



IMC30G-E Series

Motion Control Card Hardware Manual 19010953 A00

1

Preface

Thank you for purchasing Inovance IMC30G-E series motion control products. IMC30G-E series products are based on EtherCAT network and featured with hybrid pulse-type motion control and high-speed, high-synchronization and low-jitter performance. IMC30G-E series products are applicable to such fields as industrial robots, CNC machine tools, woodworking machineries, printing machineries, assembly lines, and electronic processing equipment.

IMC30G-E series motion control products are divided into IMC30G-E series motion control cards and IMC30-6G series axis control modules (terminal board). The IMC30G-E series motion control card is integrated with EtherCAT, LocalBus and Ethernet functions for easy networking and function extension. It also supports emergency stop to ensure system security. The IMC30-6G series axis control module, which is a matching module for the motion control card, is armed with diversified functions including pulse control, position comparison output, encoder, homing, motion-specific I/O, general I/O and AD sampling to implement step axis and pulse axis control and high-speed hardware capture.

IMC30G-E series motion control card can be used to extend functions of IS620N and SV820 servo drives and AM600ECAT modules (AD/DA/IO) through EtherCAT bus.

The related manuals are listed as follows:

- 1) IMC30G Series Axis Control Module Hardware Manual
- 2) IMC30G Series Motion Control Card Software Commissioning Guide
- 3) IMC30G Series Motion Control Card Software Programming Manual

Manuals are subject update without notice. Visit <http://www.inovance.com> to download the latest manual.

Safety Instructions

Safety Precautions

- 1) Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations.
- 2) To ensure the safety of humans and equipment, follow the signs on the equipment and all the safety instructions in this user guide.
- 3) "CAUTION", "WARNING", and "DANGER" items in the user guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- 4) Use this equipment according to the designated environment requirements. Damage caused by improper usage is not covered by warranty.
- 5) Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions

DANGER indicates that failure to comply with the notice will result in severe personal injuries or even death.

2

- WARNING** indicates that failure to comply with the notice may result in severe personal injuries or even death.
- CAUTION** indicates that failure to comply with the notice may result in minor personal injuries or damage to the equipment.

Unpacking

- CAUTION**
 - ◆ Check whether the packing is intact and whether there is damage, water seepage, damp, and deformation.
 - ◆ Unpack the package by following the package sequence. Do not hit the package with force.
 - ◆ Check whether there are damage, rust, or injuries on the surface of the equipment or equipment accessories.
 - ◆ Check whether the number of packing materials is consistent with the packing list.

- WARNING**
 - ◆ Do not install the equipment if you find damage, rust, or indications of use on the equipment or accessories.
 - ◆ Do not install the equipment if you find water seepage, component missing or damage upon unpacking.
 - ◆ Do not install the equipment if you find the packing list does not conform to the equipment you received.

Storage and Transportation

- CAUTION**
 - ◆ Store and transport this equipment based on the storage and transportation requirements for humidity and temperature.
 - ◆ Avoid transporting the equipment in environments such as water splashing, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
 - ◆ Avoid storing this equipment for more than three months. Long-term storage requires stricter protection and necessary inspections.
 - ◆ Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
 - ◆ Never transport this equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

- WARNING**
 - ◆ Thoroughly read the safety instructions and user guide before installation.
 - ◆ Do not modify this equipment.
 - ◆ Do not rotate the equipment components or loosen fixed bolts (especially those marked in red) on equipment components.
 - ◆ Do not install this equipment in places with strong electric or magnetic fields.
 - ◆ When this equipment is installed in a cabinet or final equipment, protection measures such as a fireproof enclosure, electrical enclosure, or mechanical enclosure must be provided. The IP rating must meet IEC standards and local laws and regulations.

- DANGER**
 - ◆ Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
 - ◆ Installation, wiring, maintenance, inspection, or parts replacement must be performed by only experienced personnel who have been trained with necessary electrical information.
 - ◆ Installation personnel must be familiar with equipment installation requirements and relevant technical materials.
 - ◆ Before installing equipment with strong electromagnetic interference, such as a transformer, install an electromagnetic shielding device for this equipment to prevent malfunctions.

