Coolmay®

MX2N HMI PLC All-In-One User Manual

Thank you for using Coolmay HMI PLC all-in-one. This manual mainly introduces the product characteristics, specifications and wiring methods. More details, please refer to “Coolmay MX2N HMI PLC All-In-One Programming Manual”. HMI details please refer to “Coolmay HMI Programming Manual”.

Main features:
1. MX2N series is the first choice for small and medium-sized automation, with multifunctional, stable performance, convenient maintenance, safe and reliable.
2. Max support 6 analog inputs and 2 analog outputs, 12-bit precision. Analogs can directly read by registers and for other output.
3. Supports multi-channel high-speed counting and high-speed pulse.
   Usually high-speed counting supports 6 channels of single-phase 10KHz or 2 channels of AB phase 10KHz, and can be customized as 6 channels of single-phase counting 6 channels of 60KHz and 2 channels of 10KHz or 2 channels of AB phase 60KHz. And high-speed pulse is 4 channels of 10KHz and can be customized as 2 channels of 200KHz and 2 channels of 100KHz.
4. The touch panel has no operating system with fast boot speed. The performance is equivalent to Coolmay MT30 series HMI.
5. The HMI and PLC can be encrypted separately. PLC password with 12345678 can completely prohibit program reading, and cannot make the clock data. (Note: PLC only supports 8-bit password encryption).
6. Supports external interruption and watchdog function. Digital display device option is functional. MX2N-701B can select 1 channel to load cell (accuracy is 24 bits) or a CAN communication port.
7. Applies space 3.8mm pluggable terminal, which is convenient for wiring.
8. PLC is compatible with Mitsubishi programming software. HMI uses CoolmayHMI programming software.

Product Details

- **Niming rules**
  - MX2N - 70M + 24 - M: RT-4AD 20A - Y1 - G1 - C1 - 1P + 485P / 232N

  1. Product series
  2. HMI type
  3. Digital points
  4. Digital outputs (DO) type
  5. Analog input (AI) points
  6. Analog outputs (AO) quantity
  7. AD type
  8. Analog outputs (DA) quantity
  9. Terminal
  10. Software solution
  11. Service life

- **Basic parameters**

<table>
<thead>
<tr>
<th>Model</th>
<th>AO</th>
<th>DO</th>
<th>DA</th>
<th>Terminal model</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX2N-43HB-24M</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>1P, 1P (RS485)</td>
</tr>
<tr>
<td>MX2N-70HB-16L</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>MX2N-70HB-24L</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
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<tr>
<td>MX2N-70HB-38H</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>MX2N-70HB-44M</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>MX2N-43HB - MT</td>
<td>8</td>
<td>8</td>
<td>8</td>
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</tr>
</tbody>
</table>

