

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

© 2010 OMRON Europe BV All rights reserved 1111953-5A

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-DRT-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.
- 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** 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-DRT-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-DRT-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

- WARNING** Failure to abide by the following precautions could lead to serious or possibly fatal injury. Always read these precautions.
  - Always connect the grounding cable to one of the ground terminals of the MX2-A□ inverter.
  - Check any user program in the system that acts as a DeviceNet master before actually running it. Not checking the program may result in unexpected operation.
  - A revision AAAA MX2-A□ inverter allows the motor to run immediately if a trip condition is reset, and at the same time, a run command is active via DeviceNet. For safe operation clear the run command via DeviceNet as soon as a trip condition is detected. Check the MX2-A□ inverter revision using the section “MX2 Inverter Support” on the next page.
- 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.
  - Install external breakers and take other safety measures against short-circuits in external wiring. Not observing this may result in burning.
  - Be sure that all the cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
  - Do not allow metal clippings to enter either option board or inverter when wiring or installing the unit.

- Follow the network configuration and wiring instructions provided in the “DeviceNet Operation Manual” (Cat. No. W267).
  - Wire the DeviceNet cables correctly. Incorrect wiring may result in burning.
  - Wire the DeviceNet connectors correctly. Incorrect wiring may result in burning.
  - Apply termination at both ends of a DeviceNet cable segment. Do not apply termination anywhere else.
- Be sure that the option board is mounted correctly. Improper mounting may result in malfunction.
- Disconnect the grounding cable when performing withstand voltage tests. Not disconnecting the grounding cable may result in burning.
- Check the inverter settings for proper inverter behaviour before actually operating the inverter remotely via the DeviceNet network.
- Check the network related inverter settings regarding DeviceNet node address and DeviceNet remote I/O allocation. Not doing so may result in unexpected operation.
- Check the inverter’s EzSQ program and its interaction with the DeviceNet master before actually running it on the inverter. Not checking the program may result in unexpected operation.
- When replacing an inverter be sure that all inverter settings of the inverter being replaced are restored to the replacement.
- Restoring parameters stored in the remote operator also restores the DeviceNet node address. Always check the node address and other network related inverter settings after restore.
- Confirm that no adverse effect will occur at the moment the DeviceNet master stops communicating with the inverter or at the moment the DeviceNet master has not yet started communicating to the inverter.
- Confirm that no adverse effect will occur in the inverter before force-setting/force-resetting any bit in the system that acts as a DeviceNet master.

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.

References

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

Name	Cat No.
MX2 User’s Manual	I570-E2-01
DeviceNet Operation Manual	W267

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-DRT-E is an option board that can be attached to an MX2-A□ series inverter. The 3G3AX-MX2-DRT-E allows controlling, monitoring and parameterization of the inverter via a DeviceNet network. The application in the system that acts as a DeviceNet master is responsible for correct behaviour of the system. The 3G3AX-MX2-DRT-E is a gateway that passes the communicated register values from the DeviceNet network to the inverter and vice versa.

## ■ MX2 Inverter Support

MX2-A□ inverter version can be read from the inverter type label. Please check the revision characters have been placed in the bottom-right corner of the type label. The revision characters have a layout as shown in the figure, with the asterisks replaced by a revision character. If the inverter does not contain such a revision label, this version does not support the 3G3AX-MX2-DRT-E.

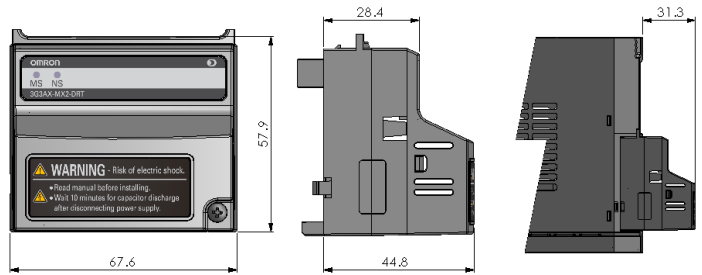
\*\*\*\*

## ■ 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. The option board has been designed not to interfere with this safety function.

## ■ External Dimensions

The drawings below specify the external dimensions of the option board.



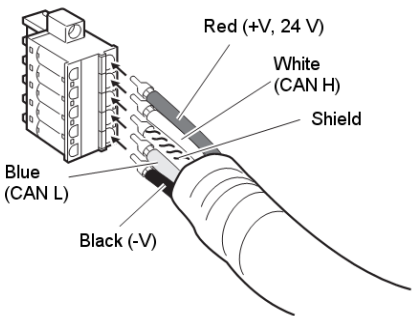
## ■ Installation Procedure

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

1. Power down the inverter
2. Loosen the screw of the option board cover, remove the cover and put the cover aside
3. 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
4. Connect the grounding cable to the chassis ground of the inverter (located on the cooling fin)
5. If removed, mount the terminal cover again and tighten the screw(s)
6. Push the 3G3AX-MX2-DRT-E option board into the previous location of the option board cover until it clicks into place
7. Tighten the screw of the option board (do not over-tighten).
8. Select the right warning language from the warning label sheet and replace the English warning if appropriate.
9. Power up the inverter and select
  - the node number via inverter parameter P192
  - the default connection path P046For other option board related inverter parameters see below
10. Power down the inverter before attaching the DeviceNet connector

## ■ DeviceNet Connector and Wiring

The 3G3AX-MX2-DRT-E option board is supplied with a multi-drop DeviceNet connector with color coded lines. Connect the DeviceNet network's communications cable to the DeviceNet communications connector.



