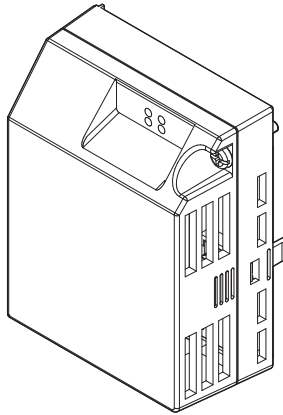


# YASKAWA AC Drive-V1000 Option EtherNet/IP Installation Manual

Type SI-EN3/V

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.



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# Table of Contents

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<b>1 PREFACE AND SAFETY .....</b>	<b>4</b>
<b>2 PRODUCT OVERVIEW .....</b>	<b>9</b>
<b>3 RECEIVING .....</b>	<b>10</b>
<b>4 ETHERNET/IP OPTION COMPONENTS .....</b>	<b>11</b>
<b>5 INSTALLATION PROCEDURE .....</b>	<b>15</b>
<b>6 ETHERNET/IP OPTION DRIVE PARAMETERS .....</b>	<b>23</b>
<b>7 CONFIGURING ETHERNET/IP MESSAGING .....</b>	<b>26</b>
<b>8 WEB INTERFACE .....</b>	<b>28</b>
<b>9 TROUBLESHOOTING .....</b>	<b>31</b>
<b>10 SPECIFICATIONS .....</b>	<b>35</b>


# 1 Preface and Safety

Yaskawa manufactures products used as components in a wide variety of industrial systems and equipment. The selection and application of Yaskawa products remain the responsibility of the equipment manufacturer or end user. Yaskawa accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any Yaskawa product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All systems or equipment designed to incorporate a product manufactured by Yaskawa must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by Yaskawa must be promptly provided to the end user. Yaskawa offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the Yaskawa manual. **NO OTHER WARRANTY, EXPRESSED OR IMPLIED, IS OFFERED.** Yaskawa assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.


## ◆ Applicable Documentation

The following manuals are available for the EtherNet/IP Option:

### Option Unit

	<b>Yaskawa AC Drive -V1000 Option EtherNet/IP Installation Manual</b> <b>Manual No: TOEP YEACOM 01□</b>
	Read this manual first. The installation manual is packaged with the EtherNet/IP Option and contains a basic overview of wiring, settings, functions, and fault diagnoses.
	<b>Yaskawa AC Drive -V1000 Option EtherNet/IP Technical Manual</b> <b>Manual No: SIEP YEACOM 01□</b>
	The technical manual contains detailed information and command registers. To obtain the technical manual access these sites: U.S.: <a href="http://www.yaskawa.com">http://www.yaskawa.com</a> Other areas: contact a Yaskawa representative.

### Yaskawa Drive

	<b>Yaskawa AC Drive-V1000 Quick Start Guide</b> <b>Manual No: TOEP C710606 14□</b>	To obtain instruction manuals for Yaskawa products access these sites: U.S.: <a href="http://www.yaskawa.com">http://www.yaskawa.com</a> Europe: <a href="http://www.yaskawa.eu.com">http://www.yaskawa.eu.com</a> Japan: <a href="http://www.e-mechatronics.com">http://www.e-mechatronics.com</a> Other areas: contact a Yaskawa representative.
	<b>Yaskawa AC Drive-V1000 Technical Manual</b> <b>Manual No: SIEP C710606 18□</b>	

## ◆ Terms

**Note:** Indicates a supplement or precaution that does not cause drive damage.

**Drive:** Yaskawa AC Drive-V1000 Series

**EtherNet/IP Option:** Yaskawa AC Drive-V1000 Option EtherNet/IP SI-EN3/V

≥ **1012:** Indicates a drive feature or function that is only available in drive software version 1012 or greater.

# 1 Preface and Safety

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## ◆ Registered Trademarks

- EtherNet/IP is a trademark of the ODVA.
  - All trademarks are the property of their respective owners.
- 

## ◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option unit. The option unit must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

### **DANGER**

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

### **WARNING**

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

### **CAUTION**

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

### **NOTICE**

Indicates an equipment damage message.

## ■ General Safety

### General Precautions

- The diagrams in this section may include option units and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option should be used according to the instructions described in this manual.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- When ordering a new copy of the manual due to damage or loss, contact your Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover.

### DANGER

#### **Heed the safety messages in this manual.**

Failure to comply will result in death or serious injury.

The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual.

### NOTICE

#### **Do not expose the drive to halogen group disinfectants.**

Failure to comply may cause damage to the electrical components in the option unit.

Do not pack the drive in wooden materials that have been fumigated or sterilized.

Do not sterilize the entire package after the product is packed.

#### **Do not modify the drive circuitry.**

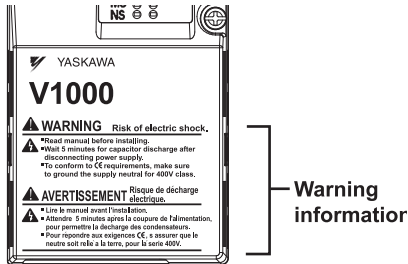
Failure to comply could result in damage to the drive and will void warranty.

YASKAWA is not responsible for any modification of the product made by the user. This product must not be modified.

# 1 Preface and Safety


## ■ Option Unit Warning Labels

Warning information is displayed on the option unit as shown in the figure below. Follow all warnings and safety instructions when using the product.




## ■ Warning Contents

### **WARNING** Risk of electric shock.

-  Read manual before installing.
- Wait 5 minutes for capacitor discharge after disconnecting power supply.
- To conform to **CE** requirements, make sure to ground the supply neutral for 400V class.

### **AVERTISSEMENT** Risque de décharge électrique.

-  Lire le manuel avant l'installation.
- Attendre 5 minutes après la coupure de l'alimentation, pour permettre la décharge des condensateurs.
- Pour répondre aux exigences **CE**, s'assurer que le neutre soit relié à la terre, pour la série 400V.