Wiring

- DANGER**
 - ◆ Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
 - ◆ Never perform wiring at power-on. Failure to comply will result in an electric shock.
 - ◆ Before wiring, cut off all equipment power supplies. Wait at least 10 minutes before further operations because residual voltage exists after power-off.
 - ◆ Make sure that the equipment is well grounded. Failure to comply will result in an electric shock.
 - ◆ During wiring, follow the proper electrostatic discharge (ESD) procedures, and wear an antistatic wrist strap. Failure to comply will result in damage to internal equipment circuits.

3

- Wiring**
- WARNING**
 - ◆ Never connect the power cable to output terminals of the equipment. Failure to comply may cause equipment damage or even a fire.
 - ◆ Wiring cables must meet diameter and shielding requirements. The shielding layer of the shielded cable must be reliably grounded at one end.
 - ◆ After wiring, make sure that no screws are fallen and cables are exposed in the equipment.

Power-on

- DANGER**
 - ◆ Before power-on, make sure that the equipment is installed properly with reliable wiring and the motor can be restarted.
 - ◆ Before power-on, make sure that the power supply meets equipment requirements to prevent equipment damage or even a fire.
 - ◆ At power-on, unexpected operations may be triggered on the equipment. Therefore, stay away from the equipment.
 - ◆ After power-on, do not open the cabinet door and protective cover of the equipment. Failure to comply will result in an electric shock.
 - ◆ Do not touch any wiring terminals at power-on. Failure to comply will result in an electric shock.
 - ◆ Do not remove any part of the equipment at power-on. Failure to comply will result in an electric shock.

Operation

- DANGER**
 - ◆ Do not touch any wiring terminals during operation. Failure to comply will result in an electric shock.
 - ◆ Do not remove any part of the equipment during operation. Failure to comply will result in an electric shock.
 - ◆ Do not touch the equipment shell, fan, or resistor for temperature detection. Failure to comply will result in heat injuries.
 - ◆ Signal detection must be performed by only professionals during operation. Failure to comply will result in personal injuries or equipment damage.

- WARNING**
 - ◆ Prevent metal or other objects from falling into the device during operation. Failure to comply may result in equipment damage.
 - ◆ Do not start or stop the equipment using the contactor. Failure to comply may result in equipment damage.

Maintenance

- DANGER**
 - ◆ Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
 - ◆ Do not maintain the equipment at power-on. Failure to comply will result in an electric shock.
 - ◆ Before maintenance, cut off all equipment power supplies and wait at least 10 minutes.

- WARNING**
 - ◆ Perform daily and periodic inspection and maintenance for the equipment according to maintenance requirements and keep a maintenance record.

Repair

- DANGER**
 - ◆ Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
 - ◆ Do not repair the equipment at power-on. Failure to comply will result in an electric shock.
 - ◆ Before inspection and repair, cut off all equipment power supplies and wait at least 10 minutes.

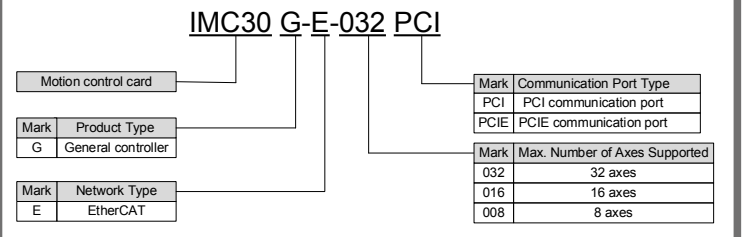
- WARNING**
 - ◆ Require for repair services according to the product warranty agreement.
 - ◆ When the equipment is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
 - ◆ Replace quick-wear parts of the equipment according to the replacement guide.
 - ◆ Do not operate damaged equipment. Failure to comply may result in worse damage.
 - ◆ After the equipment is replaced, perform wiring inspection and parameter settings again.

4

- Disposal**
- WARNING**
 - ◆ Dispose of retired equipment by following local regulations or standards. Failure to comply may result in property damage, personal injuries, or even death.
 - ◆ Recycle retired equipment by following industry waste disposal standards to avoid environmental pollution.

