

Cat.No I173E-EN-01



## RX Inverter Expansion I/O Board 3G3AX-EIO21-ROE

### USER'S MANUAL



**OMRON**

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## 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 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 3G3RX inverter with a mounted 3G3AX-EIO21-ROE 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 personel 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 requeriment 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.










### Safety Precautions

Definition of Precautionary Information:






 <b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.
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 <b>Caution</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.
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### Warning and Cautions

 <b>WARNING</b>	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.
 <b>WARNING</b>	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.
 <b>WARNING</b>	Do not attempt to disassemble, repair, or modify an option board. Any attempt to do so may result in malfunction, fire, or electric shock.
 <b>WARNING</b>	Wiring, maintenance or inspection must be performed by authorized personnel. Not doing so may result in electrical shock or fire.
 <b>WARNING</b>	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.
 <b>WARNING</b>	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 operation. Not doing so may result in serious accidents.
 <b>WARNING</b>	Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
 <b>WARNING</b>	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.
 <b>Caution</b>	Do not touch the inverter during power-on, and immediately after power-off. Hot surface may cause injury.

**Operating Environment Precautions**

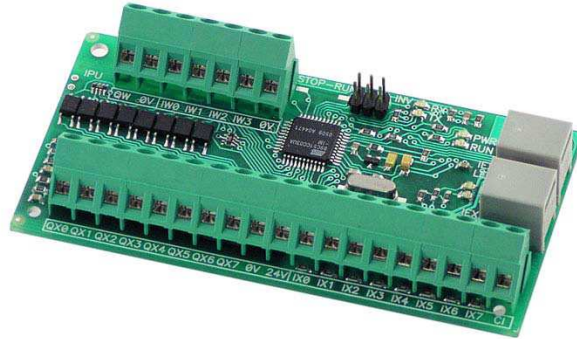
 <b>Caution</b>	<p>Do not operate the 3G3RX Inverter with a mounted 3G3AX-EIO21-ROE option board in the following locations (doing so may result in malfunction, electric shock or burning):</p> <ul style="list-style-type: none"> <li>Locations subject to direct sunlight.</li> <li>Locations subject to condensation as the result of severe changes in temperature.</li> <li>Locations subject to corrosive or flammable gases.</li> <li>Locations subject to dust (especially iron dust) or salts.</li> <li>Locations subject to exposure to water, oil or chemicals.</li> <li>Locations subject to shock or vibration.</li> </ul>
 <b>Caution</b>	<p>Take appropriate and sufficient countermeasures when installing systems in the following locations (doing so may result in malfunction):</p> <ul style="list-style-type: none"> <li>Locations subject to static electricity or other forms of noise.</li> <li>Locations subject to strong electromagnetic fields.</li> <li>Locations subject to possible exposure to radioactivity.</li> <li>Locations subject to power supplies.</li> </ul>
 <b>Caution</b>	<p>The operating environment of the 3G3RX Inverter with a mounted 3G3AX-EIO21-ROE 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.</p>
 <b>Caution</b>	<p>Do not change 3G3AX-EIO21-ROE switch operation during power on. Please, be sure it is in RUN mode before power on the 3G3RX Inverter.</p>
 <b>Caution</b>	<p>Do not attempt to plug-in/plug-out 3G3AX-EIO21-ROE board while the inverter is powered. Doing so inverter may result damaged.</p>

**Application Precautions**

 <b>Caution</b>	<p>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.</p> <p>Always read this precautions:</p> <ul style="list-style-type: none"> <li>• Wire correctly using recommended cables. Incorrect wiring may result in burning.</li> <li>• Be sure that the option board is mounted correctly. Improper mounting may result in malfunction.</li> <li>• When replacing an inverter be sure that all inverter settings of the inverter being replaced are restored to the replacement.</li> <li>• Be sure that the units of the inverter registers match the application when replacing an equivalent inverter type with an 3G3RX Inverter.</li> </ul>
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## 1 GENERAL DESCRIPTION

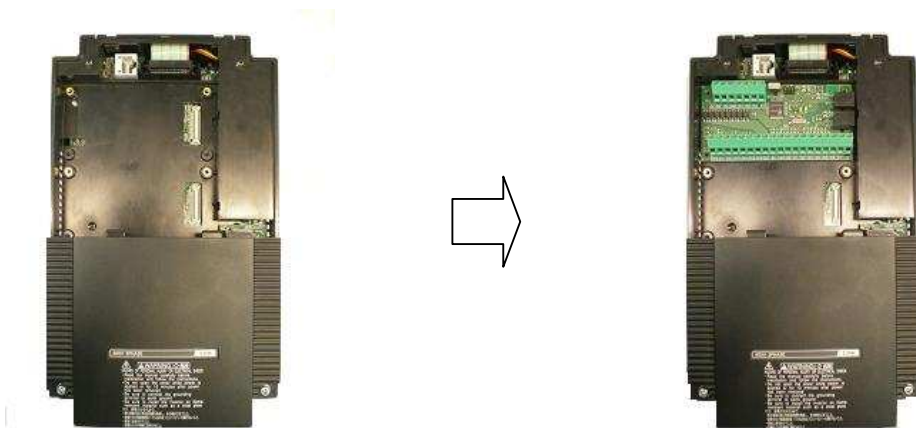
Expansion I/O Board 3G3AX-EIO21-ROE is an option board which can be attached to an 3G3RX inverter.



