Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Cat. No. W238-E1-10

SYSMAC
CQM1H/CQM1 Series

Dedicated I/O Units

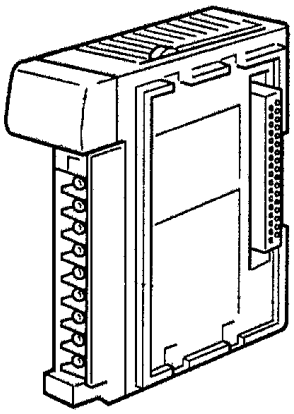
OPERATION MANUAL

OMRON

CQM1H/CQM1Series Dedicated I/O Units

Operation Manual

Revised November 2003



6495

Notice of Changes to Information on Conformance to EC Directives

OMRON

Applicable Manual
W238-E1-10

OMRON Corporation

Thank you for supporting OMRON products.
The EC Directive EN 61131-2 was modified as of May 1, 2006. As a result of the modification, the EC Directive information provided in the manual is not completely accurate. Please use the information provided below.

Conformance to EC Directives

Applicable Directives

- EMC Directives
- Low Voltage Directive

Concepts

■ EMC Directives

OMRON supplies electric devices that are used built into other devices or manufacturing equipment. These OMRON products are designed to conform to the related EMC standards (see note) so that the devices or equipment in which they are used can more easily conform to EMC standards.
EMC-related performance of the OMRON devices that conform to EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

Note: Applicable EMC (Electromagnetic Compatibility) standards are as follows: EN 61131-2

■ Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC meet the required safety standards for the PLC (EN 61131-2).

Conformance to EC Directives

CQM1-series products conform to EC Directives (see note). However, the following precautions must be observed to ensure that the machine or device in which the CQM1 PLC is used conforms to EC Directives:

1 The CQM1 PLC must be installed within a control panel.

2 You must use reinforced insulation or double insulation for the DC power supplies connected to the power supply terminals on PLCs that take DC power and for the DC power supplies connected to I/O Units. The DC power supply connected to the power supply terminals on PLCs using DC power must have an output hold time of at least 10 ms.

3 CQM1-series products conforming to EC Directives also conform to EN 61131-2 for EMI. Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment conforms to EC Directives even when using CQM1-series products that conform to EC Directives.

Note: Of the products that appear in this manual, the following products conform to EC Directives.
CQM1-LK501 I/O Link Unit
CQM1-AD041 Analog Input Unit
CQM1-DA021 Analog Output Unit
CQM1-IPS0□ Analog Power Supply Units
CQM1-TC20□/TC30□ Temperature Control Units

Conditions for Conforming to EMC Directives

The following immunity test conditions (i.e., error resulting from momentary variations in I/O data) apply to CQM1 Analog I/O Units.

Overall Accuracy
CQM1-AD041 Analog Input Unit: +12%/−6%
CQM1-DA021 Analog Output Unit: +12%/−6%

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠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.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC" means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1,2,3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

About this Manual:

This manual describes the installation and operation of the CQM1H/CQM1-series Dedicated I/O Units and includes the parts and sections described below. The CQM1H/CQM1-series Dedicated I/O Units consist of the Units listed below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the CQM1H/CQM1-series Dedicated I/O Units.

Part I: B7A Interface Units

Section 1 describes the general features, system configuration, and word allocation of the B7A Interface Units.

Section 2 provides the nomenclature and switch settings for the B7A Interface Units.

Section 3 describes the connections between the B7A Interface Units and B7A Link Terminals.

The **Appendix** provides the specifications for the Units.

Part II: G730 Interface Units

Section 1 describes the general features, system configuration, and word allocation of the G730 Interface Units.

Section 2 provides the nomenclature and switch settings for the G730 Interface Units.

Section 3 describes the connections between the G730 Interface Units and G730 Remote Terminals.

Section 4 provides the operational procedures for the G730 Interface Unit.

The **Appendices** provide the specifications, dimensions, and troubleshooting procedure for the Units.

Part III: I/O Link Unit

Section 1 describes the general features, system configuration, and word allocation of the CQM1-LK501 I/O Link Unit.