## 2 Product Overview

### ◆ About This Product

The EtherNet/IP Option provides a communications connection between the drive and an ODVA EtherNet/IP network. The EtherNet/IP Option connects the drive to an EtherNet/IP network and facilitates the exchange of data.

This manual explains the handling, installation and specifications of this product.

EtherNet/IP is a communications link to connect industrial devices (such as smart motor controllers, operator interfaces, and variable frequency drives) as well as control devices (such as programmable controllers and computers) to a network. EtherNet/IP is a simple, networking solution that reduces the cost and time to wire and install factory automation devices, while providing interchangeability of "like" components from multiple vendors.

EtherNet/IP is an open device network standard.

By installing the EtherNet/IP Option to a drive, it is possible to do the following from a EtherNet/IP master device:

- operate the drive
- monitor the operation status of the drive
- change parameter settings.

**EtherNet/IP™**  
conformance tested

### ◆ Applicable Models

The EtherNet/IP Option can be used with the drive models in *Table 1*.

**Table 1 Applicable Models**

Drive	Software Version <I>
CIMR-VU□A□□□□□A□	≥ 1012

<I> See "PRG" on the drive nameplate for the software version number.

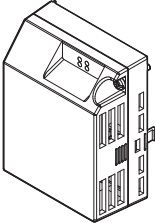
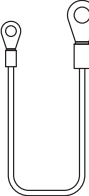
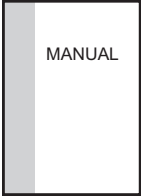
### 3 Receiving

Please perform the following tasks after receiving the EtherNet/IP Option:

- Inspect the EtherNet/IP Option for damage.  
If the EtherNet/IP Option appears damaged upon receipt, contact the shipper immediately.
- Verify receipt of the correct model by checking the information on the nameplate (see *Figure 1*).
- If you have received the wrong model or the EtherNet/IP Option does not function properly, contact your supplier.

#### ◆ Contents and Packaging

Table 2 Contents of Package

Description:	Option Unit	Ground Wires	Installation Manual
			
Quantity:	1	4	1

#### ◆ Tool Requirements

A Phillips screwdriver (M3, M3.5 to M6 metric or #1, #2 U.S. standard </>) is required to install the EtherNet/IP Option.

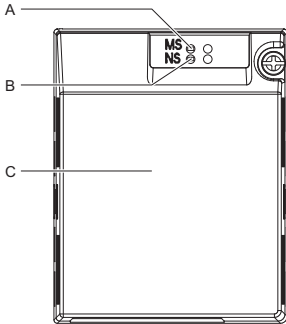
<1> Screw sizes vary by drive capacity. Select a screwdriver that matches the drive capacity.

**Note:** Tools required to prepare EtherNet/IP cables for wiring are not listed in this manual.

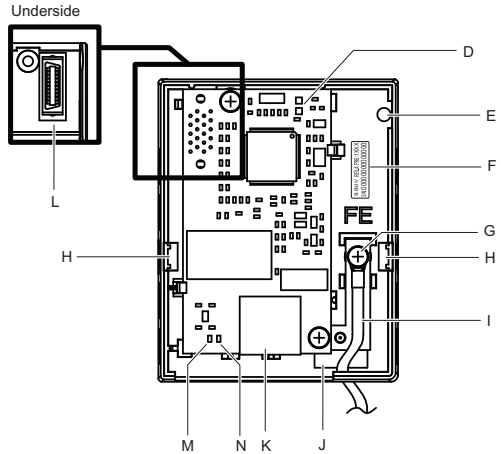
# 4 EtherNet/IP Option Components

## ◆ EtherNet/IP Option

EtherNet/IP Option with cover attached



EtherNet/IP Option with cover removed



- A – LED (MS)
- B – LED (NS)
- C – Option cover
- D – EtherNet/IP PCB
- E – Screw hole (attaching option cover)
- F – Nameplate
- G – Functional Earth cable connection (FE)

- H – Mounting tabs
- I – Ground wire <1>
- J – Pass-through hole for wire
- K – EtherNet/IP cable connection
- L – Option connector
- M – LED (10/100)
- N – LED (LINK/ACT)

<1> Ground wires are packaged loose inside the EtherNet/IP Option shipping package and must be connected during installation.

**Figure 1 EtherNet/IP Option Unit**

**Note:** For details on the LEDs, *Refer to EtherNet/IP Option LEDs on page 13.*

## 4 EtherNet/IP Option Components

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### ◆ Dimensions

The installed EtherNet/IP Option adds 27 mm (1.06 in.) to the total depth of the drive.

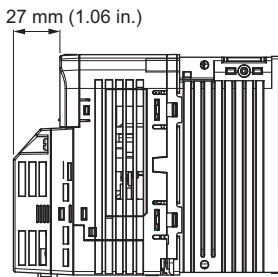


Figure 2 Dimensions

### ◆ Terminal

The communication connector is a RJ45 modular jack. This RJ45 modular jack is the connection point of the EtherNet/IP network communication cable to the EtherNet/IP Option.

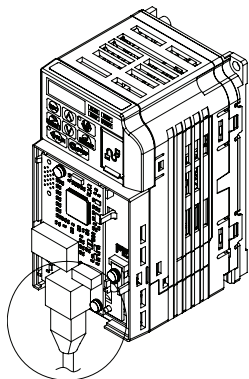
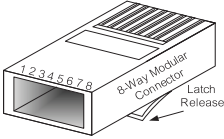


Figure 3 RJ45 Modular Jack

## 4 EtherNet/IP Option Components

**Table 3 Wiring for 8-way EtherNet/IP Modular Connectors**

SI-EN3/V EtherNet 8-Way Modular Connector	Pin	Description
	1 (Pair 2)	Transmit data (TXD) +
	2 (Pair 2)	Transmit data (TXD) -
	3 (Pair 3)	Receive data (RXD) +
	4 (Pair 1)	Not used <I>
	5 (Pair 1)	Not used <I>
	6 (Pair 3)	Receive data (RXD) -
	7 (Pair 4)	Not used <I>
	8 (Pair 4)	Not used <I>

<I> Not used for 10 Mbps and 100 Mbps networks.