It has:

- 8 digital inputs
- 8 digital outputs
- 4 analog inputs
- 1 analog output

Expansion I/O Board 3G3AX-EIO21-ROE is placed into inverter option slot .



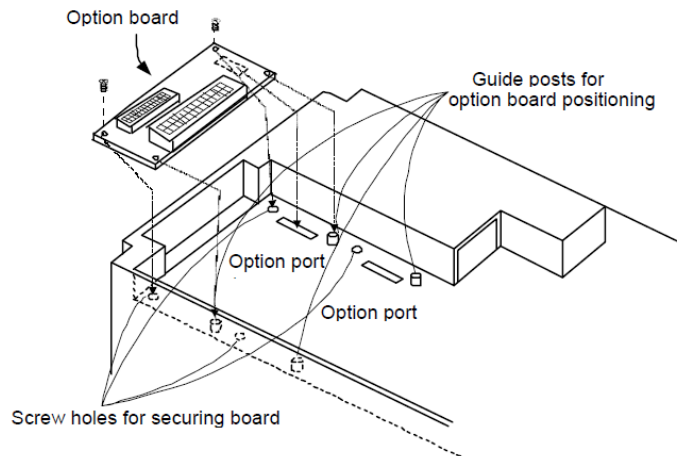
This I/O expansion board can only be used by a Drive Programming application.  
Cannot be used as standard multifunction I/O.

## 2 INSTALLATION PROCEDURE

### 2.1 Installing the Expansion I/O Board

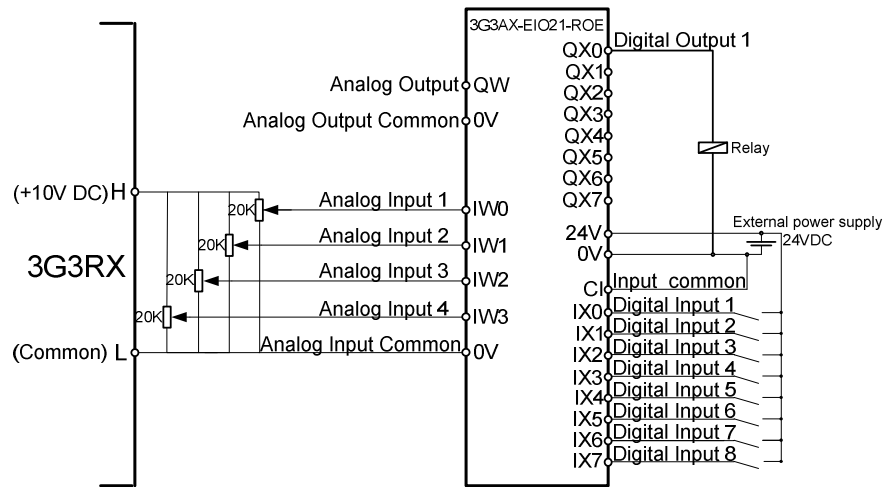
Follow next steps in order to install the expansion I/O board 3G3AX-EIO21-ROE:



- 1.-Before installing the expansion I/O board, power up the inverter.
- 2.-Set inverter parameter C091-Debug Mode = 1.
- 3.-Set parameter P199 = 1.(\*)
- 4.-Power down the inverter and wait at least five minutes before moving to the next step.
- 5.-Open and remove the lower terminal cover and confirm that the red CHARGE LED is extinguished and that the DC bus is fully discharged before proceeding further, otherwise there is the danger of electric shock.
- 6.-Then remove keypad from inverter. You can now remove the upper front cover to expose the two option ports inside.
- 7.-Next figure shows how to install the option board to option port 1 or 2 of the inverter. There are four holes on the corners of the option board. Align the board with the port connection in the proper orientation (to the left, when facing the inverter as show). Then align the top two holes with the two screw holes, and the bottom two holes with the two guide posts. Insert the board fully into the connector. Secure the board with the two screws supplied.





