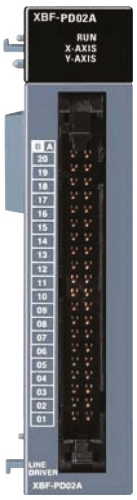
IMO

# User Manual

# XBF-PD02A Positioning Module Expansion for XGB PLC




The future in control

# Specifications

## General Specifications

The following table shows the general specification of XGB series.

<table>
<tr><th>No.</th><th>Items</th><th colspan="6">Specifications</th><th>Related standards</th></tr>
<tr><td>1</td><td>Ambient temperature</td><td colspan="6">0 ~ 55 °C</td><td></td></tr>
<tr><td>2</td><td>Storage temperature</td><td colspan="6">–25 ~ +70 °C</td><td></td></tr>
<tr><td>3</td><td>Ambient humidity</td><td colspan="6">5 ~ 95%RH (Non-condensing)</td><td></td></tr>
<tr><td>4</td><td>Storage humidity</td><td colspan="6">5 ~ 95%RH (Non-condensing)</td><td></td></tr>
<tr><td rowspan="9">5</td><td rowspan="9">Vibration resistance</td><td colspan="4">Occasional vibration</td><td>-</td><td></td></tr>
<tr><td colspan="2">Frequency</td><td>Acceleration</td><td>Amplitude</td><td>How many times</td><td rowspan="9">IEC61131-2</td></tr>
<tr><td colspan="2">5 ≤ f < 8.4Hz</td><td>–</td><td>3.5mm</td><td rowspan="6">10 times each directions (X, Y and Z)</td></tr>
<tr><td colspan="2">8.4 ≤ f ≤ 150Hz</td><td>9.8m/s$^2$(1G)</td><td>–</td></tr>
<tr><td colspan="4">Continuous vibration</td></tr>
<tr><td colspan="2">Frequency</td><td>Acceleration</td><td>Amplitude</td></tr>
<tr><td colspan="2">5 ≤ f < 8.4Hz</td><td>–</td><td>1.75mm</td></tr>
<tr><td colspan="2">8.4 ≤ f ≤ 150Hz</td><td>4.9m/s$^2$(0.5G)</td><td>–</td></tr>
<tr><td>6</td><td>Shock resistance</td><td colspan="6">• Peak acceleration: 147 m/s$^2$(15G)<br>• Duration: 11ms<br>• Half-sine, 3 times each direction per each axis</td><td>IEC61131-2</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Noise resistance</td><td>Square wave Impulse noise</td><td colspan="5">AC: ±1,500 V<br>DC: ± 900V</td><td></td></tr>
<tr><td>Electrostatic discharge</td><td colspan="5">4kV (Contact discharge)</td><td>IEC61131-2<br>IEC61000-1-2</td></tr>
<tr><td>Radiated electromagnetic field noise</td><td colspan="5">80 ~ 1,000 MHz, 10V/m</td><td>IEC61131-2,<br>IEC61000-1-3</td></tr>
<tr><td rowspan="2">Fast transient/bust noise</td><td>Segment</td><td colspan="2">Power supply module</td><td colspan="2">Digital/analog input/output communication interface</td><td rowspan="2">IEC61131-2<br>IEC61000-1-4</td></tr>
<tr><td>Voltage</td><td colspan="2">2kV</td><td colspan="2">1kV</td></tr>
<tr><td>8</td><td>Environment</td><td colspan="6">Free from corrosive gasses and excessive dust</td><td></td></tr>
<tr><td>9</td><td>Altitude</td><td colspan="6">Up to 2,000 ms</td><td></td></tr>
<tr><td>10</td><td>Pollution degree</td><td colspan="6">Less than equal to 2</td><td></td></tr>
<tr><td>11</td><td>Cooling</td><td colspan="6">Air-cooling</td><td></td></tr>
</table>

**N0ote**

1) IEC (International Electrotechnical Commission):
An international nongovernmental organization which promotes internationally cooperated standardization in electric/electronic field, publishes international standards and manages applicable estimation system related with.

2) Pollution degree:
An index indicating pollution degree of the operating environment which decides insulation performance of the devices. For instance, Pollution degree 2 indicates the state generally that only non-conductive pollution occurs. However, this state contains temporary conduction due to dew produced.

