TRIO
MOTION TECHNOLOGY

A MEMBER OF THE ESTUN GROUP

ON / RESET CONNECTOR
POWER 24V ±10%
AUDIO JACK
HDMI PORT
ETHERCAT PORT
NETWORK PORT (X3)
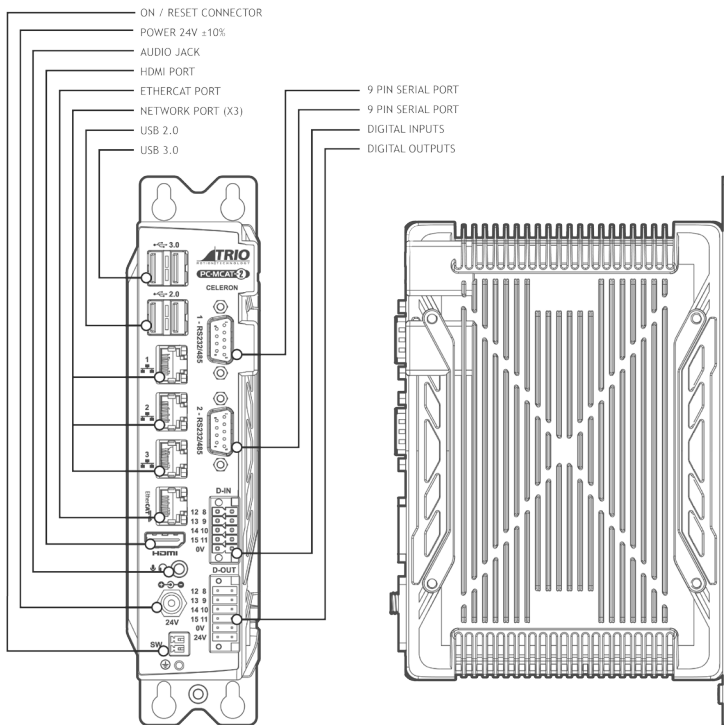USB 2.0
USB 3.0

9 PIN SERIAL PORT
9 PIN SERIAL PORT
DIGITAL INPUTS
DIGITAL OUTPUTS

QUICK START GUIDE
PC-MCAT-2
P780 - P781 - P782 - P783

☀ SAFETY WARNING

During the installation or use of control systems, users of Trio products must ensure that there is no possibility of injury to any person or damage to machinery.

Control systems, especially during installation, can malfunction or behave unexpectedly. Bearing this in mind, users must ensure that even in the event of a malfunction or unexpected behaviour, the safety of an operator or programmer is never compromised.

INTRODUCTION

The PC-MCAT-2 combines a Windows® PC with the familiar and powerful Trio *Motion Coordinator* core software. Using a multi-Core processor, the *Motion Coordinator* firmware runs in real time with performance that is at least double that of the previous PC-MCAT-64 *Motion Coordinator*. This guide will take the user from initial power up to programming and setup of the PC-MCAT-2 in a typical application.

📄 **It is assumed that the reader has some experience with Windows and the *Motion* Perfect programming application from Trio Motion Technology.**

EQUIPMENT

In addition to the PC-MCAT-2, the user will need the following;

- USB keyboard.
- USB mouse or trackball.
- An HDMI monitor and HDMI connecting cable.
- A 24V d.c. power supply rated at 3.0 Amps and above (see table below).

	Celeron	I3	I5	I7
Model #	P780	P781	P782	P783
Power rating	72W	84W	84W	84W
Recommended Supply current	3.0A	3.5A	3.5A	3.5A

INITIAL CONNECTIONS

Plug the HDMI lead into the HDMI socket on the front face of the PC-MCAT-2. Connect the other end to a suitable monitor display.

Plug the Keyboard into any of the available 4 USB sockets on the front of the PC-MCAT-2.

Plug the mouse into one of the USB sockets on the front of the PC-MCAT-2.

POWER CABLE

The provided power cable needs to be connected to a 24V ±10% power supply.

💣 **CONNECTING TO A POWER SUPPLY OF HIGHER VOLTAGE THEN 24V WILL DAMAGE THE PC-MCAT-2.**

💣 **CARE MUST BE TAKEN TO ENSURE THE POLARITY OF THE PINS CONNECTED TO THE POWER SUPPLY IS CORRECT.**

ON / RESET CONNECTOR

A button or switch can be wired into the on / reset connector. When you have turned the PC-MCAT-2 off through the power down sequence, you can begin the power up sequence by activating the button. When the PC-MCAT-2 is powered up, pressing the switch will activate a reset cycle in Windows.
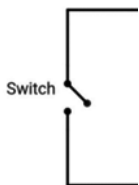
POWER UP SEQUENCE

The power up sequence will begin once the power supply is connected or the on/reset connector switch is pressed.

