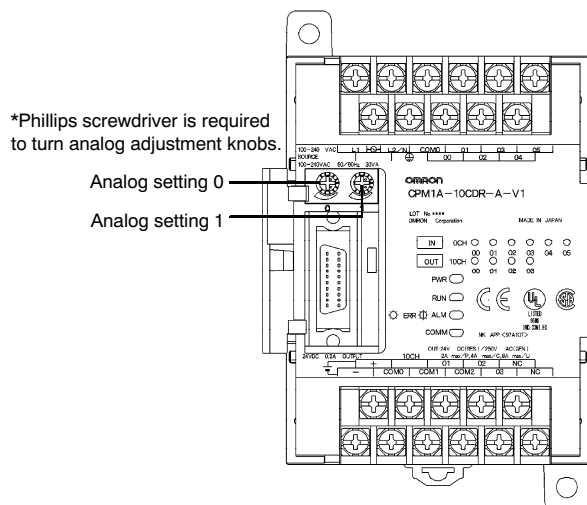
The number of pulse inputs is computed in the interrupt mode at a fixed time to calculate the speed.



■ ANALOG SETTING

The CPM1A contains two analog setting controls that can be used for a broad range of analog timer and counter settings. Turning the setting control stores values of 0 to 200 (BCD data) in the SR area.

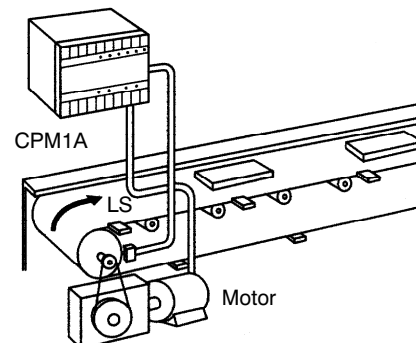
| Analog setting | Storage area | Setting value (BCD) |
|------------------|--------------|---------------------|
| Analog setting 0 | SR 250 | 0000 to 0200 |
| Analog setting 1 | SR 251 | |



Application Example:

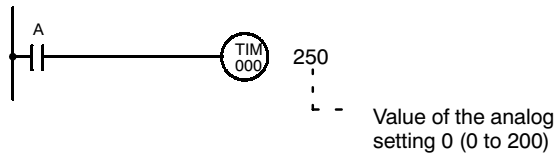
Tact Operation Control of Conveyor Lines

A conveyor can be stopped temporarily as required for assembly processes. When the timer function and limit switches are used in a combination, conveyors can be stopped for a fixed time or can be run at a constant speed for a fixed distance. Fine adjustment of the stopping time can be easily done by using the analog setting controls.

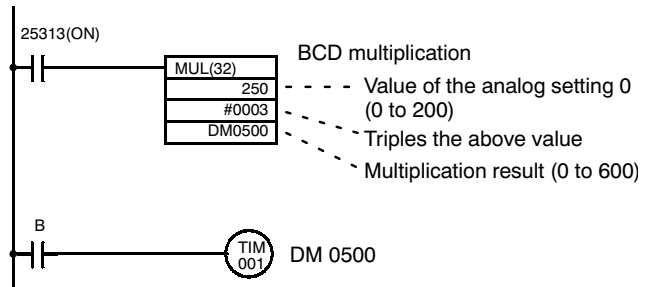


Program Example

1. Analog timer for 0.0 to 20.0 seconds



2. Analog timer for 0.0 to 60.0 seconds



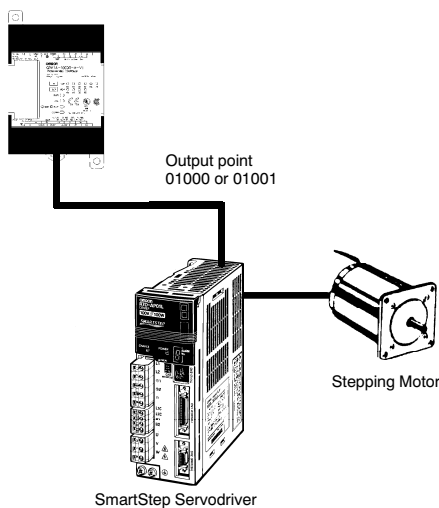
PULSE OUTPUT FUNCTION

The CPM1A transistor output models have an output function capable of outputting a pulse of 20 Hz to 2 kHz (single-phase output).