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<td></td>
</tr>
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<td>10</td>
<td></td>
</tr>
<tr>
<td>MX2N-70HB-44M</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>MX2N-43HB - MT</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Electric parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>DC24V</td>
</tr>
<tr>
<td>Isolation method</td>
<td>Photoelectric coupling</td>
</tr>
<tr>
<td>Input resistance</td>
<td>High speed input terminal 3.3KΩ, Ordinary input terminal 4.3KΩ</td>
</tr>
<tr>
<td>Input / ON</td>
<td>High speed input 4.5mA, Ordinary input 3.5mA</td>
</tr>
<tr>
<td>Input / OFF</td>
<td>+15mA</td>
</tr>
<tr>
<td>Filter function</td>
<td>Current filter can set from 0-100mA, default as 10mA</td>
</tr>
<tr>
<td>High speed counting</td>
<td>Usually support 6 single-phase (XO-XS1/XO2/XO3, or AB phase 10KHz, or 2 AB phase 10KHz, and can be customized as 6 single-phase counting 60KHz, or 2 AB phase 10KHz, or 2 AB phase 60KHz.</td>
</tr>
<tr>
<td>Input level</td>
<td>COM port connects negative terminal</td>
</tr>
<tr>
<td>Allowed current</td>
<td>5A</td>
</tr>
<tr>
<td>LOOM voltage</td>
<td>DCAC24V～220V</td>
</tr>
<tr>
<td>Circuit insulation</td>
<td>Relay mechanical insulation</td>
</tr>
<tr>
<td>On response time</td>
<td>Approx. 10ms</td>
</tr>
<tr>
<td>Mechanical life (no load)</td>
<td>10,000,000 times</td>
</tr>
<tr>
<td>Electrical life (rated load)</td>
<td>300,000 times</td>
</tr>
<tr>
<td>Output level</td>
<td>Normally, open-collector output (pull-up level can be connected to positive or negative)</td>
</tr>
<tr>
<td>MOS / Transistor Output Indicator</td>
<td></td>
</tr>
<tr>
<td>Allowed max current</td>
<td>MOS, 2A, Transistor, 500mA</td>
</tr>
<tr>
<td>Loom voltage</td>
<td>DC15V～45V</td>
</tr>
<tr>
<td>Circuit insulation</td>
<td>Optocoupler insulation</td>
</tr>
<tr>
<td>On response time</td>
<td>High speed output 10us, others 0.5ms</td>
</tr>
<tr>
<td>High speed output frequency</td>
<td>Usually 10-100KHz, Can be customized as 4 channels, 70/1/73KHz, 12/13KHz</td>
</tr>
<tr>
<td>Output level</td>
<td>COM port connects negative terminal</td>
</tr>
<tr>
<td>AD Indicator</td>
<td></td>
</tr>
<tr>
<td>Input signal</td>
<td>DIY thermometer (NTC10K/S, COM2: Digital 4-channel, COM3: Digital 2-channel)</td>
</tr>
<tr>
<td>Response time</td>
<td>Thermocouple 0~220°C can be set, others fixed 22 scan period</td>
</tr>
<tr>
<td>AD quantity</td>
<td>0-8 channels</td>
</tr>
<tr>
<td>Accuracy</td>
<td>12 bits</td>
</tr>
<tr>
<td>DA Indicator</td>
<td></td>
</tr>
<tr>
<td>Output signal</td>
<td>0-5V/0-10V/20mA/Others</td>
</tr>
<tr>
<td>DA quantity</td>
<td>0-2 channels</td>
</tr>
<tr>
<td>Accuracy</td>
<td>12 bits</td>
</tr>
<tr>
<td>Programming port</td>
<td>HMI default USB programming port, and PLC default RS232 programming port</td>
</tr>
<tr>
<td>Ambient Conditions</td>
<td></td>
</tr>
<tr>
<td>Working temperature</td>
<td>0°C～50°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>5%～95%</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20°C~70°C</td>
</tr>
<tr>
<td>Vibration frequency</td>
<td>5-50Hz, amplitude 0.35mm, 50Hz-15kHz, acceleration 4g/day (X, Y, Z and 2°5 times respectively, total 95 minutes/each)</td>
</tr>
</tbody>
</table>

Table 3: Mechanical dimension

<table>
<thead>
<tr>
<th>Model</th>
<th>Digital port</th>
<th>Max analogy</th>
<th>Mounting dimension (mm)</th>
<th>Screen</th>
<th>Product Dimension W/H/D(mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX2N-43HB</td>
<td>120</td>
<td>94</td>
<td>134×102×32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MX2N-70HB</td>
<td>240</td>
<td>200</td>
<td>84×138×50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hardware Interface

- **Four mounting holes on the side**
- **Power terminal block**
- **DO terminal block**
- **DI terminal block**
- **PWR / power indicator**
- **RUN / PLC operating indicator**
- **COM: fast flash while PLC is communicating with HMI**
- **HMI programming port**
- **PLC programming port**
- **PLC: operating with RS485/RS232**
- **AD terminal indicator**
- **DA terminal indicator**
- **PLC optional RS485/CAN**
- **LCD screen**
- **HMI optional RS232/RS485**

Terminal wiring: 22-14AWG wire. All terminals are pluggable. Special model interface, please refer to the product wire screen.