The PC-MCAT-2 will automatically boot into Windows Embedded with RTX real time running. The default password is "trio" for the default user "Trio".

The *Motion Coordinator* program will be run as a service using the RTX real time executive automatically.

POWER DOWN

A controlled power down sequence should be used to avoid damaging Windows and to allow the machine to complete a power down cycle.

This is done by using the command EX(2) inside a *Motion Coordinator* program. Alternatively, EX(3) can be used to re-start Windows. Using EX(2) allows the *Motion Coordinator* service to be closed then Windows to shut down. This process takes about 30 seconds.
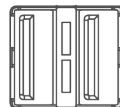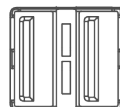
USB PORT (X4)

The USB ports on the front panel are for use with standard Windows peripheral devices. If a keyboard and mouse are used, connect them to 2 of these ports.

There are two USB 3.0 ports (higher pair) and two USB 2.0 ports (lower pair) depending on the model.

HDMI PORT

The HDMI port allows the PC-MCAT-2 to drive high resolution screens.

ETHERNET AND ETHERCAT PORTS

The PC-MCAT-2 acts as an EtherCAT master. EtherCAT drives and I/O devices are normally connected in a chain.

Use the EtherCAT (marked) to connect to the first of your EtherCAT devices in the network.

The top E1thernet port is fixed to the IP address: 192.168.0.250. The remaining two ports are set to dynamic IP addresses.
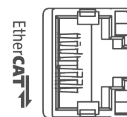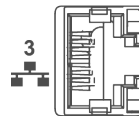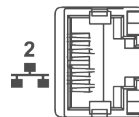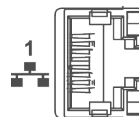
PLUG AND PLAY

The PC-MCAT-2 comes with an internal database of EtherCAT slave definitions built into the firmware. This allows many well-known devices to be connected and automatically configured by the PC-MCAT-2 on start-up without the need for ESI files to be imported.

NETWORK TOPOLOGY

EtherCAT networks are logically one string of devices. Connect the Master to the first slave IN connection, then the OUT of the first to the IN on the second and so on. There is no return cable, the last slave device automatically sets its OUT socket to be a terminator.

Star and branch topology is possible using an approved EtherCAT hub.

STANDARD ETHERNET HUBS AND SWITCHES DO NOT WORK WITHIN AN ETHERCAT NETWORK.

The EtherCAT port is automatically configured for use by the *Motion Coordinator* when it starts up. It can be viewed from the Windows Network "Change Adapter Settings" window. In Windows, the EtherCAT port is shown as Disabled. This is correct and must not be changed.
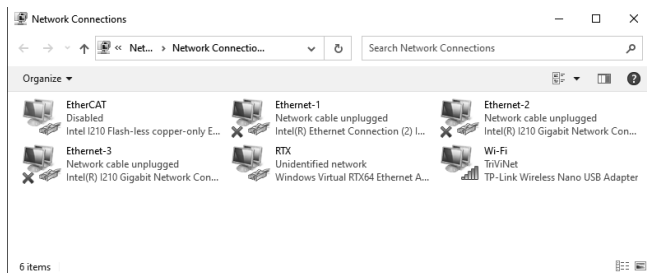
NETWORK SETUP

If the PC-MCAT-2 is connected to a network, its IP address may be given by the network DHCP address server. Use the windows command line to discover the IP address given or check the PC-MCAT tray application. This application is accessed by right clicking on the PC-MCAT logo on the botton right of the windows toolbar and click show.
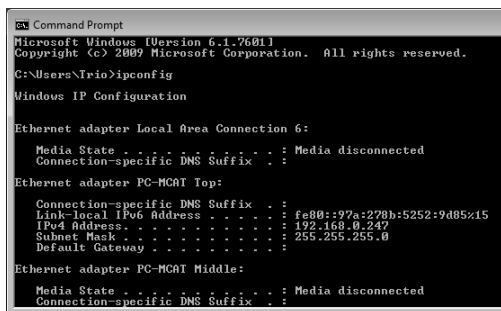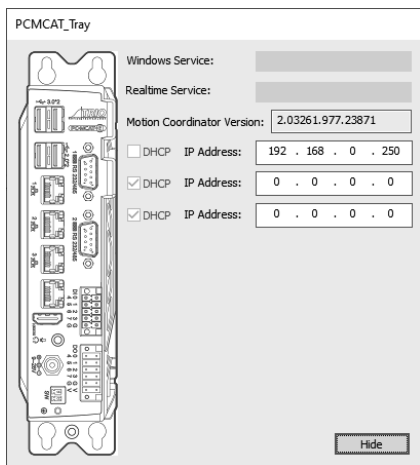
OTHER AVAILABLE PORTS