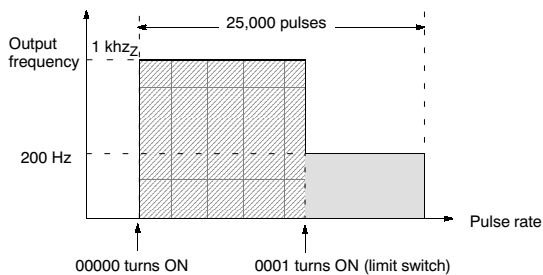
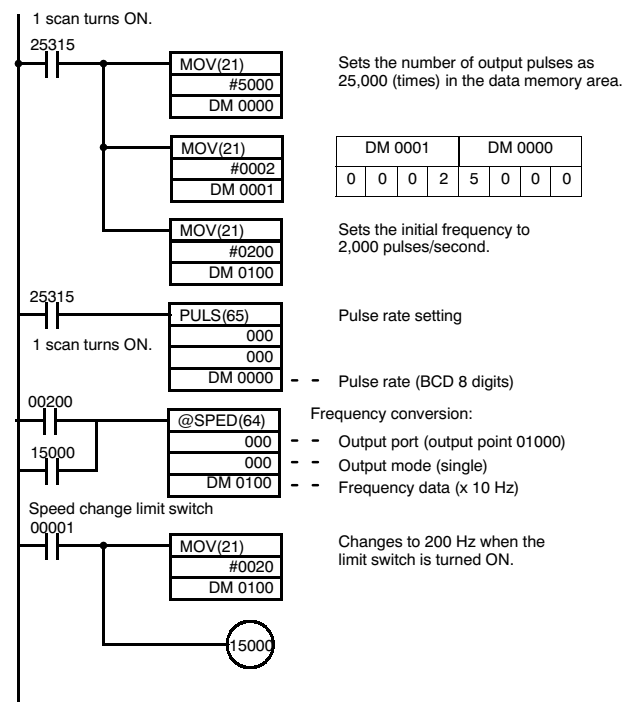
When used in combination with a Stepping Driver or SmartStep Servodriver, positioning can be easily performed.

Application Example

Changing the speed of the Stepping Motor.



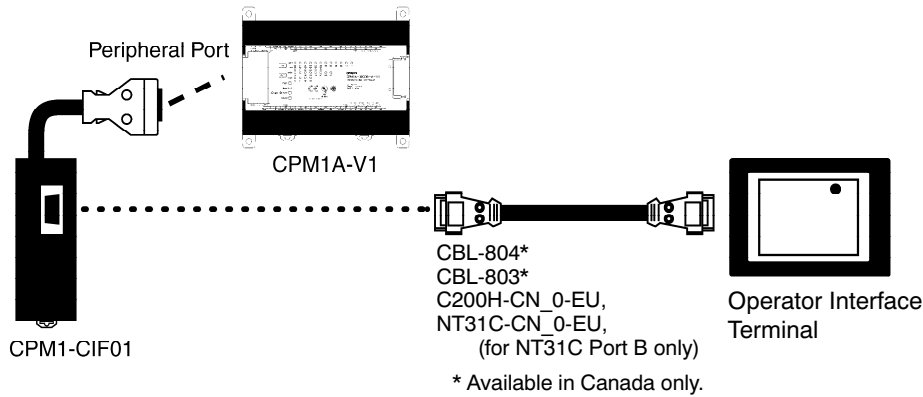
Program Example



Communications

■ NT LINK FOR PROGRAMMABLE TERMINALS

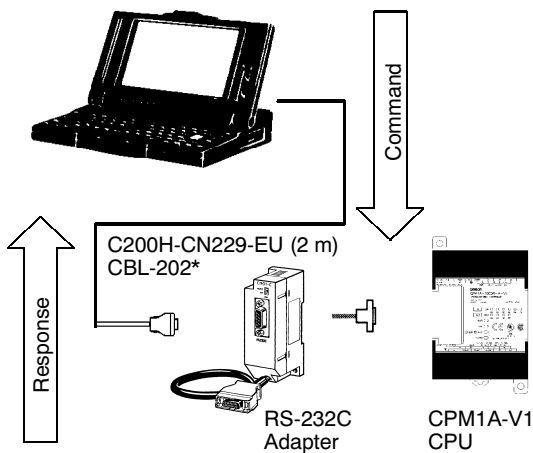
Use Omron's high-speed NT Link for real-time communications between the CPM1A and a Programmable Terminal.