8.-Wire expansion I/O board 3G3AX-EIO21-ROE. Wiring example:




 <b>Caution</b>	The maximum output current in 3G3RX terminal H is 20mA. Please refer to the 3G3RX User's Manual for detailed information.
 <b>Caution</b>	Recalculate potentiometer values in case of different wiring.

9.- Power up the inverter. Confirm in the expansion I/O board that PWR led is activated.

10.- Create with CX-Drive and Drive Programming tool your program using the exclusively dedicated user parameters for your application purpose.

11.- Set the inverter parameter A017 to value 1 or 2 to start the Drive Programming program. RUN led is activated indicating I/O board is working.

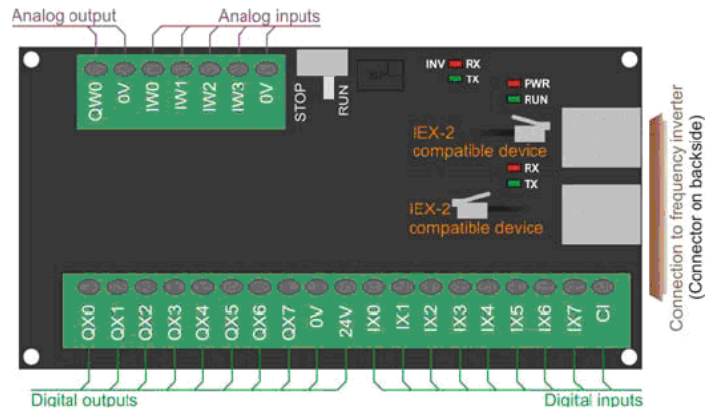
 <b>Caution</b>	Do not attempt to change the 3G3AX-EIO21-ROE switch from RUN to STOP while power is being supplied. Any attempt to do so may result in malfunction.
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(\*) Option boards (3G3AX-RX-PRT-E(Profibus DP), 3G3AX-RX-DRT-E(Devicenet), 3G3AX-RX-CRT-E(Componet),3G3AX-RX-MRT-E(MECHATROLINK-II) and 3G3AX-RX-ECT(EtherCAT) will not work with 3G3AX-EIO21-ROE.

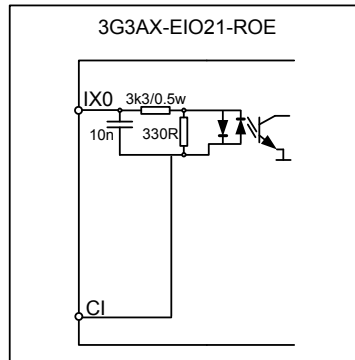


### 3 TECHNICAL SPECIFICATIONS

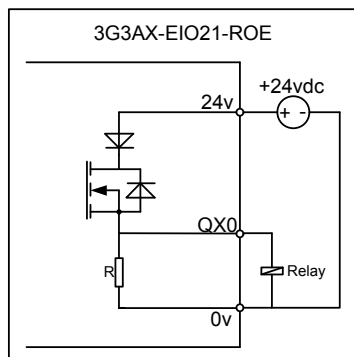
Picture below summarizes Expansion I/O Board 3G3AX-EIO21-ROE inputs and outputs:



Digital Inputs (IX)	
Input type	24V, typ. 7mA, sink or source (PNP or NPN), opto isolated
Debounce	10ms software filter, common for all inputs
Update time	10ms



Digital Outputs (QX)	
Output type	N-channel V-FET (current source, load to ground), opto isolated
Load	500mA/30V DC
Update time	100ms



<b>Analog Inputs (IW)</b>	
Input type	0..10V
Input resistance	10 Kohm
A/D converter	8-bit
Conversion time	100us
Update time	100ms
Accuracy	2% of FSR at 25°C

<b>Analog Output (QW)</b>	
Output type	0..10V
Output current	max. 10mA
D/A converter	8-bit
Setting time	100us
Update time	100ms
Accuracy	2% of FSR at 25°C

## 4 OPTION BOARD RELATED INVERTER PARAMETERS

### 4.1 Dedicated User Parameters

Using Expansion I/O Board 3G3AX-EIO21-ROE on 3G3RX inverter some Drive Programming internal user parameters are exclusively dedicated. Refer to the next table:

Parameters	Description	Range
U(00)	To read the 8 expanded digital input status	0 – 255 [from bit 0(IX0) to bit 7(IX7)]
U(01)	To write into the 8 expanded digital outputs	0 – 255 [from bit 0(QX0) to bit 7(QX7)]
U(02)	To read the expanded Analog Input IW0	0 – 255 [0 VDC – 10 VDC]
U(03)	To read the expanded Analog Input IW1	0 – 255 [0 VDC – 10 VDC]
U(04)	To read the expanded Analog Input IW2	0 – 255 [0 VDC – 10 VDC]
U(05)	To read the expanded Analog Input IW3	0 – 255 [0 VDC – 10 VDC]
U(06)	To write the expanded Analog Output QW value	0 – 255 [0 VDC – 10 VDC]