Table 6: Electrical parameters

<table>
<thead>
<tr>
<th>Pin signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>RXD Receive</td>
</tr>
<tr>
<td>3</td>
<td>TXD Send</td>
</tr>
<tr>
<td>5</td>
<td>GND Ground</td>
</tr>
<tr>
<td>6</td>
<td>COM2 / HMI optional RS485</td>
</tr>
<tr>
<td>7</td>
<td>RXD Receive</td>
</tr>
<tr>
<td>8</td>
<td>TXD Send</td>
</tr>
<tr>
<td>9</td>
<td>GND Ground</td>
</tr>
<tr>
<td>10</td>
<td>COM optional RJ45</td>
</tr>
<tr>
<td>11</td>
<td>Terminal A</td>
</tr>
<tr>
<td>12</td>
<td>B</td>
</tr>
<tr>
<td>13</td>
<td>C</td>
</tr>
</tbody>
</table>

Diagram 7: Optional terminals

On optional terminals

- **DI port** (with terminal)
- **RS485 port**
- **CAN port** (with terminal)
- **PLC port** (with terminal)
- **CAN port** (without terminal)
- **RS485 port** (without terminal)

Note: Detailed settings, please refer to “Coolmay MX2N HMI PLC All-In-One Programming Manual”.

Diagram 8: Mechanical Design

Diagram 9: Electrical Design

Diagram 4: MX2N-43HB

Diagram 5: MX2N-70HB

Diagram 3: PLC program port

Diagram 2: Hardware interface

Diagram 1: Mounting dimension

Diagram 1: Mounting dimension
The PLC has a built-in user switch state detection power supply (DC24V), and the user only needs to access the dry contact input. The output wiring method is NPN, COM common cathode.

Equivalent Circuit

The transistor output can only be used for DC DC24V load loops. The output wiring method is NPN, COM common cathode.

Diagram 6 Input Wiring Diagram

Figure 8 shows the equivalent circuit diagram of the relay output module. The output terminals are several groups. Each group is electrically isolated. The output contacts of different groups are connected to different power circuits.

To prevent the relay contacts from being burnt out and other faults, burn out the PLC board. Please select the appropriate ac to each load.

Photocoupler

AC/DC

logic

PLC circuit

power

speed

Output drive circuit

Figure 9 shows the equivalent circuit diagram of the relay output module. The output terminals are several groups.

For inductive loads connected to the AC loop, the external circuit should consider the RC transient voltage sink and anti-interference treatment. As shown in Diagram 11.

When PLC is in STOP, D8096 D8097 automatically set as 0, DA is also 0. When DA setting is wrong, 0712 fault will be checked, DA output is abnormal.

The soft component retention of HMI PLC all-in-one is internal retention, i.e. All soft components in the maintenance area will not lose. Real-time clock always rechargeable battery to keep it all the current time. All power retention functions must ensure that it is more than 23W. When DC24V supply voltage is abnormally high or low, PLC power-on time must be more than 2 minutes, or the power retention will be abnormal.

PLC analog wiring

1. Strong electricity and weak electricity should be routed separately. When there is strong electrical interference, add a magnetic ring on the power supply end and grounding properly according to the case type.

2. When the analog is interfered, 104 ceramic capacitors can be added for filtering and grounding properly.

PLC anti-interference treatment

Programming Reference

Instructions of device allocation and power-down retention instructions

M20N-43HB-24M

M20N-70HB-44M

DI X

D0 Y

Y000 Y13

Y000 Y27

D0 Y

Y000 Y13

Y000 Y27

Memory allocation. M

State relay: S

Counter:

Data register: D

Preferably passed through the power relay to avoid electromagnetic interference

1. Power on after confirmed the voltage (24VDC, ±15%) and right wiring to avoid damage.

2. Tighten the screws of the relay while mounting the product to avoid falling off.

3. Avoid wiring or plug the cable with electricity, or it is easy to cause electric shock or circuit damage. When the product emits odor or abnormal sound, please immediately switch off the power. While processing air holes or wiring, do not get the metal chips and wires head into the ventilation hole of the controller, which may cause product failure and depreciation.

4. Do not do power cables and communication cables together or close and keep them at a distance of 10cm or more. Strong and weak currents need to be separated and correctly grounded. In severe interference situations, input and output cables of the communication and high-frequency signals should use shielded cables to improve anti-jamming performance. The grounding terminal FG on this unit must be properly grounded to improve the anti-interference ability.

5. The COM of DO/DO (transistor) is common cathode.

6. Please do not disassemble the product or change the wiring. Drill it will possible cause breakdown: malfunction, loss of function. Please do not disassemble the product or use in or may cause malfunction and breakdown.

7. While installing or disassembling the product, ensure to turn off all power. Or it may cause malfunction and breakdown.

Diagram 11 Inductive load absorption circuit

Diagram 12 Pulse output wiring

When select weighting function, it will cover ADE~A0D (sink point as E+, S+, S-, E- on the product.)