■ HOST LINK COMMUNICATIONS

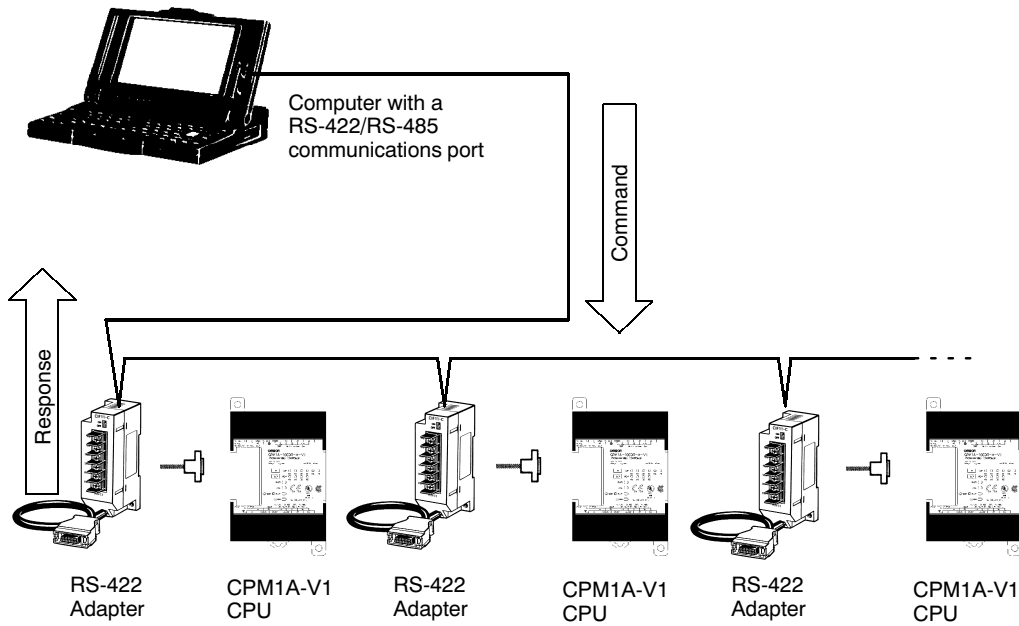
CPM1A Host Link communications consist of interactive procedures whereby the CPM1A returns a response to a command sent from the IBM PC/AT or compatible computer. These communications allow the IBM PC/AT or compatible computer to read and write in the CPM1A's I/O Areas and Data Memory Areas as well as in areas containing the status of various settings.

1:1 Host Link Communications



* Available in Canada only.

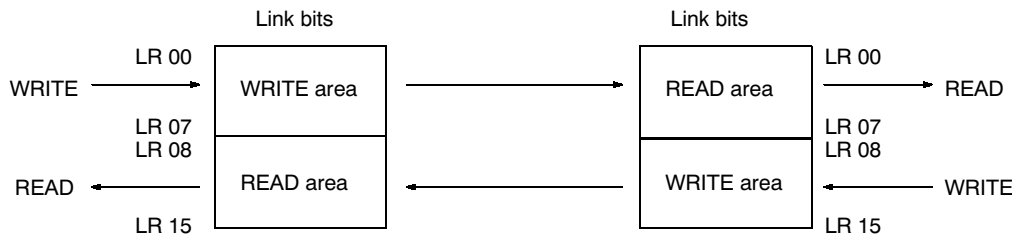
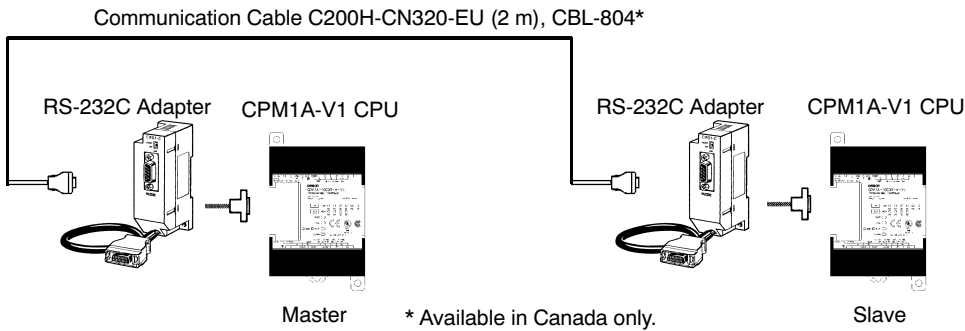
1:N Host Link Communications



1:1 CONNECTIONS FOR DATA EXCHANGE

With a 1:1 Link, two CPM1As or a CPM1A and CQM1 or C200H□ are connected 1:1 with one side as the Master and the other as the Slave to provide an I/O link of a maximum of 256 points (LR 0000 to LR 1515).