All communication with the *Motion Coordinator* in the PC-MCAT-2 is through the given Windows IP address. There is no function to set IP_ADDRESS on the PC-MCAT-2 *Motion Coordinator*. Any external device that wants to open a *Motion Coordinator* Server connection must do so using the Windows IP address for the connection.

There are 3 Ethernet connections available; each has its own IP address configuration in Windows.

Many Windows services provide server functions and have port numbers allocated according to the Internet Assigned Numbers Authority. (IANA) Clients that open connections to these port numbers will be communicating with a Windows Application and not the *Motion Coordinator*

Any application running in the PC-MCAT-2 itself must use the internal IP address 127.0.0.1 to communicate with the *Motion Coordinator*. For example, a Modbus Client running in the PC-MCAT-2 will use 127.0.0.1 and not the IP address of either of the physical Ethernet connections

DIGITAL INPUTS

The digital inputs require 0V to be wired to one of the bottom pins as shown in the diagram. The bottom two pins are linked internally and the input pins are activated by a voltage of 24V. They can be monitored through controller programs or the *Motion* Perfect I/O tool.

D-IN

```
12  8
13  9
14 10
15 11
   0V
```
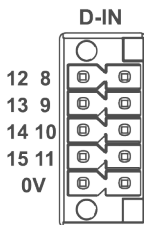
DIGITAL OUTPUTS

The digital outputs requires both 24V to be wired into one of the bottom two pins (marked 24V) and 0V to be wired into the pair of pins above the bottom pair (marked 0V) as shown in the diagram. The 0V pair and 24V pair of pins are linked internally. The digital outputs can be activated through controller programs or manually through the *Motion* Perfect I/O tool.

D-OUT

```
12  8
13  9
14 10
15 11
   0V
  24V
```

SERIAL COM PORTS

There are 2 serial communication ports that allow for RS232 and RS485 communications. The top one is set by default to RS232 and the bottom is set to RS485 by default.

INFORMATION ABOUT THE SERIAL PORTS

COM 1 and COM 2 can be adjusted to RS-232 mode or RS-485 mode in the BIOS.

RS232 is defined as:	RS485 is defined as:
PIN2 : RX	PIN1 : TX-
PIN3 : TX	PIN2 : TX+
PIN5 : GND	PIN5 : GND

1 - RS232/485

2 - RS232/485

ADJUSTING THE SERIAL PORT SETTINGS

1. During the booting process repeatedly press the Delete Key to enter the BIOS menu.

2. Move the cursor key to select the "Advanced" item and enter "Super IO Configuration".

3. If you need to adjust the COM1 port mode, enter "COM1", in "Function Settings", you can adjust "RS-232" or "RS-485" mode. As shown in the figure below, the RS-232 mode can be adjusted to RS-485 mode.

4. The COM2 mode adjustment steps are the same as COM1 steps.

5. After adjustment, press F4 and enter to save and exit.

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RUNNING *MOTION* PERFECT ON REMOTE PC

Connect the PC to the PC-MCAT-2 Ethernet port, either directly with a fixed IP address on both the PC and the PC-MCAT, or via a network with automatic IP address control.

Close the *Motion* Perfect that is running in the PC-MCAT-2. You can now use *Motion* Perfect 5 to on the remote PC to connect to the *Motion Coordinator* in the PC-MCAT-2. *Motion* Perfect version 5.3 or above is required.

Motion Perfect is free to download from www.triomotion.com and provides the user with an easy to understand interface for application development and configuration and setup of drives, controllers, robots and HMI.

PC-MCAT API

There is a shared memory API that allows Windows programs to interact with the PC-MCAT-2 *Motion Coordinator*.

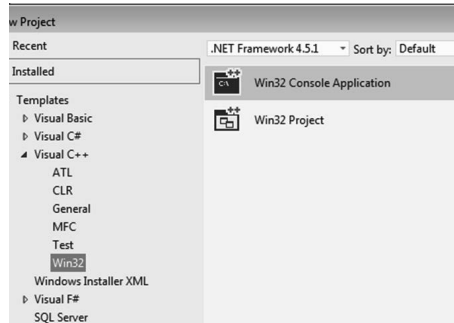The API is installed in C:\Program Files\TrioMotion\PC-MCAT.