## ■ EDS File and CX-Integrator

OMRON provides a series of EDS files for the 3G3AX-MX2-DRT-E option board via the OMRON website. For each of the MX2 inverter type there is a unique EDS file, which is named:

3G3AX-MX2-DRT-□-E.eds

□ indicates the specific inverter type, such as A4150 or AB004\_A2004. Use these EDS files in the DeviceNet master configuration program used to configure your DeviceNet master.

CX-Integrator is the configuration program for OMRON DeviceNet masters. Start CX-Integrator and select the Tools/EDS File/Install menu item. Select the EDS file(s) to start using the 3G3AX-MX2-DRT-E together with OMRON DeviceNet masters.

## ■ Supported Modules and I/O Register Layout

The 3G3AX-MX2-DRT-E supports the modules as listed in the EDS file. The modules can be selected as pair by using the default connection / fixed allocation mechanism of the master or by user allocation. The table below shows which modules can be selected given the setting in P046: Default Connection Path.

P046	Description	Output assembly	Input assembly
0	Basic Speed IO	20	70
1	Extended Speed IO (default)	21	71
2	Extended Speed and Torque Control	123	173
3	Special IO	100	150
4	Extended Control IO	101	151
5	Extended Control IO and Multi function IO monitor	101	153
6	Flexible format	139	159
7	Extended Speed and Acceleration Control	110	111

The DeviceNet master can be the source of either frequency reference or run command. The selected modules influences the required source selection. See the section below about Option Board Related Inverter Parameters.

In case the DeviceNet master is configured using the user allocation, only the pairs as specified for the default connection paths are supported.

## ■ LED Indicators

Indicator	Color	Status	Meaning
MS (Module Status)	Green	Lit	Normal operating status
	Red	Lit	Unit hardware error
		Flashing	Unsupported inverter version. DeviceNet power supply is OFF.
	---	Not lit	Power is not supplied to the Slave Unit. The Unit is being reset.
NS (Network Status)	Green	Lit	Network is operating normally (communications established)
		Flashing	Network is operating normally, but communications have not been established.
	Red	Lit	Communications error. Unit has detected that network communication is not possible. Bus Off error. Node address duplication.
		Flashing	Communications time-out.
	---	Not lit	Checking for node address duplication at the Master. Power supply is OFF.

## ■ Option Board Related Inverter Parameters

Various inverter parameters influence the behaviour of the option board. The table below shows these parameters. Please note that most parameter changes require a power cycle of the inverter or a restart of the option board.

DeviceNet Network Related Parameters		
Par	Description	Setting
P192	DeviceNet Node Address	0 to 63 (default: 63)
P044	Communication watchdog timer while running. Note: additional to Devicenet inactivity timer.	0 to 9999 in 0.01 s units. Set 0 to disable. Action is defined in P045.
P045	Action on Network Error	Set to 0 for inverter trip (default) Set to 1 for deceleration and trip Set to 2 for no action Set to 3 for stop due to free-run Set to 4 for deceleration and stop
P048	Action on Network Idle Mode	

Source Selection Parameters		
Par	Description	Setting
A001	Motor 1 Frequency Source	For option board as source: Set to 4 for P046 is not 6 Set to 3 for P046 is 6 (Flexible format)
A002	Motor 1 Run Command Source	
P033	Torque Command Source	For option board as source: Set to 6 for P046 is not 6 Set to 3 for P046 is 6 (Flexible format)
P036	Torque Bias Mode	For option board as source: Set to 5 for P046 is not 6 Set to 0 for P046 is 6 (Flexible format)
C021	Output Terminal 11 Source	Set to 63 for option board as source
C022	Output Terminal 12 Source	Set to 63 for option board as source
C028	Analog Output AM Source	Set to 16 for option board as source
Option Board Behaviour Related Parameters		
Par	Description	Setting
C102	Reset Mode Selection	Set to 3 for resetting trip only
P160-P169	Output Register 1 to 10 contents	Modbus register mapped into flexible output word 1 to 10
P170-P179	Input Register 1 to 10 contents	Modbus register mapped into flexible input word 1 to 10

## ■ IO Assembly Object Allocation

The following table shows the I/O allocation for the main assemblies.