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

· **U(00)**: stores the status of the 8 expanded Digital Inputs. The next table indicates the correspondence between each expanded digital input and U(00) parameter bit:

U(00)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
0	0	0	0	0	0	0	0	IX7	IX6	IX5	IX4	IX3	IX2	IX1	IX0

· **U(01)**: to write into the 8 expanded Digital Outputs. The next table indicates the correspondence between each expanded digital output and U(01) parameter bit:

U(01)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
X	X	X	X	X	X	X	X	QX7	QX6	QX5	QX4	QX3	QX2	QX1	QX0

 <b>Caution</b>	if U(01) user parameter has a value greater than 255, all 3G3AX-EIO21-ROE digital outputs will be activated during Drive Programming program execution.
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## 4.3 Drive Programming example

```

1  '-----
2  'Drive Programming exclusive dedicated registers for Expansion I/O Module 3G3AX-EIO21-ROE
3  '-----
4
5  #region 3G3AX-EIO21-ROE
6
7  #alias global IX    as U(00)          ' Used for 8 Digital Inputs  [ix0 to ix7 terminals]
8  #alias global QX    as U(01)          ' Used for 8 Digital Outputs [qx0 to qx7 terminals]
9  #alias global IW0    as U(02)          ' Used for Analog Input 0   [iw0 - terminal]
10 #alias global IW1    as U(03)          ' Used for Analog Input 1   [iw1 - terminal]
11 #alias global IW2    as U(04)          ' Used for Analog Input 2   [iw2 - terminal]
12 #alias global IW3    as U(05)          ' Used for Analog Input 3   [iw3 - terminal]
13 #alias global QW     as U(06)          ' Used for Analog Output 0  [qw - terminal]
14
15 #endregion
16
17 #region Constant_Mask
18
19 #alias global cIX0 as 1          ' Constant definition for Digital Input IX0
20 #alias global cIX1 as 2          ' Constant definition for Digital Input IX1
21 #alias global cIX2 as 4          ' Constant definition for Digital Input IX2
22 #alias global cIX3 as 8          ' Constant definition for Digital Input IX3
23 #alias global cIX4 as 16         ' Constant definition for Digital Input IX4
24 #alias global cIX5 as 32         ' Constant definition for Digital Input IX5
25 #alias global cIX6 as 64         ' Constant definition for Digital Input IX6
26 #alias global cIX7 as 128        ' Constant definition for Digital Input IX7
27
28 #alias global cQX0 as 1          ' Constant definition for Digital Output QX0 with a mask
29 #alias global cQX1 as 2          ' Constant definition for Digital Output QX1 with a mask
30 #alias global cQX2 as 4          ' Constant definition for Digital Output QX2 with a mask
31 #alias global cQX3 as 8          ' Constant definition for Digital Output QX3 with a mask
32 #alias global cQX4 as 16         ' Constant definition for Digital Output QX4 with a mask
33 #alias global cQX5 as 32         ' Constant definition for Digital Output QX5 with a mask
34 #alias global cQX6 as 64         ' Constant definition for Digital Output QX6 with a mask
35 #alias global cQX7 as 128        ' Constant definition for Digital Output QX7 with a mask
36
37 #endregion
38
39
40 entry
41
42     QX := 0          ' It sets Digital Outputs to zero.
43     QW := 0          ' It sets Analog Output to zero.
44
45 :Top
46
47     '-----
48     'Read IX0 Status from Expanded I/O board 3G3AX-EIO21-ROE
49     '-----
50     U(10) := IX and cIX0
51     U(11) := U(10) / cIX0
52
53     '-----
54     'Read IX5 Status from Expanded I/O board 3G3AX-EIO21-ROE
55     '-----
56     U(10) := IX and cIX5
57     U(12) := U(10) / cIX5
58
59     '-----
60     'Monitor Analog Input 0 [IW0] value from Expanded I/O Board 3G3AX-EIO21-ROE
61     '-----
62     UMon(0) := IW0
63
64     '-----
65     'Monitor Analog Input 1 [IW1] value from Expanded I/O Board 3G3AX-EIO21-ROE
66     '-----
67     UMon(1) := IW1
68
69     '-----
70     'Activating 3G3AX-EIO21-ROE Digital Outputs QX0 and QX3
71     '-----
72     QX := QX or cQX0          ' It will activate Digital Output QX0
73     QX := QX or cQX3          ' It will activate Digital Output QX3
74
75     goto Top
76
77 end
78

```