1. Product Information

Nameplate and Product Code



Mounting Dimension

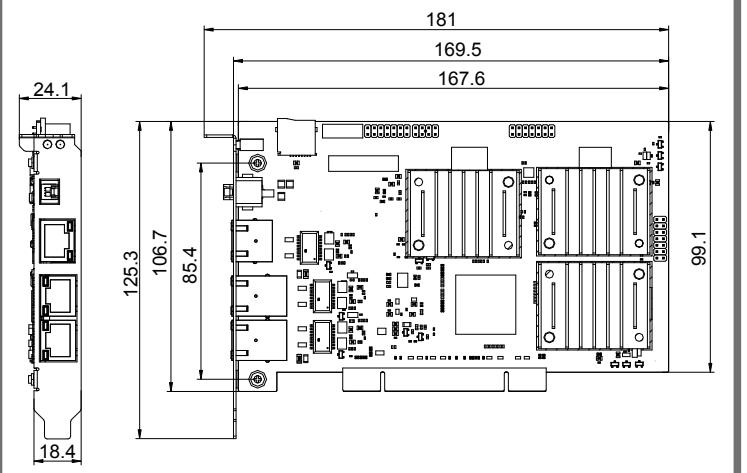
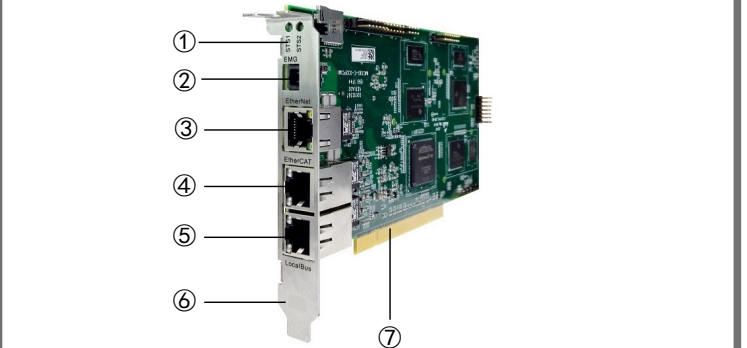


Figure 1 Dimensions of IMC30G series motion control card (unit: mm)

Parts Overview



Interface	Pin	Description
1	LED	Sts1: CPU1 running status indicator Quick flashing: CPU1 runs normally Slow flashing: CPU1 enters test mode OFF: CPU1 runs improperly Sts2: CPU2 running status indicator Flashing: CPU2 runs normally OFF: CPU2 runs improperly
2	EMG	Emergency-stop switch, used in emergencies to stop the mechanical device
3	Ethernet	Ethernet port; baud rate: 100 MHz
4	EtherCAT	EtherCAT output interface of master station Baud rate: 100 MHz
5	LocalBus	Local axis extension port Baud rate: 100 MHz
6	LOGO	Inovance's LOGO
7	PCI	PCI edge connector

Technical Specification

Function	Sub-function	Specification
EtherCAT	Baud rate	100 MHz, full duplex
	Control mode	CSP/TQ/CST/Home
	SDO mode	COE
	EtherCAT axis	Support up to 32/16/8 axes
	Communication cycle	500 us/1 ms/2 ms/4 ms/8 ms
	Interpolation cycle	500 us/1 ms/2 ms/4 ms/8 ms
	DC	Available
	Jitter	<= 100 ns
	Distance between two neighboring stations	No more than 100 m for Cat 5 (and above) network cables
	PDO	Flexible PDO configuration
	Slave station scanning	Automatic scanning
	EtherCAT I/O	Support up to 512 inputs and 512 outputs
Motion control	Point-to-point	Available (Note: Both online speed variation and point variation are available)
	JOG	Available
	Reverse clearance compensation	Available
	Handwheel follow-up	Available
	Position comparison output	Available
	Homing	Available
	I/O, AD, encoder processing	Available
	Two-dimensional linear interpolation	Available
	Three-dimensional linear interpolation	Available
	Interpolation of circular-arcs in an arbitrary plane	Available
	Multi-axis synchronous motion	Available
	Immediate interpolation	Available
	Electronic gear	Available
	Electronic cam	Reserved
	Event control	Available
	Spiral interpolation	Available
	Prospective pre-treatment	Available
	Interpolation follow-up motion	Available
	PVT/PT	Available
	Gantry synchronization	Available

2. Installation

IMC30G-E series motion control card must be installed on an industrial-level PC with PCI interfaces. Applicable operation systems include 32-bit and 64-bit Windows XP and Windows 7.

