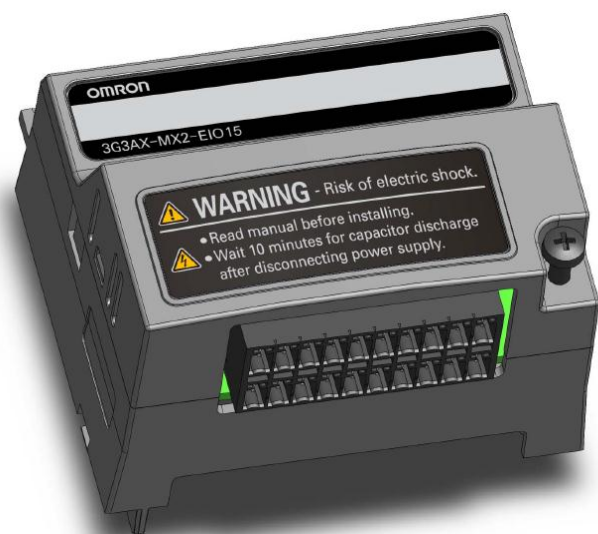


INSTRUCTION SHEET

Thank you for purchasing an OMRON product. Read this thoroughly and familiarize yourself with the functions and characteristics of the product before using it. Keep this instruction sheet for future reference.



OMRON Corporation

■ General Precautions

The user must operate the product according to the performance specifications described in this instruction sheet and in the operation manual of the inverter.

Before using the product under conditions which are not described in the inverter manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

- The MX2-A□ inverter with a mounted 3G3AX-MX2-EIO15-E option board is a general purpose product combination. It is a system component and is used in conjunction with other items of industrial equipment such as PLCs.
- A detailed system analysis and job safety analysis should be performed by the system designer or system integrator before including the inverter option board combination in any new or existing system. Consult your OMRON representative for application specific system integration information if required.
- The product will be used to control an adjustable speed drive connected to high voltage sources and rotating machinery that is inherently dangerous if not operated safely. Interlock all energy sources, hazardous locations, and guards in order to restrict the exposure of personnel to hazards. The adjustable speed drive may start the motor without warning. Signs on the equipment installation must be posted to this effect. A familiarity with auto-restart settings is a requirement when controlling adjustable speed drives. Failure of external or ancillary components may cause intermittent system operation, i.e., the system may start the motor without warning or may not stop on command. Improperly designed or improperly installed system interlocks and permissives may render a motor unable to start or stop on command.
- This Instruction Sheet does not contain illustrations of the product with protective covers removed from the MX2-A□ inverter. Make sure that these protective covers are on the inverter before use.

■ Safety Precautions

Definition of Precautionary Information

WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

Caution Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury, or property damage.

■ Warnings and Cautions

WARNING Do not attempt to take an option board apart or touch any internal parts while the power is being supplied. Doing so may result in electric shock.

WARNING Do not touch the conductive parts such as the internal PCB or connector while power is being supplied. Doing so may result in electrical shock.

WARNING Do not attempt to disassemble, repair, or modify an option board. Any attempt to do so may result in malfunction, fire, or electric shock.

WARNING Wiring, maintenance or inspection must be performed by authorized personnel. Not doing so may result in electrical shock or fire.

WARNING Turn OFF the power supply before performing wiring, maintenance or inspection. Wait for the time specified on the Inverter front cover for the capacitors to discharge. Not doing so may result in electrical shock.

WARNING Provide safety measures in external circuits, i.e. not in the option board. This ensures safety in the system if an abnormality occurs due to malfunction of the option board or another external factor affecting the option board operation. Not doing so may result in serious accidents.

WARNING Refer to the section "MX2 Inverter Safety (ISO 13849-1)" for details if the safety measures mentioned in the previous warning are to be ensured using the Gate Suppress function of the MX2-A□ inverter.

WARNING Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.

WARNING Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes. Not doing so may result in serious accidents.

Caution The digital outputs of the option board must not be considered as safety related signals. The outputs of the external safety relay must be used for integration into a safety related control/command circuit.