Diagram 13 MX2N-70HB Analog wiring

Diagram 14 Load cell sensor wiring

Load cell sensor reading registers

Note: Analog input range and register corresponding values, please refer to "Coolmay MX2N HMI PLC All-in-One Programming Manual"

AD Registers

Thermocouple analog reading registers (Only supports 2 thermocouples, and cannot connect with NTC.)

Load cell sensor reading registers

Note: Analog input range and register corresponding values, please refer to "Coolmay MX2N HMI PLC All-in-One Programming Manual"

TIPS

MX2N HMI PLC All-in-One User Manual

—Please read carefully the related manuals before using our products, and use the product under the environmental conditions specified in this manual.

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2. Tighten the screws of the relay while mounting the product to avoid falling off.

3. Avoid wiring or plug the cable with electricity, or it is easy to cause electric shock or circuit damage. When the product emits odor or abnormal sound, please immediately switch off the power. While processing air holes or wiring, do not get the metal chips and wires head into the ventilation hole of the controller, which may cause product failure and depreciation.

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7. While installing or disassembling the product, ensure to turn off all power. Or it may cause malfunction and breakdown.

Diagram 8 Relay output equivalent circuit

To prevent the relay contacts from being burnt out and short-circuit, please select appropriate fuse. 1A

Diagram 10 Transistor output equivalent circuit

The equivalent circuit of the PLC output part of the transistor output type is shown in Diagram 10. The output terminals are in groups, each of which is electrically isolated, and different sets of output contacts can be connected to different power circuits. The transistor output can only be used for DC DC24V load type. The output wiring method is NPN, COM common cathode.

For induction loads connected to the AC loop, the external circuit should consider the RC transient voltage sink and anti-interference treatment. As shown in Diagram 11.

Diagram 9 Relay output equivalent circuit

To prevent the output unit and PLC load wiring being burnt out by load short circuit, please select appropriate fuse. 1A

Diagram 12 Input wiring diagram

Figure 8 shows the equivalent circuit diagram of the relay output module. The output terminals are several groups. Each group is electrically isolated. The output contacts of different groups are connected to different power circuits.

To prevent the relay contacts from being burnt out and other faults, burn out the PLC board. Please select the appropriate ac to each load.

Photocoupler

AC/DC

logic

PLC circuit

power

speed

Output drive circuit

Figure 9 shows the equivalent circuit diagram of the relay output module. The output terminals are several groups.

For inductive loads connected to the AC loop, the external circuit should consider the RC transient voltage sink and anti-interference treatment. As shown in Diagram 11.

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PLC analog wiring

1. Strong electricity and weak electricity should be routed separately. When there is strong electrical interference, add a magnetic ring on the power supply end and grounding properly according to the case type.

2. When the analog is interfered, 104 ceramic capacitors can be added for filtering and grounding properly.

PLC anti-interference treatment

Programming Reference

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D0 Y

Y000 Y13

Y000 Y27

D0 Y

Y000 Y13

Y000 Y27

Memory allocation. M

State relay: S

Counter:

Data register: D

Preferably passed through the power relay to avoid electromagnetic interference

1. Power on after confirmed the voltage (24VDC, ±15%) and right wiring to avoid damage.

2. Tighten the screws of the relay while mounting the product to avoid falling off.

3. Avoid wiring or plug the cable with electricity, or it is easy to cause electric shock or circuit damage. When the product emits odor or abnormal sound, please immediately switch off the power. While processing air holes or wiring, do not get the metal chips and wires head into the ventilation hole of the controller, which may cause product failure and depreciation.

4. Do not do power cables and communication cables together or close and keep them at a distance of 10cm or more. Strong and weak currents need to be separated and correctly grounded. In severe interference situations, input and output cables of the communication and high-frequency signals should use shielded cables to improve anti-jamming performance. The grounding terminal FG on this unit must be properly grounded to improve the anti-interference ability.

5. The COM of DO/DO (transistor) is common cathode.

6. Please do not disassemble the product or change the wiring. Drill it will possible cause breakdown: malfunction, loss of function. Please do not disassemble the product or use in or may cause malfunction and breakdown.

7. While installing or disassembling the product, ensure to turn off all power. Or it may cause malfunction and breakdown.