## Performance Specifications

The following table shows the performance specifications of XGB Positioning Module.

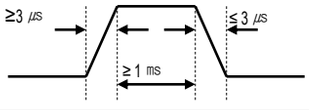
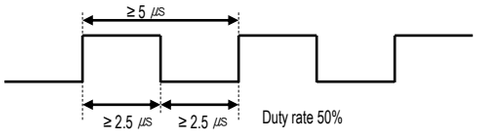
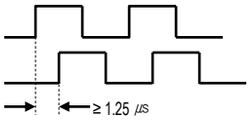
### Function Specifications

| Items \ Model | | XBF-PD02A |
|---|---|---|
| No. of control axis | | 2 |
| Interpolation function | | 2 axes linear interpolation, 2 axes circular interpolation |
| Control method | | Position control, Speed control, Speed/Position control, Position/Speed control, |
| Control unit | | Pulse |
| Positioning data | | 150 data area for each axis (operation step number 1 ~ 150)<br>Can be set by parameter, dedicated monitor window, program |
| Monitoring window | Connection | RS-232C port or USB of basic unit |
| | Setting data | Basic, home/manual, common, I/O signal parameter, operation data, command information |
| | Monitor | Operating information, input signal information, error information |
| Back-up | | Saves parameter, operation data at flash memory (battery is not necessary) |
| POSITIONING | Coordinate | Absolute coordinate/Incremental coordinate |
| | Position address range | -2,147,483,648 ~ 2,147,483,647(pulse) |
| | Speed range | 1 ~ 2,000,000pps(1pps unit) |
| | Acceleration/deceleration process | Trapezoid type |
| | Acceleration/deceleration time | 0 ~ 65,535 ㎳, selection available from 4 types of acceleration/deceleration pattern |
| Manual Operation | | JOG operation / MPG operation / Inching operation |
| Homing method | | DOG+HOME(Off), DOG+HOME(On), DOG, upper-lower limit + HOME, upper-lower limit |
| Speed change function | | Speed change (Percent/Absolute value) |
| External Encoder | Channel | 1 channel |
| | Max. Input | max 200 kpps |
| | Input form | Lin driver input(RS-422A IEC standard) |
| | Input type | CW/CCW, PLS/DIR, Phase A/B(4 multiplication) |
| Max. connection distance | | 10 m |
| Error indication | | Indicated by LED |
| Connection connector | | 40 Pin connector |
| I/O share point | | Fixed type: 64 points |
| Consumable current | | 500 ㎃(DC 5V) |
| Weight | | 65g |

# External I/O Interface Specifications

Here describes the I/O interface for external equipment.

## Input Specifications

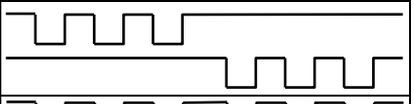
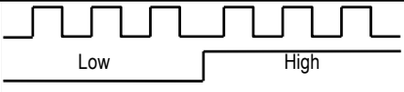
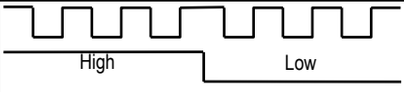
<table>
<tr><th>Signal name</th><th>Rated input voltage/ current</th><th>Use voltage range</th><th>On voltage/ current</th><th>Off voltage/current</th><th>Input resistance</th><th>Response time</th></tr>
<tr><td>DOG</td><td>DC 24V/4.7㎃</td><td>DC 20.4~ 26.4V</td><td>≥DC 16V/3.1㎃</td><td>≤DC 4V/1.0㎃</td><td>Approx. 5.1㏀</td><td>≤0.7㎳</td></tr>
<tr><td>External upper-limit</td><td>DC 24V/4.7㎃</td><td>DC 20.4~ 26.4V</td><td>≥DC 16V/3.1㎃</td><td>≤DC 4V/1.0㎃</td><td>Approx. 5.1㏀</td><td>≤0.7㎳</td></tr>
<tr><td>External lower-limit</td><td>DC 24V/4.7㎃</td><td>DC 20.4~ 26.4V</td><td>≥DC 16V/3.1㎃</td><td>≤DC 4V/1.0㎃</td><td>Approx. 5.1㏀</td><td>≤0.7㎳</td></tr>
<tr><td>Emergency stop</td><td>DC 24V/4.7㎃</td><td>DC 20.4~ 26.4V</td><td>≥DC 16V/3.1㎃</td><td>≤DC 4V/1.0㎃</td><td>Approx. 5.1㏀</td><td>≤0.7㎳</td></tr>
<tr><td>In-position</td><td>DC 24V/4.7㎃</td><td>DC 20.4~ 26.4V</td><td>≥DC 16V/3.1㎃</td><td>≤DC 4V/1.0㎃</td><td>Approx. 5.1㏀</td><td>≤0.7㎳</td></tr>
<tr><td rowspan="2">Home</td><td>DC 5V/8㎃</td><td>DC 4.25~ 5.5 V</td><td>≥DC 3V/3.5㎃</td><td>≤DC 1V/0.7㎃</td><td>Approx. 670Ω</td><td>≤0.2㎳</td></tr>
<tr><td colspan="6"> 
</td></tr>
<tr><td rowspan="3">Manual pulse generator<br>/Encoder input</td><td colspan="6">Encoder input : based on RS-422A Line Driver Level (Am26LS31)</td></tr>
<tr><td colspan="6">1) Pulse width<br> 
<br>2) Phase difference<br> 
<br>If A phase input pulse precedes B phase input pulse, the position address value increases.<br>If B phase input pulse precedes A phase input pulse, the position address value decreases.</td></tr>
</table>