### ◆ EtherNet/IP Option LEDs

The EtherNet/IP Option has two bi-color, red/green LEDs: one for Module Status (MS) and one for Network Status (NS) and two green Ethernet LEDs: one to indicate network speed (10/100) and one to indicate the link status and network activity (LINK/ACT).

The operational states of the EtherNet/IP Option LEDs after the EtherNet/IP power-up diagnostic LED sequence is completed are described in **Table 4**. Wait at least 2 seconds for the power-up diagnostic process to complete before verifying the states of the LEDs.

**Table 4 EtherNet/IP Operation LED States**

Name	Indication		Operating Status	Remarks
	Color	Status		
MS	–	OFF	Power supply OFF	Power is not being supplied to the drive
	Green	ON	EtherNet/IP Option operating	EtherNet/IP Option is operating normally
	Green	Flashing	EtherNet/IP Option initializing	EtherNet/IP Option is configuring an IP address
	Red	ON	Fatal error occurred	EtherNet/IP Option has detected a fatal (unrecoverable) error
	Red	Flashing	Non-fatal error occurred	EtherNet/IP Option has detected a non-fatal (recoverable) error
	Green/Red	Flashing	EtherNet/IP Option self-test	EtherNet/IP Option is in self-test mode

## 4 EtherNet/IP Option Components

Name	Indication		Operating Status	Remarks
	Color	Status		
NS	–	OFF	Offline or Power supply OFF	–
	Green	ON	Online communications established	EtherNet/IP Option is online and has established connections
	Green	Flashing	Online communications not established	EtherNet/IP Option is online without established connections
	Red	ON	Communications error (fatal)	EtherNet/IP Option detected a duplicate IP address.
	Red	Flashing	Communications time-out (non-fatal)	A communications time-out occurred
	Green/ Red	Flashing	EtherNet/IP self-test	EtherNet/IP Option in self-test mode

**Table 5 Ethernet LEDs**

Name	Indication		Operating Status
	Color	Status	
10/100	Green	OFF	10 Mbps is established
	Green	ON	100 Mbps is established
LINK/ACT	Green	OFF	Link is not established
	Green	ON	Link is established
	Green	Flashing	Link is established and there is network activity

### ■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence may take several seconds. After the LEDs have completed the EtherNet/IP diagnostic LED sequence, the EtherNet/IP Option is successfully initialized. The LEDs then assume operational conditions as shown in *Table 4*.

**Table 6 Power-Up Diagnostic LED Sequence**

Sequence	Module Status (MS)	Network Status (NS)	Time (ms)
1	GREEN	OFF	250
2	RED	OFF	250
3	GREEN	OFF	-
4	GREEN	GREEN	250
5	GREEN	RED	250
6	GREEN	OFF	-

## 5 Installation Procedure

### ◆ Section Safety

#### DANGER

##### **Electrical Shock Hazard**

**Do not connect or disconnect wiring while the power is on.**

Failure to comply will result in death or serious injury.

Disconnect all power to the drive, wait at least five minutes after all indicators are off, measure the DC bus voltage to confirm safe level, and check for unsafe voltages before servicing to prevent electric shock. The internal capacitor remains charged even after the power supply is turned off. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc.

#### WARNING

##### **Electrical Shock Hazard**

**Do not remove option board cover while the power is on.**

Failure to comply could result in death or serious injury.

The diagrams in this section may include option units and drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating any devices. The option board should be used according to the instructions described in this manual.

**Do not allow unqualified personnel to use equipment.**

Failure to comply could result in death or serious injury.

Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of this product.

**Do not remove option cover while the power to the drive is on.**

Failure to comply could result in death or serious injury.

## 5 Installation Procedure

---

### **WARNING**

**Do not use damaged wires, place excessive stress on wiring, or damage the wire insulation.**

Failure to comply could result in death or serious injury.

#### **Fire Hazard**

**Tighten all terminal screws to the specified tightening torque.**

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

### **NOTICE**

#### **Damage to Equipment**

**Observe proper electrostatic discharge (ESD) procedures when handling the option unit, drive, and circuit boards.**

Failure to comply may result in ESD damage to circuitry.

**Never shut the power off while the drive is outputting voltage.**

Failure to comply may cause the application to operate incorrectly or damage the drive.

**Do not operate damaged equipment.**

Failure to comply may cause further damage to the equipment.

Do not connect or operate any equipment with visible damage or missing parts.

**Do not use unshielded cable for control wiring.**

Failure to comply may cause electrical interference resulting in poor system performance.

Use shielded twisted-pair wires and ground the shield to the ground terminal of the drive.



### NOTICE

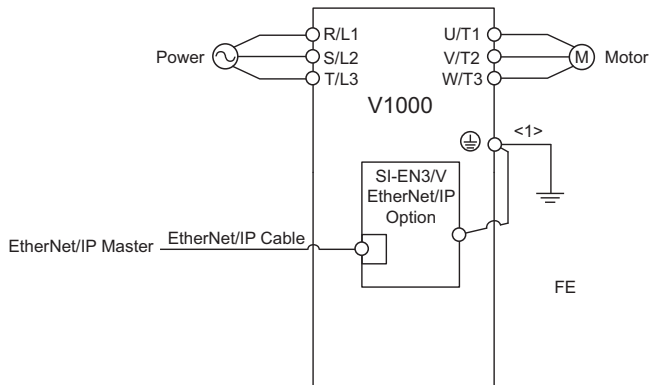
**Properly connect all pins and connectors.**

Failure to comply may prevent proper operation and possibly damage equipment.