Example of a 1:1 Link between CPM1As

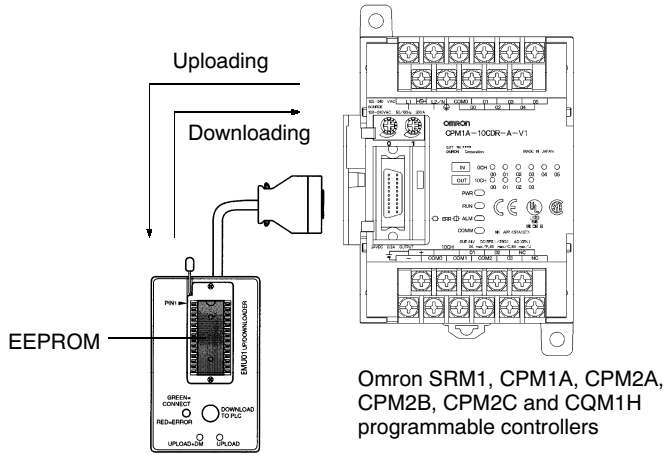


Limitations of the CPM1A 1:1 Link

CPM1A I/O links are limited to 16 words (LR 00 to LR 15). Therefore, use these 16 words (LR 00 to LR 15) on the CQM1 or C200H□ side when forming 1:1 links with a CQM1 or C200H□.

■ PROGRAM TRANSFER UNIT

Use Omron's EEPROM program transfer unit to update programs in machines or program multiple controllers with the same program. The CPM1-EMU01-V1 Expansion Memory Unit connects to the peripheral port of micro and small PLCs.



Certain Terms and Conditions of Sale

1. **Offer; Acceptance.** These terms and conditions (these "Terms") are deemed part of all catalogs, manuals or other documents, whether electronic or in writing, relating to the sale of goods or services (collectively, the "Goods") by Omron Electronics LLC and its subsidiary companies ("Seller"). Seller hereby objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms. Please contact your Omron representative to confirm any additional terms for sales from your Omron company.
2. **Prices.** All prices stated are current, subject to change without notice by Seller. Buyer agrees to pay the price in effect at time of shipment.
3. **Discounts.** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Seller's payment terms and (ii) Buyer has no past due amounts owing to Seller.
4. **Orders.** Seller will accept no order less than \$200 net billing.
5. **Governmental Approvals.** Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Goods.
6. **Taxes.** All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Seller or required to be collected directly or indirectly by Seller for the manufacture, production, sale, delivery, importation, consumption or use of the Goods sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Seller.
7. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Seller, Seller reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Seller may (without liability and in addition to other remedies) cancel any unshipped portion of Goods sold hereunder and stop any Goods in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
8. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Seller fully against all costs or expenses arising in connection therewith.
9. **Force Majeure.** Seller shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
10. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Seller:
 - a. Shipments shall be by a carrier selected by Seller;
 - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
 - c. All sales and shipments of Goods shall be FOB shipping point (unless otherwise stated in writing by Seller), at which point title to and all risk of loss of the Goods shall pass from Seller to Buyer, provided that Seller shall retain a security interest in the Goods until the full purchase price is paid by Buyer;
 - d. Delivery and shipping dates are estimates only.
 - e. Seller will package Goods as it deems proper for protection against normal handling and extra charges apply to special conditions.
11. **Claims.** Any claim by Buyer against Seller for shortage or damage to the Goods occurring before delivery to the carrier must be presented in writing to Seller within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Goods from Seller in the condition claimed.
12. **Warranties.** (a) **Exclusive Warranty.** Seller's exclusive warranty is that the Goods will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Seller (or such other period expressed in writing by Seller). Seller disclaims all other warranties, express or implied. (b) **Limitations.** SELLER MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE GOODS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE GOODS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Seller further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Goods or otherwise of any intellectual property right. (c) **Buyer Remedy.** Seller's sole obligation hereunder shall be to replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Good or, at Seller's election, to repay or credit Buyer an amount equal to the purchase price of the Good; provided that in no event shall Seller be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Goods unless Seller's analysis confirms that the Goods were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any goods by Buyer must be approved in writing by Seller before shipment. Seller shall not be liable for the suitability or unsuitability or the results from the use of Goods in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.
13. **Damage Limits; Etc.** SELLER SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE GOODS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Seller exceed the individual price of the Good on which liability is asserted.
14. **Indemnities.** Buyer shall indemnify and hold harmless Seller, its affiliates and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Seller is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Goods. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Seller and defend or settle any action brought against Seller to the extent that it is based on a claim that any Good made to Buyer specifications infringed intellectual property rights of another party.
15. **Property; Confidentiality.** The intellectual property embodied in the Goods is the exclusive property of Seller and its affiliates and Buyer shall not attempt to duplicate it in any way without the written permission of Seller. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Seller. All information and materials supplied by Seller to Buyer relating to the Goods are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
16. **Miscellaneous.** (a) **Waiver.** No failure or delay by Seller in exercising any right and no course of dealing between Buyer and Seller shall operate as a waiver of rights by Seller. (b) **Assignment.** Buyer may not assign its rights hereunder without Seller's written consent. (c) **Amendment.** These Terms constitute the entire agreement between Buyer and Seller relating to the Goods, and no provision may be changed or waived unless in writing signed by the parties. (d) **Severability.** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (e) **Setoff.** Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (f) As used herein, "including" means "including without limitation".

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