## Output Specifications

| Signal | Rated load voltage | Use load voltage range | Max. load current / Dash current | Max. voltage falling (On) | Leakage current (Off) | Response Time |
|---|---|---|---|---|---|---|
| Deviation clear counter | DC 5~ 24V | DC 4.75~ 26.4V | 0.1A(1 point) / ≤0.4A 10㎳ | ≤DC 1V (rating) ≤DC 2.5V (max) | ≤0.1㎃ | ≤0.1ms- |

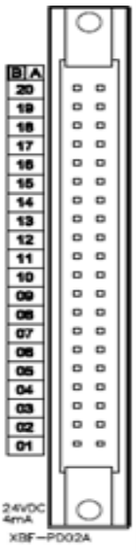
**Pulse output**

▷ Differential Line Driver based on Am26C31
▷ CW/ CCW type, PLS/DIR type can be selected from pulse output mode of basic parameter
▷ Pulse output mode (setting it from basic parameter)
Pulse output level (setting it from common parameter) is as follows.

| Pulse output mode | | Output signal level | | | |
|---|---|---|---|---|---|
| | | High Active | | Low Active | |
| | | Forward | Reverse | Forward | Reverse |
| CW/CCW | CW<br>CCW |  | |  | |
| PLS/DIR | PULSE<br>DIR |  Low | High |  High | Low |

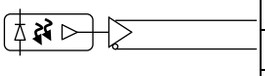
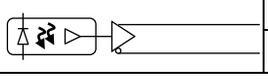
## Specifications on Interface with External Equipment