Installation Environment

- Ambient temperature has a great effect on the service life of the power supply unit. The operating ambient temperature of the control card must not exceed an allowable temperature range (-5°C to +45°C).
- Make sure enough space surrounding the control card has been reserved for heat dissipation.
- Install the control card in a place with minimum vibration. Keep away from devices such as punch presses.
- Keep away from places with direct sunlight, moisture, and water drops.
- Keep away from places with corrosive, combustible and explosive gases.
- Keep away from places with oily dirt and dusts. The pollution degree of the installation site is PD2.
- IMC30G-E series motion control card intends to be installed inside a PC cabinet and applied in a final system with fire-proof housings that provide effective electrical and mechanical protection. The final system must comply with local laws and regulations and related IEC standards. Take enough care when mounting the product onto PCD slots to prevent the edge connector from being damaged due to improper operations.

Item	Requirement
Ambient temperature	-5°C to +45°C
Operating humidity	Below 90% RH (no condensation)
Storage temperature	-20°C to +85°C (non-freezing)
Storage humidity	Below 90% RH (no condensation)
Vibration	Below 4.9 m/s ²

Item	Requirement
Altitude	Below 1000 m

Installation Procedures

Note: Before installation, make sure the industrial PC is powered off and does not support hot plugging.

- Prepare an industrial PC with PCI (32-bit) interface slots and external extension interface slots for the convenience of connection.



Figure 2 PCI slots

- Disassemble the cabinet and find the proper PCI slots. Take the keying slot of the edge connector as the reference to insert the card into the slot directly, and snap the fastener clip if there is any.

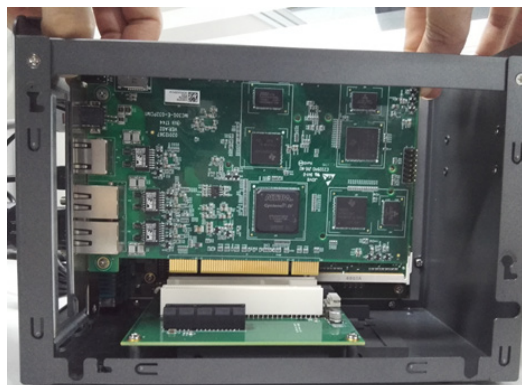
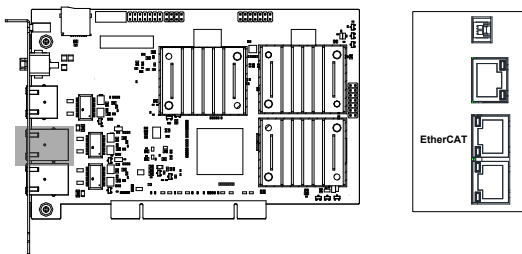


Figure 3 Connection diagram of the motion control card

- Tighten up the screws in the front panel.
- Check whether the screws in the front panel are tightened up, and whether the edge connector is installed properly. If yes, assemble the cabinet properly to finish installation.

3. Hardware Connection

EtherCAT Network Port and Wiring



Pin No.	Signal	Description	Pin No.	Signal	Description
1	TX+	Data transmission positive	5	-	
2	TX-	Data transmission negative	6	RX-	Data receiving negative
3	RX+	Data receiving positive	7	-	
4	-		8	-	

The EtherCAT network port acts as the output interface of the EtherCAT master station and is cascaded with the input interface of the EtherCAT slave station of the slave device.

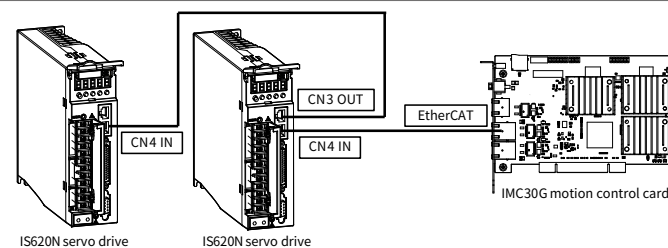
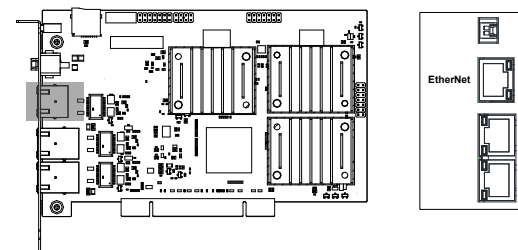


Figure 4 Wiring of EtherCAT port

Ethernet Network Port and Wiring



Pin No.	Signal	Description	Pin No.	Signal	Description
1	TX+	Data transmission positive	5	-	
2	TX-	Data transmission negative	6	RX-	Data receiving negative
3	RX+	Data receiving positive	7	-	
4	-		8	-	

The Ethernet network port is connected to the network port of the PC.