The PCMCAT_ApiTest.exe application uses the API to talk to the *Motion Coordinator*.

The pcmcat_api.h file contains definitions that should be included into your MSVC C/C++ source code. The pcmcat_api.dll and motion_api.dll contain the implementation.
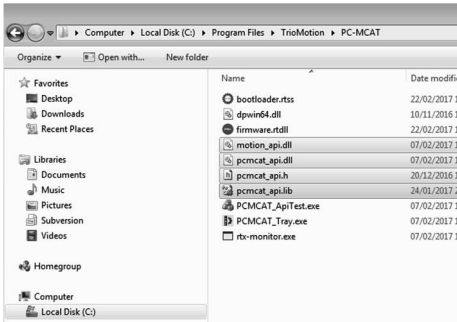
CREATING AN EXAMPLE WINDOWS CONSOLE APPLICATION

1. Open Visual Studio.

2. Create a new C++ Windows console application.

3. Copy the files to the solution directory.

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4. Add in the references to the API file.

5. Add the PCMCAT API calls.

```cpp
int _tmain(int argc, _TCHAR* argv[])
{
    // open the PCMCAT connection
    if (pcmcat_api_open(pcmcat_api_callback, NULL))
        printf("Could not open PCMCAT API\r\n");
    else
    {
        // set output
        if (pcmcat_api_set_op(16, 1))
            printf("Could not turn OP(16) on\r\n");
        else
        {
            // wait for a second
            Sleep(1000);

            if (pcmcat_api_set_op(16, 0))
                printf("Could not turn OP(16) on\r\n");
        }

        // close the PCMCAT connection
        pcmcat_api_close();
    }
    return 0;
}
```

CHASSIS MOUNTING DIMENSIONS (LOOKING FROM FRONT)

M4 screws should be used in 4 places to mount the PC-MCAT-2 to an unpainted metal panel.
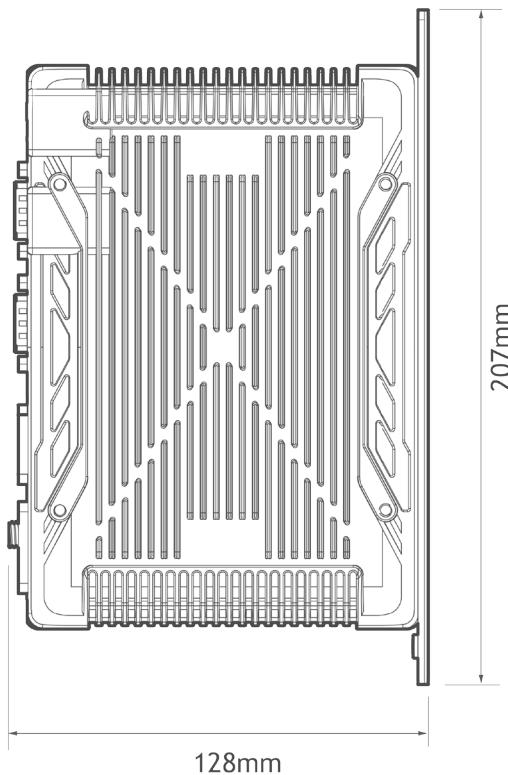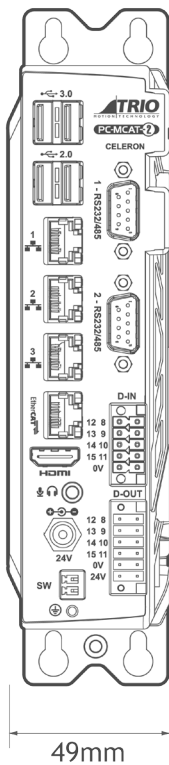
The best EMC performance is obtained when the PC-MCAT-2 is attached from the shield screw (see below) using a flat braided conductor with a cross section of 4mm x 1mm. Do NOT use a circular section wire or run the braid to a central star point.
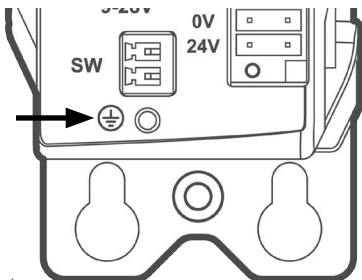
Intentionally left blank.

Dimensions: 49mm, 128mm, 207mm

CAD data Drawings to aid packaging and mounting are available in various formats from the Trio web site. Products should be wired by qualified persons.
Specifications may change without notice. E & OE

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