Caution Do not touch the inverter during power-on, and immediately after power-off. Hot surface may cause injury.

■ Operating Environment Precautions

Caution Do not operate the MX2-A□ inverter with a mounted 3G3AX-MX2-EIO15-E option board in the following locations (doing so may result in malfunction, electric shock or burning):

- Locations subject to direct sunlight
- Locations subject to temperatures or humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to exposure to water, oil, or chemicals
- Locations subject to shock or vibration

Caution Take appropriate and sufficient countermeasures when installing systems in the following locations (doing so may result in malfunction):

- Locations subject to static electricity or other forms of noise
- Locations subject to strong electromagnetic fields
- Locations subject to possible exposure to radioactivity
- Locations close to power supplies

Caution The operating environment of the MX2-A□ inverter with a mounted 3G3AX-MX2-EIO15-E option board can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the system. Make sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

■ Application Precautions

Caution Failure to abide by the following precautions could lead to faulty operation of the option board or the inverter, or could damage either of the two. Always read these precautions.

- Wire correctly using recommended cables. Incorrect wiring may result in burning.
- Be sure that the option board is mounted correctly. Improper mounting may result in malfunction.
- Be sure to mount the IO Connector correctly. Improper mounting may result in malfunction.
- When replacing an inverter be sure that all inverter settings and programs of the inverter being replaced are restored to the replacement.
- Check the inverter's Drive Program and its interaction with the option board before actually running it on the inverter. Not checking the program may result in unexpected operation.
- Disconnect the grounding cable when performing withstand voltage tests. Not disconnecting the grounding cable may result in burning.

- Do not connect an insulation tester (megger) to any terminal of the IO connector. Doing so may damage to option board or the inverter.
- Install external breakers and take other safety measures against short-circuits in external wiring. Not observing this may result in burning.
- Do not allow metal clippings to enter either option board or inverter when wiring or installing the unit.
- Do not use excessive force when connecting or disconnecting the I/O-cable. Do not pull on the I/O-cable.
- Check that the I/O connector is wired correctly before the MX2-A□ inverter is powered on.
- Maintain the voltages and currents of the option board inputs/outputs within specifications. Exceeding the specifications may damage the option board or the inverter.

■ Handling, Storage and Disposal

- Before touching the option board or inverter, be sure to first touch a grounded metallic object in order to discharge any static built-up. Not doing so may result in malfunction or damage.
- When transporting or storing the option board, cover the PCBs with electrically conductive materials to prevent electronic components from being damaged by static electricity. Also keep the product within the specified storage temperature range.
- Never dispose electrical components by incineration. Contact your state environmental agency for details on disposal of electrical components and packaging in your area.

■ Compliance with EC Directives

- This product complies with EC Directives when mounted on an MX2-A□ inverter and having connected the grounding cable. For grounding, cable selection, and any other conditions for EMC compliance, refer to the MX2 User's Manual for installation.

■ MX2 Inverter Safety (ISO 13849-1)

- MX2-A□ inverters provide the Gate Suppress function to perform a safe stop according to the EN60204-1, stop category 0. This option board has been designed not to interfere with this safety function.

■ References

Please be sure to read the related user manuals to use the 3G3AX-MX2-EIO15-E option board safely and properly. Be sure you are using the most current version of the manual.

Name	Cat No.
MX2 series User's Manual	I570
CX-Drive Operation Manual	W453
Drive Programming User's Manual	I170

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products. Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used. Please know and observe all prohibitions of use applicable to the products. NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM. See also product catalogs for Warranty and Limitations of Liability.