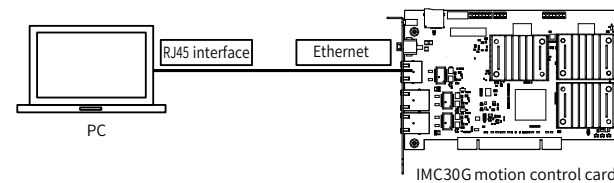
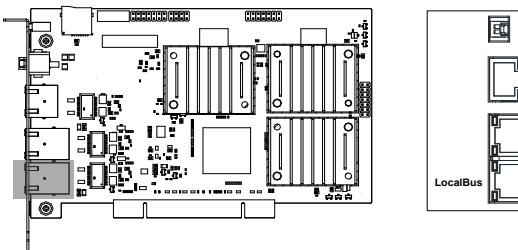


Figure 5 Wiring of Ethernet port

LocalBUS Network Port and Wiring



Pin No.	Signal	Description	Pin No.	Signal	Description
1	TX+	Data transmission positive	5	-	
2	TX-	Data transmission negative	6	RX-	Data receiving negative
3	RX+	Data receiving positive	7	-	
4	-		8	-	

The LocalBUS network port is used for local module function extension. It is connected to IMC30-60G terminal board.

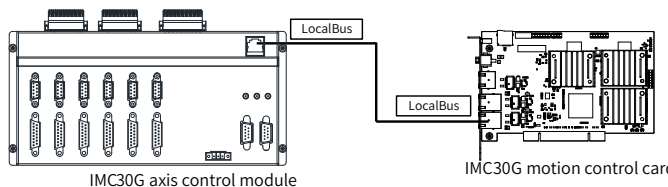
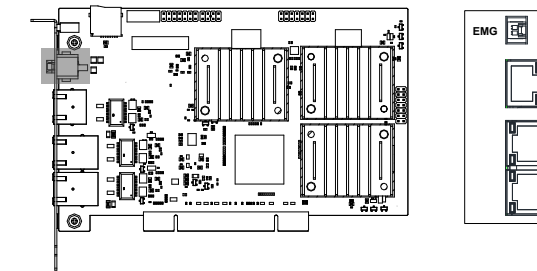


Figure 6 Wiring of LocalBUS port

Emergency-Stop (EMG) Terminal and Wiring



Pin No.	Signal	Electrical Specification	Description
1	24V/0V	Rated input voltage: 24 V (Available voltage input range: 16-30 V)	Emergency-stop terminal is bipolar input, and each pin can be connected to 24 V or 0 V.
2	0V/24V		

EMG signal can be used for PNP or NPN circuits.

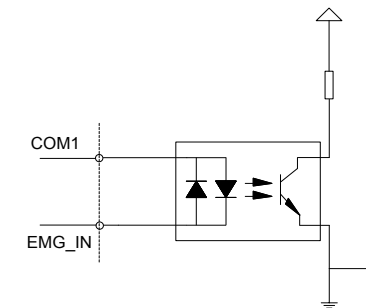


Figure 7 Wiring of emergency-stop (EMG) terminal

Item	PNP mode	NPN mode
EMG	Emergency-stop signal	Emergency-stop signal
COM	24V_GND	24 V

INOVANCE Warranty Agreement

- Inovance provides an 18-month free warranty to the equipment itself from the date of manufacturing for the failure or damage under normal use conditions.
- Within the warranty period, maintenance will be charged for the damage caused by the following reasons:
 - Improper use or repair/modification without prior permission
 - Fire, flood, abnormal voltage, natural disasters and secondary disasters
 - Hardware damage caused by dropping or transportation after procurement
 - Operations not following the user instructions
 - Damage out of the equipment (for example, external device factors)
- The maintenance fee is charged according to the latest Maintenance Price List of Inovance.
- If there is any problem during the service, contact Inovance's agent or Inovance directly.
- Inovance reserves the rights for explanation of this agreement.

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