(1) Pin Array of Connector

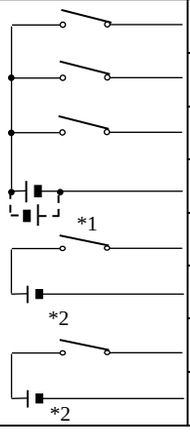
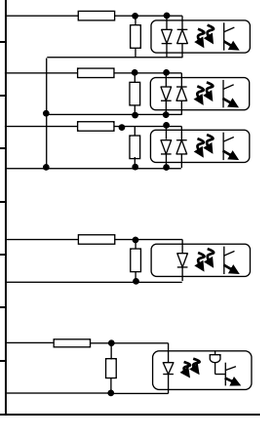
| Pin Array | Pin no. Y | Pin no. X | Signal Name | | Signal direction positioning-external | **Action condition** |
|---|---|---|---|---|---|---|
|  | B20 | | MPG A+ | Manual pulse generator/Encoder A+ | ← | |
| | A20 | | MPG A- | Manual pulse generator/Encoder A- | ← | |
| | B19 | | MPG B+ | Manual pulse generator/Encoder B+ | ← | |
| | A19 | | MPG B- | Manual pulse generator/Encoder B- | ← | |
| | B18 | A18 | FP+ | Pulse output (Differential Motion +) | → | |
| | B17 | A17 | FP- | Pulse output (Differential Motion -) | → | |
| | B16 | A16 | RP+ | Pulse sign (Differential Motion +) | → | |
| | B15 | A15 | RP- | Pulse sign (Differential Motion -) | → | |
| | B14 | A14 | OV+ | Upper limit | ← | |
| | B13 | A13 | OV- | Lower limit | ← | |
| | B12 | A12 | DOG | DOG | ← | |
| | B11 | A11 | NC | Not used | - | |
| | B10 | A10 | NC | | | |
| | B9 | A9 | COM | Common (OV+, OV-, DOG) | - | |
| | B8 | A8 | NC | Not used | - | |
| | B7 | A7 | INP | In-Position Signal | ← | |
| | B6 | A6 | INP COM | Common (INP) | - | |
| | B5 | A5 | CLR | Deviation counter clear signal | → | |
| | B4 | A4 | CLR COM | Common (CLR) | - | |
| | B3 | A3 | HOME | Home(+5V) | ← | |
| | B2 | A2 | COM HOME | Common (Home) | - | |
| | B1 | A1 | NC | Not used | - | |

(2) Internal circuit of connector

(a) Pulse output

| **Internal circuit** | **Pin No.** Y | X | Signal | |
|---|---|---|---|---|
|  | B18 | A18 | FP+ | Pulse F+(CW/Pulse) |
| | B17 | A17 | FP- | Pulse F-(CW/Pulse) |
|  | B16 | A16 | RP+ | Pulse R+(CCW/Sign) |
| | B15 | A15 | RP- | Pulse R-(CCW/Sign) |

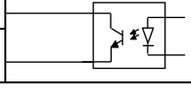
(b) External input signal

| Classification | Pin No. Y | Pin No. X | Internal circuit | Signal | |
|---|---|---|---|---|---|
|  | B14 | A14 |  | OV+ | Upper limit |
| | B13 | A13 | | OV- | Lower limit |
| | B12 | A12 | | DOG | DOG |
| | B9 | A9 | | COM | Common(OV+,OV-,DOG) |
| | B7 | A7 | | INP | In-position signal |
| | B6 | A6 | | COM | In-position Common |
| | B3 | A3 | | HOME +5V | HOME (+5V) |
| | B2 | A2 | | HOME COM | HOME(+5V) Common |

*1: Available to use it as Sink or Source type input

*2: Available to use it as Sink type input

(c) External Output Signal

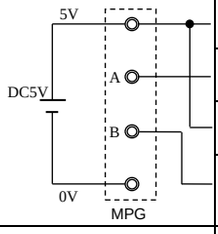
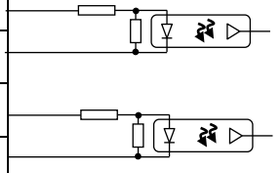
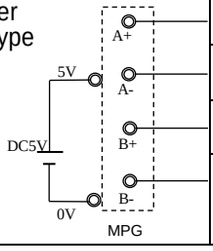
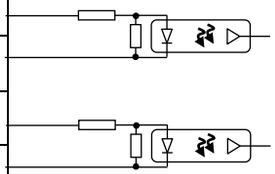
| Pin No. Y | Pin No. X | Internal circuit | Signal | |
|---|---|---|---|---|
| B5 | A5 |  | CLR | Deviation counter clear signal |
| B4 | A4 | | CLR COM | Deviation counter clear signal Common |

**Remark**

1. Deviation counter clear signal is provided on each axis, as the output signal of the servo motor interface, deviation counter of servo motor driver counter cleared. The deviation of the servo motor driver until the count value reaches zero, the motor is driven. Thus, even if the COMMAND pulse output is completed until the motor stops, there may be a short delay. The deviation counter value is cleared to zero, motor can be stopped immediately.

2. Position deviation counter clear signal from the control module is automatically output after completion of homing. Clearing the count of the servo drive for the deviation is used as the output signal.