**Check wiring to ensure that all connections are correct after installing the option unit and connecting any other devices.**

Failure to comply may result in damage to the option unit.

### ◆ Wiring Diagram



<1> The FE terminal on the EtherNet/IP Option is supplied with a ground wire that should be connected to the ground terminal on the drive.

**Figure 4 Wiring Diagram**

### ◆ Prior to Installing the Option Unit

Prior to installing the EtherNet/IP Option, wire the drive and make necessary connections to the drive terminals. Refer to the Quick Start Guide for information on wiring and connecting the drive. First, verify that the drive functions normally without the option installed.

## 5 Installation Procedure

### ◆ Installing the Option Unit

Remove the front cover of the drive before installing the EtherNet/IP Option. Follow the directions below for proper installation.

1. Switch off the power supply to the drive.

**DANGER! Electrical Shock Hazard** - Do not connect or disconnect wiring while the power is on. Failure to comply will result in death or serious injury. Before installing the EtherNet/IP Option, disconnect all power to the drive. The internal capacitor remains charged even after the power supply is turned off. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. To prevent electric shock, wait at least five minutes after all indicators are off and measure the DC bus voltage level to confirm safe level.

2. Remove the front cover. The original drive front cover may be discarded because it will be replaced by the EtherNet/IP Option cover in step 8.

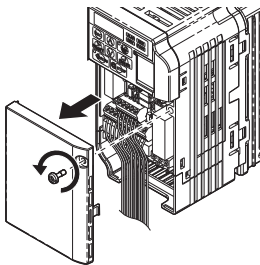


Figure 5 Remove Front Cover

3. Remove the bottom cover and connect the EtherNet/IP Option ground wire to the ground terminal.

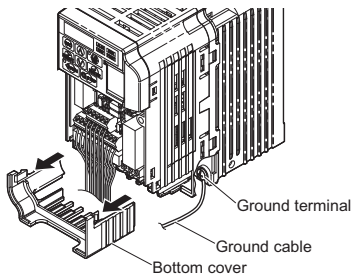
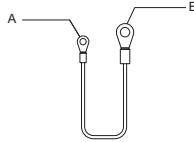


Figure 6 Connect Ground Wire

## 5 Installation Procedure

**Note:** The four different ground wires packaged with the EtherNet/IP Option connect the unit to different drive models. Select the proper ground wire from the EtherNet/IP Option kit depending on drive size. **Refer to Ground Wire Selection on page 19.**



- A – Option unit connection: screw size = M3
- B – Drive-side connection: screw size = M3.5 to M6

Figure 7 Ground Wire

Table 7 Ground Wire Selection

Ground Wire Length (mm/in)	Drive Model CIMR-VU		
	Single-Phase 200 V Class	Three-Phase 200 V Class	Three-Phase 400 V Class
150/5.9	BA0001 BA0002 BA0003	2A0001 2A0002 2A0004 2A0006	-
200/7.9	BA0006 BA0010 BA0012 BA0018	2A0010 2A0012 2A0020	4A0001 4A0002 4A0004 4A0005 4A0007 4A0009 4A0011
250/9.8	-	2A0030 2A0040	4A0018 4A0023
400/15.7	-	2A0056 2A0069	4A0031 4A0038

## 5 Installation Procedure

**Note:** Cover removal steps for certain larger models of V1000 with a Terminal Cover:

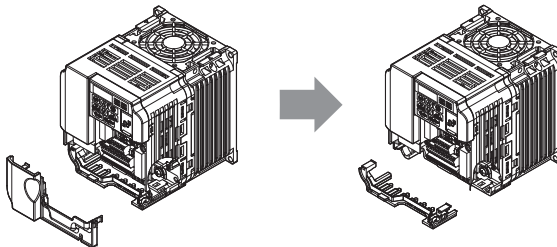
-Single-Phase 200 V Class: CIMR-VUBA0006 to BA0018

-Three-Phase 200 V Class: CIMR-VU2A0008 to 2A0069

-Three-Phase 400 V Class: All models

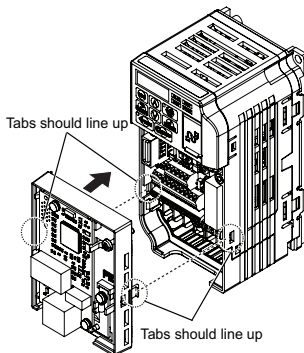
Remove the terminal cover before removing the bottom cover to install the EtherNet/IP Option.

Replace the terminal cover after wiring the EtherNet/IP Option.



**Figure 8 Models with Terminal Cover**

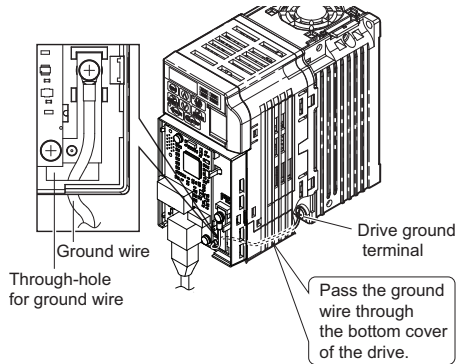
4. Reattach the bottom cover.
5. Connect the EtherNet/IP Option to the drive. Properly secure the tabs on the left and right sides of the EtherNet/IP Option to the drive case.



**Figure 9 Attach EtherNet/IP Option**

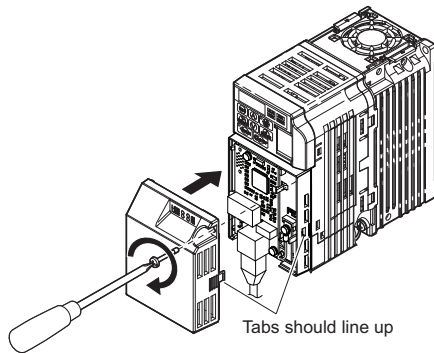
## 5 Installation Procedure

6. Connect the ground wire between the drive ground terminal and the EtherNet/IP Option ground. When wiring the EtherNet/IP Option, pass the ground wire through the inside of the drive bottom cover, then pass the ground wire into the through-hole for the ground wire at the front of the EtherNet/IP Option.