Section 2 provides the nomenclature and switch settings for the CQM1-LK501 I/O Link Unit.

Section 3 describes the SYSMAC BUS cable connections for the CQM1-LK501 I/O Link Unit.

The **Appendix** provides the specifications for the Unit.

Part IV: Analog Input Unit and Analog Power Supply Units

Section 1 provides the features and system configuration relating to the Analog Input Unit and Analog Power Supply Units.

Section 2 provides the nomenclature and functions of the Analog Input Unit and Analog Power Supply Units.

Section 3 provides the operational procedures for the Analog Input Unit and Analog Power Supply Units.

The **Appendices** provide the specifications, internal configuration, dimensions, and troubleshooting procedure for the Units.

Part V: Analog Output Unit and Analog Power Supply Units

Section 1 provides the features and system configuration relating to the Analog Output Unit and Analog Power Supply Units.

Section 2 provides the nomenclature and functions of the Analog Output Unit.

Section 3 provides the operational procedures for the Analog Output Unit.

The **Appendices** provide the specifications and troubleshooting procedures for the Units.

> ⚠ **WARNING** Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

Part VI: Sensor Unit

Section 1 provides the features and system configuration relating to the Sensor Unit and dedicated sensor modules.

Section 2 provides the nomenclature and switch settings for the CQM1-SEN01, CQM1-TU001, E3X-MA11, E3C-MA11, and E2C-MA11.

Section 3 describes the connections between the CQM1-SEN01 and E3X-MA11, E3C-MA11, E2C-MA11, and CQM1-TU001.

Section 4 provides information on the operation of the CQM1-SEN01.

Section 5 provides information on the operation of the CQM1-TU001 Remote Console.

The **Appendix** provides the specifications for the Units.

Part VII: Linear Sensor Interface Units

Section 1 provides the features and system configuration relating to the Linear Sensor Interface Unit.

Section 2 provides an explanation of the scaling, timing hold, measured value, teaching, forced-zero shift, and monitor output functions.

Section 3 provides the nomenclature, and terminal and indicator functions of the Linear Sensor Interface Unit.

Section 4 describes the connections of the Linear Sensor Interface Unit.

Section 5 describes the basic operation of the Linear Sensor Interface Unit using the Programming Console.

Section 6 describes the applied operation of the Linear Sensor Interface Unit using the Programming Console.

Section 7 provides details on the commands and responses of the Linear Sensor Interface Unit.

The **Appendices** provide the specifications, block diagram, data processing timing, and troubleshooting for the Units.

Part VIII: Temperature Control Units

Section 1 lists the Temperature Control Unit model numbers and the basic specifications for each Unit.

Section 2 describes the features and operation of the CQM1-TC20□/TC30□ Temperature Control Units.

Section 3 describes the features and operation of the CQM1-TC00□/TC10□ Temperature Control Units.

The **Appendix** provides the specifications for the Unit.

PRECAUTIONS

This section provides general precautions for using the Programmable Controller (PC) and related devices.

The information contained in this section is important for the safe and reliable application of the Programmable Controller. You must read this section and understand the information contained before attempting to set up or operate a PC system.

1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the 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.

This manual provides information for programming and operating the Unit. Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation.

⚠WARNING It is extremely important that a PC and all PC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PC System to the above-mentioned applications.

3 Safety Precautions

⚠WARNING Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.

⚠WARNING Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.

⚠WARNING Provide safety measures in external circuits, i.e., not in the Programmable Controller (CPU Unit and associated Units; referred to as “PC”), in order to ensure safety in the system if an abnormality occurs due to malfunction of the PC or another external factor affecting the PC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.

- The PC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-VDC output (service power supply to the PC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

⚠ **Caution** Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

⚠ **Caution** Confirm safety at the destination node before transferring a program to another node or editing the I/O area. Doing either of these without confirming safety may result in injury.

⚠ **WARNING** Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.

⚠ **Caution** Provide appropriate safety measures, such as overheat prevention and alarm systems, in separate circuits to ensure safety of the entire system even when the Temperature Controller malfunctions.