Option Board Description

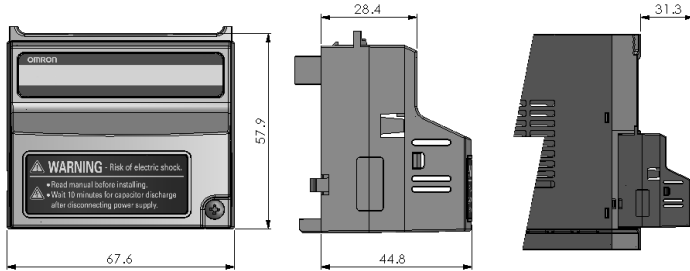
The 3G3AX-MX2-EIO15-E is an option board that can be attached to an MX2-A□ series inverter. The 3G3AX-MX2-EIO15-E provides extra inputs and outputs to the inverter:

- 1x Analog Voltage Input
- 1x Analog Current Input
- 1x Analog Voltage Output
- 8x Discrete Logic Inputs
- 4x Discrete Logic Outputs

Controlling, monitoring and configuration of the extra inputs and outputs can be done via the MX2 Drive programming (EzSQ).

External Dimensions

External dimensions of the option board, shown in millimeters:



General Specifications

Item	Specifications
Ambient operating temperature	See MX2 series User's manual.
Ambient operating humidity	See MX2 series User's manual.
Storage temperature	-20 °C to 65 °C
Weight	170g

Detailed Input / Output Specifications

Discrete Logic Inputs (DI)	
No. of inputs	8
ON voltage	18 VDC minimum
OFF voltage	3 VDC maximum
Allowable voltage	27 VDC maximum
Load current at 24VDC	5 mA
Input type	sink or source (selectable by connecting CMI either to – or + terminal of the 24V IO supply)
Common	CMI
Discrete Logic Outputs (DO)	
No. of outputs	4
ON state current	50 mA maximum
ON state voltage drop	3 VDC maximum
OFF state voltage	27 VDC maximum
Output type	sink or source (selectable by connecting CMO either to – or + terminal of the 24V IO supply)
Common	CMO
Analog Voltage Input (AIV)	
Range	-10 to 10 VDC
Input impedance	10 kOhms
Accuracy	1% of FS
Resolution	12 bit
Common	CMA
Analog Current Input (AIC)	
Range	0 to 20 mA
Input impedance	100 Ohms
Accuracy	1.5% of FS
Resolution	12 bit
Common	CMA
Analog Voltage Output (AO)	
Range	0 to 10 VDC
Output current	10 mA maximum
Accuracy	1% of FS
Resolution	12 bit
Common	CMA
Common for Analog Inputs and Output (CMA)	
Maximum current	50 mA (sum of analog input/output currents)
Common for Discrete Logic Inputs (CMI)	
Maximum current	50 mA (sum of discrete logic input currents)
Common for Discrete Logic Outputs (CMO)	
Maximum current	200 mA (sum of discrete logic output currents)

Installation Procedure

Follow the next steps to install a 3G3AX-MX2-EIO15-E on an MX2-A□ series inverter:

- Power down the inverter
- Loosen the screw of the option board cover on the inverter, remove the cover and put the cover aside.
- For inverters up to 4.0 kW only: loosen the screws of the terminal block cover and remove the cover to enable access to the chassis ground terminal screws.
- Connect the grounding cable to the chassis ground of the inverter (located on the cooling fin) and the IO connector Functional Ground (FG) pins 1 and/or 11.
- If removed, mount the terminal cover again and tighten the screw(s)
- Push the 3G3AX-MX2-EIO15-E option board into the previous location of the option board cover until it clicks into place
- Tighten the screw of the option board (do not over-tighten).
- Select the right warning language from the warning label sheet and replace the English warning if appropriate.

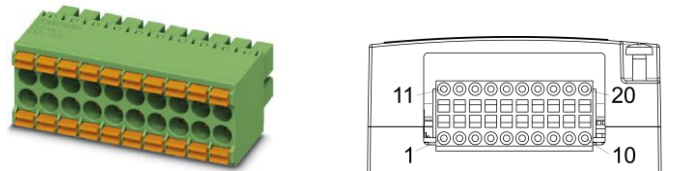
Please note the RS485 MODBUS RTU Port (pin SP, SN) of the inverter is not supported when the 3G3AX-MX2-EIO15-E is mounted.