(d) Manual pulse generator input/encoder input

| Classification | Pin No. | Internal circuit | Signal | |
|---|---|---|---|---|
| Open collector voltage type   | B20 |  | MPG A+ | Manual pulse generator A+ input |
| | A20 | | MPG A- | Manual pulse generator A- input |
| | B19 | | MPG B+ | Manual pulse generator B+ input |
| | A19 | | MPG B- | Manual pulse generator B- input |
| Line driver voltage type   | B20 |  | MPG A+ | Encoder A+ input |
| | A20 | | MPG A- | Encoder A- input |
| | B19 | | MPG B+ | Encoder B+ input |
| | A19 | | MPG B- | Encoder B- input |

(3) I/O wiring by using I/O Link Board

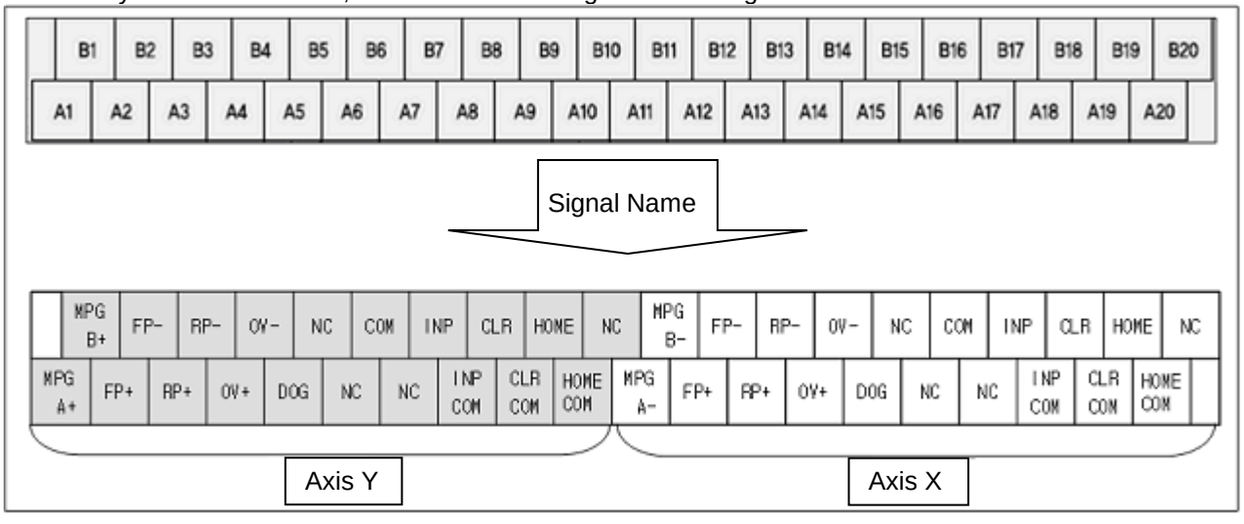
(a) When using positioning function, easy wiring is available by connecting the I/O connector with smart link board. The available I/O link and I/O cable are as follows.

| XGB | | I/O link | | Connection cable | | |
|---|---|---|---|---|---|---|
| Classification | Model | Name | The no. of pin | Name | Length | Content |
| Positioning | XBF-PD02A | TG7-1H40S | 40 | C40HH-10SB-XBI | 1m | For extension module connection (40Pin) |

(b) Terminal array and specification of TG7-1H40S is as follows.