4 Operating Environment Precautions

⚠ **Caution** Do not operate the control system in the following places:

- 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:

- 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 PC System 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 PC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PC System.

⚠ **WARNING** Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always ground to 100 Ω or less when installing the Units. Improper grounding may result in electric shock.
- Always turn OFF the power supply to the PC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
  - Assembling the Units.
  - Setting DIP switches or rotary switches.
  - Connecting or wiring the cables.
  - Connecting or disconnecting the connectors.

⚠ **Caution** Failure to abide by the following precautions could lead to faulty operation of the PC or the system, or could damage the PC or PC Units. Always heed these precautions.

- 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.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Mount the Unit only after checking the terminal block completely.
- Be sure that all the mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Always use the power supply voltage specified in this operation manual. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.

- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Disconnect the functional ground terminal when performing withstand voltage tests. Not disconnecting the functional ground terminal may result in burning.
- Double-check all the wiring and switch settings before turning ON the power supply. Incorrect wiring or switch settings may result in burning.
- Check that the DIP switches and data memory (DM) are properly set before starting operation.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Resume operation only after transferring to the new CPU Unit the contents of the DM and HR Areas required for resuming operation. Not doing so may result in an unexpected operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
  - Changing the operating mode of the PC.
  - Force-setting/force-resetting any bit in memory.
  - Changing the present value of any word or any set value in memory.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables. Doing so may break the cables.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- Before touching the Unit, 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.
- Do not turn OFF the power supply to the Unit while data is being transferred.
- When transporting or storing the product, cover the PCBs with electrically conductive materials to prevent LSIs and ICs from being damaged by static electricity, and also keep the product within the specified storage temperature range.
- Install the Unit properly as specified in the operation manual. Improper installation of the Unit may result in malfunction.
- Provide a control circuit so that the power to the I/O circuits will turn ON after the power to the PC turns ON. If the power to the I/O circuits turns ON before the power to the PC turns ON, the system may malfunction temporarily.
- If the I/O Hold Bit (SR 25212) is turned ON, the outputs from the PC will not be turned OFF and will maintain their previous status when the PC is switched from RUN or MONITOR mode to PROGRAM mode. Make sure that the external loads will not produce dangerous conditions when this occurs. (When operation stops for a fatal error, including those produced

with the FALS(07) instruction, all outputs from Output Unit will be turned OFF and only the internal output status will be maintained.)

- When assembling the Units or mounting the end cover, be sure to lock them securely as shown in the following illustrations. If they are not properly locked, desired functionality may not be achieved.
- Be sure to mount the end cover to the rightmost Unit.
- Be sure that the connectors, terminal blocks, connection cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Be sure to confirm the orientation and polarities when connecting terminal blocks and connectors.
- Do not touch the back side of circuit boards or the components mounted to them with your bare hands. There are sharp leads and other parts on the boards that may cause injury if handled improperly.
- Provide sufficient clearances around the Unit and other devices to ensure proper heat dissipation. Do not cover the ventilation openings of the Unit.
- Do not allow metallic objects or conductive wires to enter the Unit.
- Set the operating settings of the Temperature Controller properly according to the system to be controlled.
- Allow at least 30 minutes after turning ON the Temperature Controller as warmup time.
- Do not use thinner to clean the product. Use commercially available cleaning alcohol.

PART I
B7A Interface Unit

CQM1-B7A02
CQM1-B7A03
CQM1-B7A12
CQM1-B7A13
CQM1-B7A21

SECTION 1
Features and System Configuration

This section describes the general features, system configuration, and word allocation of the CQM1-B7A□□ Interface Units.

1-1 Features

- The CQM1-B7A□□ Interface Unit incorporates the B7A transmission operations for the CQM1H/CQM1 I/O Unit.
- The following five models of CQM1H/CQM1 B7A Interface Unit are available.