IO Connector and Wiring

The 3G3AX-MX2-EIO15-E option board is supplied with a double-row 20pins connector plug for the IO wiring and a grounding cable.

Part	Manufacturer	Type
Connector	Phoenix	DFMC 1.5/10 – ST – 3.5

Wire the connector following the below pin layout:

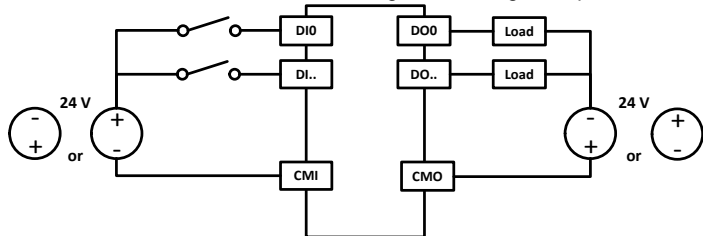


Description	Item	Pin No.	Pin No.	Item	Description
Functional Ground	FG	1	11	FG	Functional Ground
Digital Input 4	DI4	2	12	DI0	Digital Input 0
Digital Input 5	DI5	3	13	DI1	Digital Input 1
Digital Input 6	DI6	4	14	DI2	Digital Input 2
Digital Input 7	DI7	5	15	DI3	Digital Input 3
Digital Output 2	DO2	7	17	DO0	Digital Output 0
Digital Output 3	DO3	8	18	DO1	Digital Output 1
Analog Common	CMA	9	19	AO	Analog Voltage Output
Analog Current Input	AIC	10	20	AIV	Analog Voltage Input

- Use shielded cable for the wiring of the inputs/outputs. Connect the cable shield to ground.
- Keep the wiring for the option board separated from the inverter power wiring and the inverter motor wiring.

Conductor cross section	Min	Max
Solid wire	0.2mm ²	1.5mm ²
Stranded wire	0.2mm ²	1.5mm ²
Stranded wire, with ferrule without plastic sleeve	0.25mm ²	1.5mm ²
Stranded wire, with ferrule with plastic sleeve	0.25mm ²	0.75mm ²

Wire the 3G3AX-MX2-EIO15-E according to the wiring example below.



Configuration Instructions

- Power up the inverter and perform the inverter's restore factory default settings setting parameters b084 and b180 (see MX2 series User's Manual).
- Select the correct Filter parameter values in case default is not acceptable:
 - Analog Input AIV Filter Time using P160
 - Analog Input AIC Filter Time using P161
 - Digital Inputs DI Filter Time using P162
- Be sure to set parameter A017 to zero to stop the Drive Programs and data exchange of the 3G3AX-MX2-EIO15-E*. Use either the Drive Program control buttons in CX-Drive or the MX2 Digital Operator to change the A017 value.
- Create your program with CX-Drive's Drive Programming tool using the dedicated user parameters for your application purpose and download to the inverter.
- Set the inverter parameter A017 to value 1 or 2 to start the Drive Programming program.
- In case of a parameter change in step 2, power cycle the inverter.
- The option board runs automatically.

* The 3G3AX-MX2-EIO15-E will only refresh the IO status when the Drive Program is running. Be sure to have the IO in a failsafe state before downloading the program or stopping the Drive Program. The outputs will keep their latest values.

Option Board Inverter Parameters Details

I/O Data

Use the following parameters within the Drive Program to control the inputs and outputs of the 3G3AX-MX2-EIO15-E.

Parameter	Description	Range (decimal)
U(00)	The 8 digital input data of the Unit.	0 to 255 [from bit 0 (DI0) to bit 7 (DI7)]
U(01)	The 4 digital output data of the Unit.	0 to 15 [from bit 0 (DO0) to bit 3 (DO3)]
U(02)	The Analog Voltage Input AIV value of the Unit. Note this value is unsigned. Use UL(00) as in programming example.	-10000 to 10000 [-10 to 10 VDC]
U(03)	The Analog Current Input AIC value of the Unit.	0 to 10000 [0 to 20 mA]
U(04)	The Analog Voltage Output AO value of the Unit.	0 to 10000 [0 to 10 VDC]

Parameter settings

Please note a change of value for these parameters (except P165) requires a power cycle of the inverter and the 3G3AX-MX2-EIO15-E.