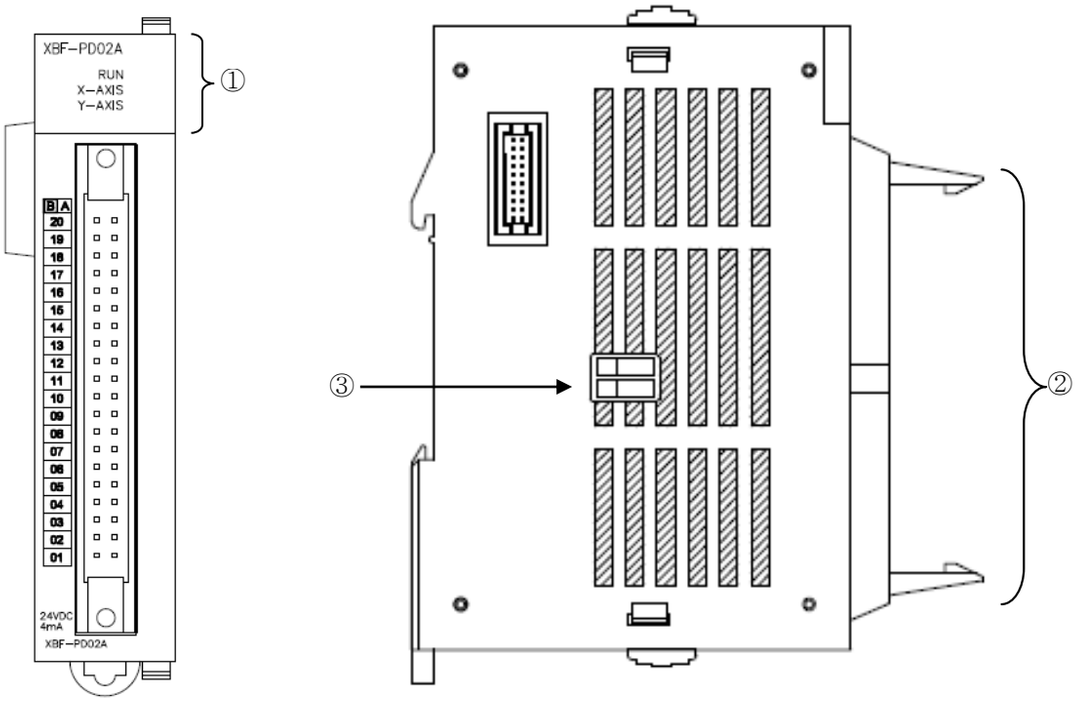
| Item | Specification |
|---|---|
| Rated voltage | AC/DC 125[V] |
| Rated current | max 1[A] |
| Withstanding voltage | 600V 1 minute |
| Insulation resistor | 100㏁ (DC500V) |
| Cable specification | 1.25[㎟] or below |
| Terminal/screw | M3 X 8L |
| Torque | 6.2㎏f.㎝ or above |
| Terminal material | PBT, UL94V-0 |
| Weight | 186g |

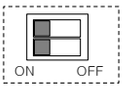
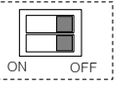
(c) In case of wiring positioning module by using TG7-1H40S and C40HH-10SB-XBI, relationship of XGB I/O signal name and I/O link board terminal number is as follows.
The following figure describes signal allocation when TG7-1H40S is used as connection cable.
When you make the cable, make sure that wring is done as figure below.



## The Name of Each Part

### The name of each part




| No. | Name | Description |
|---|---|---|
| ① | Operating indication LED | 1. RUN : indicates whether power is supplied or not<br>2. X-AXIS, Y-AXIS<br>▶ On : during corresponding axis operation<br>▶ Off : when the corresponding axis stops<br>▶ Blink : error of the corresponding axis(LED of axis has error would be blinking) |
| ② | External wiring connector | Drive device, machinery input, Connector to encoder |
| ③ | Dip switch for O/S mode | Dip switch for setting O/S download mode/operating mode<br>  : O/S download mode<br>  : operating mode |

**Remark**

1. In case dip switch is set as O/S download mode, positioning module doesn't operate. Make sure to set dip switch as off except for O/S download.

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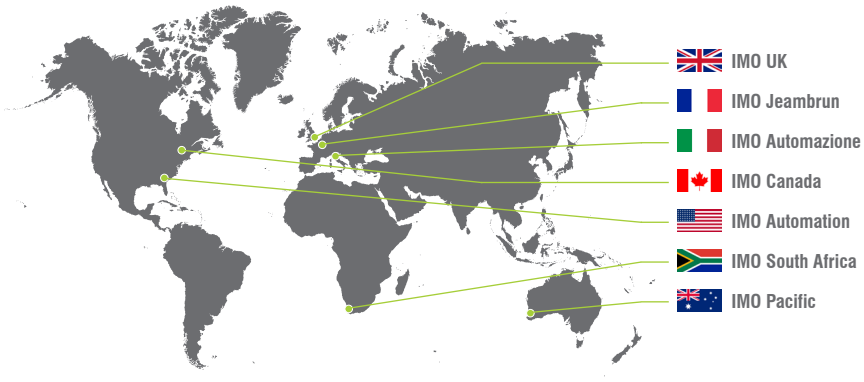



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