Model	No. of points	
	Input	Output
CQM1-B7A21	16	16
CQM1-B7A13	32	0
CQM1-B7A03	0	32
CQM1-B7A12	16	0
CQM1-B7A02	0	16

- Each Unit can be connected to the same number of points on 16-point B7A Link Terminals as provided by the Unit. For example, two B7A Link Terminal Units with 16 input points each can be connected to a CQM1-B7A13.
- The transmission delay time can be switched between STANDARD (19.2 ms rated) or RAPID (3 ms rated).
- The data processing when a transmission error occurs can be switched between HOLD (see note 1) and LOAD OFF (see note 2).
- The CPU treats the B7A Interface Units as the equivalent number of points. It can handle remote I/O equipment, such as switches and lamps, without recognizing communications.

Note 1. HOLD: When an error occurs, the input bit status immediately prior to the error is held.

2. LOAD OFF: When an error occurs, all input bits turn off.

The B7A Link Terminal is a terminal board that incorporates a communication function, connects to external I/O devices, and communicates with a PC over a single cable, thus reducing wiring effort.

Differences Between CQM1-B7A01 and CQM1-B7A21

CQM1-B7A21 is an upgraded version of the CQM1-B7A01 and can replace the CQM1-B7A01.

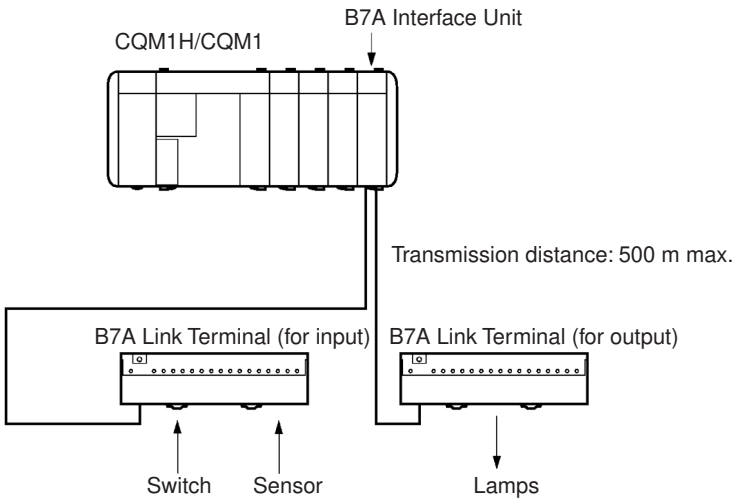
The features listed in the table below have been added to the CQM1-B7A21.

Item	CQM1-B7A01	CQM1-B7A21
Transmission delay time	STANDARD only	STANDARD/RAPID switchable
Transmission error processing	HOLD	HOLD/LOAD OFF switchable

Note CQM1-B7A01 is no longer in production. Use the upgraded CQM1-B7A21.

1-2 System Configuration

The following is a CQM1H/CQM1 system configuration with a B7A Interface Unit.



Note The maximum transmission distance depends on the transmission delay time and the power supply wiring.

Refer to *3-1 Connections to B7A Link Terminals*.

1-3 Connecting Devices

1-3-1 CPU

The B7A Interface Unit connects to the following CPUs.

Name	Model
CQM1H-series CPU	CQM1H-CPU11
	CQM1H-CPU21
	CQM1H-CPU51
	CQM1H-CPU61
CQM1-series CPU	CQM1-CPU11-E
	CQM1-CPU21-E
	CQM1-CPU41-EV1
	CQM1-CPU42-EV1
	CQM1-CPU43-EV1
	CQM1-CPU44-EV1

1-3-2 B7A Link Terminal

The B7A Interface Unit connects to the following 16-point B7A Link Terminals with a standard I/O delay of 19.2 ms (typical).

Input

Name	Model	Transmission delay time
Screw terminal models	B7A-T6□1	STANDARD (19.2 ms)
	B7AS-T6□1	
	B7A-T6□6	RAPID (3 ms)
	B7AS-T6□6	
Module models	B7A-T6D2	STANDARD (19.2 ms)
	B7A-T6D7	RAPID (3 ms)
PC connector models	B7A-T□E3	STANDARD (19.2 ms)
	B7A-T□E8	RAPID (3 ms)