Word	Bit Allocation							
	7 15	6 14	5 13	4 12	3 11	2 10	1 9	0 8
Instance ID 20: Basic Speed Control Output								
n	-	-	-	-	-	RST	-	FWD
n + 1	Rotational Speed Reference (default [0.01 Hz]) Rotational Speed Reference							
Instance ID 70: Basic Speed Control Input								
n	-	-	-	-	-	DFR	-	FLT
n + 1	Rotational Speed Monitor (default [0.01 Hz]) Rotational Speed Monitor							
Instance ID 21: Extended Speed Control Output								
n	-	REF	CTR	-	-	RST	REV	FWD
n + 1	Rotational Speed Reference (default [0.01 Hz]) Rotational Speed Reference							
Instance ID 71: Extended Speed Control Input								
n	ARF	RFN	CFN	RDY	DRR	DFR	WR	FLT
n + 1	Drive Status (see below) Rotational Speed Monitor (default [0.01 Hz]) Rotational Speed Monitor							
Instance ID 123: Extended Speed and Torque Control Output								
n/n+1	See instance ID 21							
n + 2	Torque Reference [1 %] Torque Reference							
Instance ID 173: Extended Speed and Torque Control Input								
n/n+1	See instance ID 71							
n + 2	Torque actual [1 %] Torque actual							
Instance ID 101: Extended Control Output								
n	- CO2	CI7 CO1	CI6 CR	CI5 -	CI4 -	CI3 -	REV RST	FWD FFL
n + 1	Rotational Speed Reference (default [0.01 Hz]) Rotational Speed Reference							
n + 2	Torque Reference [1 %] Torque Reference							
n + 3	Torque Compensation Bias [1 %] Torque Compensation Bias							
Instance ID 151: Extended Control Input								
n	FLT	WR	RDY	ARF	-	DRR	DZS	DFR
n + 1	-	-	MO2	MO1	MR	CFN	-	-
n + 2	Rotational Speed Monitor (default [0.01 Hz]) Rotational Speed Monitor							
n + 3	Torque actual [1 %] Torque actual							
n + 4	Output current monitor [0.1 A] Output current monitor							

Word	Bit Allocation							
	7	6	5	4	3	2	1	0
	15	14	13	12	11	10	9	8
Instance ID 153: Extended Control Input + Multi Function Input								
n to n + 3	See instance ID 151.							
n + 4	-	MI7	MI6	MI5	MI4	MI3	MI2	MI1

## Output bits

Bit	Name	Description
FWD	Forward/Stop	0: Stop 1: Forward
REV	Reverse/Stop	0: Stop 2: Reverse
RST	Fault Reset	Reset Fault/Trip condition on transition from 0 to 1
REF	NetRef	Speed reference input is set. 0: Setting of A002 1: DeviceNet reference
CTR	NetCtrl	Run command input is set. 0: Setting of A001 1: DeviceNet reference
FFL	Force Fault	Force external fault/trip from network
CI3 to CI7	Control /Override Input	0: Reset 1: Set override for Multi Function input 3 to 7
CO1, CO2, CR	Set (Relay) Output	0: Reset 1: Set Multi Function output 1 to 2 or Relay Output (CR)

## Input bits

Bit	Name	Description
FLT	Fault	0: Normal 1: Fault/Trip
WR	Warning	0: Normal 1: Warning
DFR	During forward run	0: Stop/reverse 1: During forward run
DRR	During reverse run	0: Stop/forward 1: During reverse run
DZS	During zero speed	0: Non-zero speed 1: During zero speed.
RDY	Inverter ready	0: Inverter not ready 1: Inverter ready
CFN	Ctrl from Net	Run command input selection 0: Setting of A002 1: DeviceNet controlled
RFN	Ref from Net	Speed reference input selection 0: Setting of A001 1: DeviceNet reference
ARF	At reference	0: Accel/decel phase 1: At reference
MI1 to MI7	Monitor inputs 1 to 7	0: OFF 1: ON
MO1, MO2, MR	Monitor (Relay) outputs	0: OFF 1: ON

## Drive Status (for instance ID 71 and 173)

Value	Description	Value	Description
1	Startup	5	Stopping
2	Not ready	6	Fault/Trip Stop
3	Ready	7	Faulted/Tripped
4	Enabled		

## ■ General Specifications

Item	Specifications
DeviceNet Specification	Designed for conformance.
DeviceNet Profile	AC Drive (0x02)
Automatic baud rate detection	Yes
Ambient operating temperature	See MX2 inverter User's Manual
Ambient operating humidity	See MX2 inverter User's Manual
Storage temperature	-20 °C to 65 °C
Weight	170g

OMRON

OMRON EUROPE BV

Wegalaan 67-69, NL- 2132 JD Hoofddorp  
The Netherlands  
Tel: (31) 23-5681300 / Fax: (31) 23-5681388

Note: Specification is subject to change without notice