Parameter	Description	Range
P160	Analog Input AIV Filter Time	0 to 255, [1 to 255: x2ms filter 0: default 16ms]
P161	Analog Input AIC Filter Time	0 to 255, [1 to 255: x2ms filter 0: default 16ms]
P162	Digital Input DI Filter Time	0 to 255, [1 to 255: x2ms filter 0: default 16ms]
P163, P164	Reserved (do not write)	
P165	The Option board status * Bit 00: Running [0 = Not running, 1 = Running] Other bits are reserved.	0 to 1

* Be sure to check that the Running bit is 1 before using the input data.

Dedicated User Parameters U(00) and U(01) bit detail description

U(00): Stores the status of the Unit's 8 Digital Inputs DI0 to DI7.

U(00) Bits															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	*	*	*	*	*	*	*	D7	D6	D5	D4	D3	D2	D1	D0

* Bits 08 to 15 are reserved for future use. Please do not use.

U(01): Writes the Unit's 4 Digital Outputs DO0 to DO3.

U(01) Bits															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	*	*	*	*	*	*	*	*	*	*	*	DO3	DO2	DO1	DO0

* Bits 04 to 15 are reserved for future use. Please keep to zero.

Drive Programming Example

```
*****
**3G3AX-MX2-EIO15-E Programming Example **
*****
#alias global DI as U(00)      '8 Digital Inputs
#alias global DO as U(01)      '4 Digital Outputs
#alias global uAIV as U(02)    'AIV (unsigned)
#alias global AIC as U(03)     'AIC
#alias global AO as U(04)      'AO
#alias global obstatus as P165 'Option board status

#alias global AIV as UL(00)     'AIV (signed)
#alias global neg0 as U(20)     'AIV negative
#alias global DI0temp as U(21) 'Temp DI0
#alias global running as U(22) 'Running status

#alias global DI0 as U(11)
#alias global DI1 as U(12)
#alias global DI2 as U(13)
#alias global DI3 as U(14)
#alias global DI4 as U(15)
#alias global DI5 as U(16)
#alias global DI6 as U(17)
#alias global DI7 as U(18)

#alias global cDI0 as 1        'Constant definition DI0
#alias global cDI1 as 2        'Constant definition DI1
#alias global cDI2 as 4        'Constant definition DI2
#alias global cDI3 as 8        'Constant definition DI3
#alias global cDI4 as 16       'Constant definition DI4
#alias global cDI5 as 32       'Constant definition DI5
#alias global cDI6 as 64       'Constant definition DI6
#alias global cDI7 as 128      'Constant definition DI7
#alias global cDO0 as 1        'Constant definition DO0
#alias global cDO1 as 2        'Constant definition DO1
#alias global cDO2 as 4        'Constant definition DO2
#alias global cDO3 as 8        'Constant definition DO3
```

```
entry
  obstatus := 0      'Write zero to P165
  DO := 0           'Set Dig Outputs to zero
  AO := 0           'Set Analog Output to zero
```

```
:ini
  running := obstatus
  running := running mod 2
```

```
if running = 1 goto loop_
goto ini_

:loop_
  '* Include user code here (see examples below)
  '* Set Digital output 0
  DO := DO or cDO0

  '* Reset Digital output 1
  DI0temp := not cDI0
  DO := DO and DI0temp

  '* Read Digital input 0 into DI0
  DI0temp := DI and cDI0
  DI0 := DI0temp / cDI0

  '* Read Digital input 1 into DI1
  DI0temp := DI and cDI1
  DI1 := DI0temp / cDI1
```

```
'* Convert Analog input 0 value to UL(00) signed
neg0 := uAIV and 32768
```

```
if neg0 > 1 then
  AIV := uAIV - 65536
else
  AIV := uAIV
endif
```

```
goto loop_
```

end