**Figure 10 Ground Wire Connection**

7. Connect the communication wire to the EtherNet/IP Option modular connector. Refer to Procedure on page 22.
8. Attach the EtherNet/IP Option cover to the front of the EtherNet/IP Option.



**Figure 11 Attach Cover**

## 5 Installation Procedure

---

### ◆ Communication Cable Wiring

#### ■ Procedure

To connect the EtherNet/IP Option to a network, insert a RJ45 8-pin Straight Connector STP Cat 5e cable into the modular connector port. Ensure the cable end is firmly connected.

**Note:** Only use cable recommended for EtherNet/Industrial Protocol (EtherNet/IP™). Using a cable not specifically recommended may cause the EtherNet/IP Option or drive to malfunction.

**Note:** Replace the option cover after all wiring is completed.

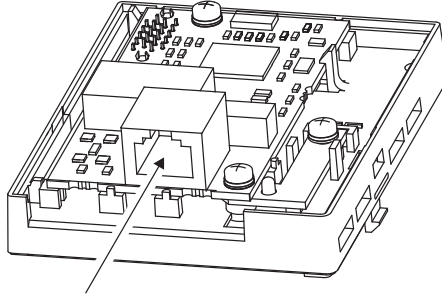


Figure 12 Communication Cable Port

#### IGMP Snooping

Switches implementing IGMP Snooping are strongly recommended. When IGMP Snooping is used, devices will only receive the multicast packets in which they are interested.

---

### ◆ Communication Cable Specifications

Refer to the ODVA website for more information on network cabling (<http://www.odva.org>).

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#### ◆ EDS Files

For easy network implementation of drives equipped with a SI-EN3/V EtherNet/IP Option, an EDS file can be obtained from:

U.S.: <http://www.yaskawa.com>

Other areas: Contact a Yaskawa representative.

## 6 EtherNet/IP Option Drive Parameters

Before starting network communications, verify proper setting of drive parameters in *Table 8* using the drive digital operator.

**Table 8 Parameter Settings**

No.	Name	Description	Default
b1-01 <1>	Frequency Reference Selection	Selects the frequency reference input source 0: Operator - Digital preset speed d1-01 to d1-17 1: Terminals - Analog input terminal A1 or A2 2: MEMOBUS/Modbus communications 3: Option PCB 4: Pulse Input (Terminal RP)	1 (Set to 3 for EtherNet/IP)
b1-02 <1>	Run Command Selection	Selects the run command input source. 0: Digital Operator - RUN and STOP keys 1: Digital input terminals S1 to S7 2: MEMOBUS/Modbus communications 3: Option PCB	1 (Set to 3 for EtherNet/IP)
F6-01	Operation Selection after Communications Error	Determines drive response when a bUS error is detected during communications with the DeviceNet Option. 0: Ramp to Stop 1: Coast to Stop 2: Fast-Stop 3: Alarm Only <2>	1
F6-02	External Fault Detection Conditions (EF0)	Sets the condition for external fault detection (EF0). 0: Always detected 1: Detected only during operation	0
F6-03	Stopping Method for External Fault from Communication Option Board	Determines drive response for external fault input (EF0) detection during DeviceNet communication 0: Ramp to Stop 1: Coast to Stop 2: Fast-Stop 3: Alarm Only <2>	1
F6-07 <3>	NetRef/ComRef Selection Function	0: Multi-step speed reference disabled 1: Multi-step speed reference allowed	1
F6-08 <3>	Reset Communication Related Parameters	Determines if communication-related parameters F6-□□ and F7-□□ are set back to original default values when the drive is initialized using parameter A1-03 0: Do not reset F6-□□ and F7-□□ parameters 1: Reset F6-□□ and F7-□□ parameters <b>Note:</b> Setting this parameter does not affect communication-related parameters	0
F7-01 to F7-04	IP Address	Sets static IP address of network connection <b>Note:</b> Parameter F7-01 sets the most significant octet	192 168 1 20

## 6 EtherNet/IP Option Drive Parameters

No.	Name	Description	Default
F7-05 to F7-08	Subnet Mask	Sets static Subnet Mask of network connection <b>Note:</b> Parameter F7-05 sets the most significant octet	255 255 255 0
F7-09 to F7-12	Gateway Address	Sets static Gateway address of network connection <b>Note:</b> Parameter F7-09 sets the most significant octet	192 168 1 1
F7-13	Address Mode at Startup	Selects how the EtherNet/IP address is set. 0: Static 1: BOOTP 2: DHCP	2
F7-14	Duplex Mode Selection	Selects duplex mode setting. 0: Half duplex forced 1: Auto-negotiate duplex mode and communication speed 2: Full duplex forced	1 <4>
F7-15	Communication Speed Selection	Sets the communication speed 0: Auto Negotiate 10: 10 Mbps 100: 100 Mbps	10
F7-16	Communication Loss Time-out	Sets the time-out value for communication loss detection (not used)	0
F7-17	EtherNet/IP Speed Scaling Factor	Sets the scaling factor for the speed monitor in EtherNet/IP Class ID 2AH Object	0
F7-18	EtherNet/IP Current Scaling Factor	Sets the scaling factor for the output current monitor in EtherNet/IP Class ID 2AH Object	0
F7-19	EtherNet/IP Torque Scaling Factor	Sets the scaling factor for the torque monitor in EtherNet/IP Class ID 2AH Object	0
F7-20	EtherNet/IP Power Scaling Factor	Sets the scaling factor for the power monitor in EtherNet/IP Class ID 2AH Object	0
F7-21	EtherNet/IP Voltage Scaling Factor	Sets the scaling factor for the voltage monitor in EtherNet/IP Class ID 2AH Object	0
F7-22	EtherNet/IP Time Scaling	Sets the scaling factor for the time monitor in EtherNet/IP Class ID 2AH Object	0
F7-23 to F7-32	Dynamic Output Assembly Parameters	Parameters used in Output Assembly 116	0
F7-33 to F7-42	Dynamic Input Assembly Parameters	Parameters used in Input Assembly 166	0

<1> To start and stop the drive with the EtherNet/IP master device using serial communications, set b1-02 to “3”. To control the frequency reference of the drive via the master device, set b1-01 to “3”.

<2> If F6-01 is set to 3, then the drive will continue to operate when a bUS error or an EF0 fault is detected. Take proper safety measures, such as installing an emergency stop switch.

<3> Software versions 1012 and later have F6-07 and F6-08 both set to 1.

<4> F7-14 default value is “0” for drive software versions PRG:1014 and less.



## 6 EtherNet/IP Option Drive Parameters

**Table 9 EtherNet/IP Option Monitors**

Function	Monitor	Value Range	Description
Online IP Address	U6-80 to U6-83	0 to 255	IP Address U6-80 is the most significant octet
Online Subnet	U6-84 to U6-87	0 to 255	Subnet U6-84 is the most significant octet
Online Gateway	U6-88 to U6-91	0 to 255	Gateway U6-88 is the most significant octet
Online Speed	U6-92	10, 100	Link Speed
Online Duplex	U6-93	0: Half, 1: Full	Duplex Setting
First Fault	U6-98	-	First Option Board Fault
Current Fault	U6-99	-	Current Option Board Fault

# 7 Configuring EtherNet/IP Messaging

This section provides information on methods used to control the drive with an EtherNet/IP Option installed.

### ◆ Drive Polled Configuration on EtherNet/IP

The assemblies in *Table 10* are available for polled I/O:

**Table 10 Supported Polled I/O Assemblies**

Assembly Number (decimal)	Description	Type	Bytes	Page
20	Basic Speed Control Output	Output	4	27
21	Extended Speed Control Output	Output	4	27
22	Speed and Torque Control Output	Output	6	-
23	Extended Speed and Torque Control Output	Output	6	-
70	Basic Speed Control Input	Input	4	27
71	Extended Speed Control Input	Input	4	27
72	Speed and Torque Control Input	Input	6	-
73	Extended Speed and Torque Control Input	Input	6	-
100	(Vendor Specific YE Assy)-MEMOBUS/Modbus Message Output	Output	5	-
101	(Vendor Specific YE Assy)-Speed/Torque Control Output	Output	8	-
116	(Vendor Specific YE Assy)-High Speed/Torque Control Output	Output	44	-
150	(Vendor Specific YE Assy)-MEMOBUS/Modbus Message Input	Input	5	-
151	(Vendor Specific YE Assy)-Speed/Torque Status Input	Input	8	-
166	(Vendor Specific YE Assy)-High Speed/Torque Status Input	Input	44	-

## 7 Configuring EtherNet/IP Messaging

### ■ Polled Assemblies Quick Reference

Refer to the EtherNet/IP Option SI-EN3/V Technical Manual SIEP YEACOM 01□ for details on all supported polled assemblies and message types.

#### Basic Speed Control Output

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
20 Basic Speed Control Output	0	-	-	-	-	-	Fault Reset	-	Run Fwd
	1	-							
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							

#### Extended Speed Control Output

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21 Extended Speed Control Output	0	-	NetRef	NetCtrl	-	-	Fault Reset	Run Rev	Run Fwd
	1	-							
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							

#### Basic Speed Control Input

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
70 Basic Speed Control Input	0	-	-	-	-	-	Run Fwd	-	Faulted
	1	-							
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							

#### Extended Speed Control Input

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
71 Extended Speed Control Input	0	At Speed	NetRef	NetCtrl	Ready	Run Rev	Run Fwd	Warning	Faulted
	1	Drive State							
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							

# 8 Web Interface

The web server interface to the drive EtherNet/IP Option allows management of diagnostic information through a standard web browser. The embedded web pages include:

- Main page
- Drive Status page
- Network Monitor page
- Documentation page

### ◆ Main Page

The embedded main page shows basic EtherNet/IP Option information such as vendor ID, serial number, MAC address, and firmware version. This page also shows the status of the EtherNet/IP Option, and provides links to the other embedded web pages.

**YASKAWA**  
The Drive for Quality™

Information

Protocol	EtherNet/IP
IP Address:	192.168.1.20
MAC ID:	00:20:B5:24:22:70
Product Name	SI-EN3
Option Serial Number	136316736
Option Firmware Version:	VST800220
Drive Firmware Version:	1012

Main Status

Information

Main Menu

Welcome to the Yaskawa EtherNet/IP Web Interface

Please choose from the following options:

 <b>Status &amp; Monitor</b> Monitor Drive Signals	 <b>Network</b> Network Status Monitor	 <b>Information</b> View Drive and Option Documentation
--	--	---

[www.yaskawa.com](http://www.yaskawa.com)

Figure 13 Main Page View

## ◆ Drive Status Page

The embedded drive status page shows basic I/O information and drive state information.

**YASKAWA**  
The Drive for Quality™

Status, Monitor and Fault History

### Drive Signals

Stopped	<b>On</b>	Forward	<b>On</b>	Alarm	<b>Off</b>
Running	<b>Off</b>	Reverse	<b>Off</b>	Fault	<b>Off</b>

Drive Signals		Multi-function Inputs		Multi-function Outputs	
Frequency Ref.	<b>0.00 Hz</b>	Terminal S1	<b>Off</b>	Output MA/MB-MC	<b>Off</b>
Output Frequency	<b>0.00 Hz</b>	Terminal S2	<b>Off</b>	Output P1 - PC	<b>Off</b>
Output Current	<b>0.00</b>	A. Terminal S3	<b>Off</b>	Output P2 - PC	<b>Off</b>
DC Bus Voltage	<b>319</b>	VDC Terminal S4	<b>Off</b>		
		Terminal S5	<b>Off</b>		
		Terminal S6	<b>Off</b>		
		Terminal S7	<b>Off</b>		

### Analog Input Signals

Input Terminal A1	<b>0.0</b>	%
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### Fault Information

Active: None

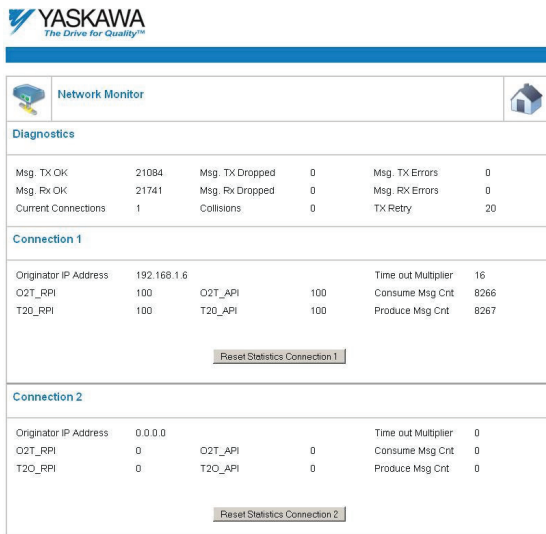
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Figure 14 Drive Status Page View

## 8 Web Interface

### ◆ Network Monitor Page

The embedded network monitor page shows the status of EtherNet/IP Option network traffic and the status of open I/O connections.



The screenshot displays the Yaskawa Network Monitor interface. At the top, the Yaskawa logo and tagline "The Drive for Quality" are visible. Below the header, the page is titled "Network Monitor".

**Diagnostics**

Msg. TX OK	21084	Msg. TX Dropped	0	Msg. TX Errors	0
Msg. Rx OK	21741	Msg. Rx Dropped	0	Msg. RX Errors	0
Current Connections	1	Collisions	0	TX Retry	20

**Connection 1**

Originator IP Address	192.168.1.6	Time out Multiplier	16		
O2T_RPI	100	O2T_API	100	Consume Msg Cnt	8266
T2O_RPI	100	T2O_API	100	Produce Msg Cnt	8267

Reset Statistics Connection 1

**Connection 2**

Originator IP Address	0.0.0.0	Time out Multiplier	0		
O2T_RPI	0	O2T_API	0	Consume Msg Cnt	0
T2O_RPI	0	T2O_API	0	Produce Msg Cnt	0

Reset Statistics Connection 2

Figure 15 Network Monitor Page View

### ◆ Documentation Page

The embedded documentation page contains links to EtherNet/IP Option documentation on the Yaskawa website.



The screenshot displays the Yaskawa V1000 Documentation page. At the top, the Yaskawa logo and tagline "The Drive for Quality" are visible. Below the header, the page is titled "V1000 Documentation".

Document	Description
Quick Start Manual	Electrical Installation, Start-Up Programming and Operation.
Technical Manual	Electrical Installation, Start-Up, Parameter Details, Communication Setup.

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Figure 16 Documentation Page View

## 9 Troubleshooting

### ◆ Drive-Side Error Codes

Drive-side error codes appear on the drive digital operator. Causes of the errors and corrective actions are listed in **Table 11**. For additional error codes that may appear on the drive digital operator, refer to the drive technical manual.

#### ■ Faults

Both bUS (EtherNet/IP Option Communication Error) and EF0 (External Fault Input from the EtherNet/IP Option) can appear as an alarm or as a fault. When a fault occurs, the digital operator ALM LED remains lit. When an alarm occurs, the ALM LED flashes.

If communication stops while the drive is running, use the following questions as a guide to help remedy the fault:

- Is the EtherNet/IP Option properly installed?
- Is the communication line properly connected to the EtherNet/IP Option? Is it loose?
- Is the controller program working? Has the controller/PLC CPU stopped?
- Did a momentary power loss interrupt communications?

**Table 11 Fault Display and Possible Solutions**

LED Operator Display		Fault Name
<i>bUS</i>	bUS	EtherNet/IP Option Communication Error
		<ul style="list-style-type: none"> <li>• After establishing initial communication, the connection was lost</li> <li>• Only detected when the run command or frequency reference is assigned to the option (b1-01 = 3 or b1-02 = 3)</li> </ul>
Cause		Possible Solution
Master controller (PLC) has stopped communicating		<ul style="list-style-type: none"> <li>• Check that power is supplied to the PLC</li> <li>• Check that PLC is not in program mode</li> </ul>
Communication cable is not connected properly		<ul style="list-style-type: none"> <li>• Check for faulty wiring</li> <li>• Correct any wiring problems</li> </ul>
A data error occurred due to noise		<ul style="list-style-type: none"> <li>• Check the various options available to minimize the effects of noise.</li> <li>• Counteract noise in the control circuit, main circuit, and ground wiring</li> <li>• If a magnetic contactor is identified as a source of noise, install a surge absorber to the contactor coil</li> <li>• Make sure the cable used meets the EtherNet/IP requirements</li> <li>• Make sure the option ground wire is connected between option FE terminal and the drive ground terminal connected to earth ground</li> </ul>
EtherNet/IP Option is damaged		If there are no problems with the wiring and the error continues to occur, replace the EtherNet/IP Option
Connection Time-out		<ul style="list-style-type: none"> <li>• The EtherNet/IP Option Requested Packet Interval (RPI) timer timed out</li> <li>• Make sure that RPI time is set properly</li> </ul>
Duplicate IP Address		The EtherNet/IP Option shares IP Address with at least one other node

## 9 Troubleshooting

LED Operator Display		Fault Name
EF0	EF0	External Fault Input from EtherNet/IP Option
		The alarm function for an external device has been triggered
Cause		Corrective Action
An external fault is being sent from the upper controller (PLC)		<ul style="list-style-type: none"> <li>Remove the cause of the external fault</li> <li>Reset the external fault input from the PLC device</li> </ul>
Problem with the PLC program		Check the program used by the PLC and make the appropriate corrections

LED Operator Display		Fault Name
oFA00	oFA00	EtherNet/IP Option Fault
		EtherNet/IP Option is not properly connected.
Cause		Possible Solution
Non-compatible option connected to the drive		Connect an option that is compatible with the drive

LED Operator Display		Fault Name
oFA01	oFA01	EtherNet/IP Option Fault
		EtherNet/IP Option is not properly connected
Cause		Possible Solution
Problem with the connectors between the drive and EtherNet/IP Option		Turn the power off and check the connectors between the drive and EtherNet/IP Option

LED Operator Display		Fault Name
oFA03	oFA03	EtherNet/IP Option Fault
		EtherNet/IP Option self-diagnostics error
Cause		Possible Solution
EtherNet/IP Option hardware fault		Replace the EtherNet/IP Option

LED Operator Display		Fault Name
oFA04	oFA04	EtherNet/IP Option Fault
		EtherNet/IP Option Flash write mode
Cause		Possible Solution
EtherNet/IP Option hardware fault		Replace the EtherNet/IP Option



LED Operator Display		Fault Name
oFA30	oFA30 to oFA43	EtherNet/IP Option Fault (Port A)
oFA43		Communication ID error
Cause		Possible Solution
EtherNet/IP Option hardware fault		Replace the EtherNet/IP Option

### ■ Minor Faults and Alarms

LED Operator Display		Minor Fault Name	
CALL	CALL	Serial Communication Transmission Error	
		Communication is not established	
Cause		Possible Solution	Minor Fault (H2-□□ = 10)
Communication wiring is faulty, there is a short circuit, or improper connection		<ul style="list-style-type: none"> <li>• Check for wiring errors</li> <li>• Correct the wiring</li> <li>• Remove ground shorts and reconnect loose wires</li> </ul>	YES
Programming error on the master side		Check communications at start-up and correct programming errors	
Communication circuitry is damaged.		<ul style="list-style-type: none"> <li>• Perform a self-diagnostics check</li> <li>• Replace the drive if the fault continues to occur</li> </ul>	

## 9 Troubleshooting

### ◆ EtherNet/IP Option Error Codes

#### ■ EtherNet/IP Option Fault Monitors U6-98 and U6-99

The EtherNet/IP Option can declare error/warning conditions via drive monitor parameters on the drive digital operator as shown in *Table 13*.

**Table 12 EtherNet/IP Option Fault Monitor Descriptions**

Fault Condition	Fault Declared	Status Value (U6-98/U6-99)	Description
No Fault	n/a	0	No faults
Force Fault	EF0	3	Network sent a message to force this node to the fault state
Network Link Down	BUS ERROR	1100	No network link to option board
Connection Time-out	BUS ERROR	1101	The node timer (Requested Packet Interval) timed out
Duplicate IP Address	BUS ERROR	1102	This node and at least one other node have the same IP Address
Default MAC Address	None	1103	Factory default MAC Address programmed into EtherNet/IP Option. Return for reprogramming

Two drive monitor parameters, U6-98 and U6-99 assist the user in network troubleshooting.

- U6-98 displays the first declared fault since the last power cycle.
- U6-99 displays the present EtherNet/IP Option SI-EN3/V status.

If another fault occurs while the original fault is still active, parameter U6-98 retains the original fault status value and U6-99 stores the new fault status value.

# 10 Specifications

## ◆ Specifications

**Table 13 Option Specifications**

Item	Specification
Model	SI-EN3/V (PCB model: UTC000280)
SI-N3/V Supported Messages	<ul style="list-style-type: none"> <li>• Explicit: Explicit Class 3, Unconnected</li> <li>• I/O: Class 1, Listen Only, Input Only</li> </ul>
I/O Assembly Instance	<ul style="list-style-type: none"> <li>• Input: 7 types (4~44 bytes)</li> <li>• Output: 7 types (4~44 bytes)</li> </ul>
EtherNet/IP Specification	Conformance Level A5: Passed
EtherNet/IP Profile	AC Drive
Connector Type	RJ45 8-pin Straight Connector STP Cat 5e cable
Physical Layer Type	<ul style="list-style-type: none"> <li>• Isolated Physical Layer</li> <li>• TCP Protocol Transformer Isolated</li> </ul>
IP Address Setting	Programmable from drive keypad or network
Communication Speed	Programmable from drive keypad or network: 10/100 Mbps, auto-negotiate
Number of Connections	<ul style="list-style-type: none"> <li>• I/O: 2</li> <li>• Explicit: 6</li> </ul>
Duplex Mode	Half forced, Auto-negotiate, Full-forced
Address Startup Mode	Static, BOOTP, DHCP
Ambient Temperature	-10 °C to +50 °C
Humidity	Up to 95% RH (no condensation)
Storage Temperature	-20 °C to +60 °C (allowed for short-term transport of the product)
Area of Use	Indoor (free of corrosive gas, airborne particles, etc.)
Altitude	Up to 1000 m

## 10 Specifications

### ◆ Revision History

The revision dates and the numbers of the revised manuals appear on the bottom of the back cover.

MANUAL NO. TOEP YEACOM 01 A  
Published in U.S.A. June 2010 08-06

Major revision letter  
Minor revision number  
Date of publication  
Date of original publication

Date of Publication	Revision Number	Section	Revised Content
June 2008	–	–	First edition
May 2010	<1>	Section 5 & 7	F7-14 default value and IGMP Snooping note.
June 2010	<2>	Section 6	Moved Section 6 before Troubleshooting section.

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# YASKAWA AC Drive-V1000 Option EtherNet/IP Installation Manual

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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MANUAL NO. TOEP YEACOM 01A

Published in U.S.A June 2010 08-06   
08-06-1