MC-4011-USB
Data Line Interface

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Manual Part # 180-0623

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Introduction

The MC-4011-USB provides an interface from a USB port on the computer to the RS-485 data line. There are two versions of the interface; single port and dual port. The single port is most commonly used in the MC-4000 Mine Monitoring System, and dual port is used for redundancy in MineNet Tracking and Communications Systems. Surge protection, fuses, and a 27 DC power supply is provided.

Features

- Detectable AC power cord with switch and pilot LED
- Transmit and Receive LEDs
- Power supply for surface equipment, 27VDC at 400mA
- Watch Dog relay contacts with adjustable delay, 0-10 seconds
- Removable trunk line connector
- Standard USB "B" type jack with cable
- Replaceable internal fuses and line drivers
- Firmware Upgradable core module

Installation

Connect the AC power cord to the battery backed UPS. Connect the UBS port from the interface to any available USB port on the computer with the cable provided *(Note: this cable must be shielded for best performance)*.

Connect the trunk line cable(s) to the appropriate terminals on J2 as indicated in Figure 1. The terminal block connector is removable for ease of making these connections. Care should be taken to avoid possible shorting wires; the strip length is ¼" for this terminal block connector.

Connect the hardware *"Watch Dog"* relay contacts to the surface alarm. Typically this is done by connecting the Normally Closed (NC) and Common (C) contacts in series with the ground circuit of the alarm activation. When communication activity is present, these contacts will open.

The single port version has internal dip switches allowing for optional setups. Typical configuration for a WinMac system is:
- DS1, position 1, 2, & 3 – ON   Biased and terminated
- DS2, position 1 – ON, 2&3 OFF   AMR mode
- DS3, position 1 & 2 – OFF, 1 – ON   38.4K Baud

Typically the USB drivers are factory installed on computers provided by AMR. If not, refer to Appendix A for instructions to install the USB drivers.
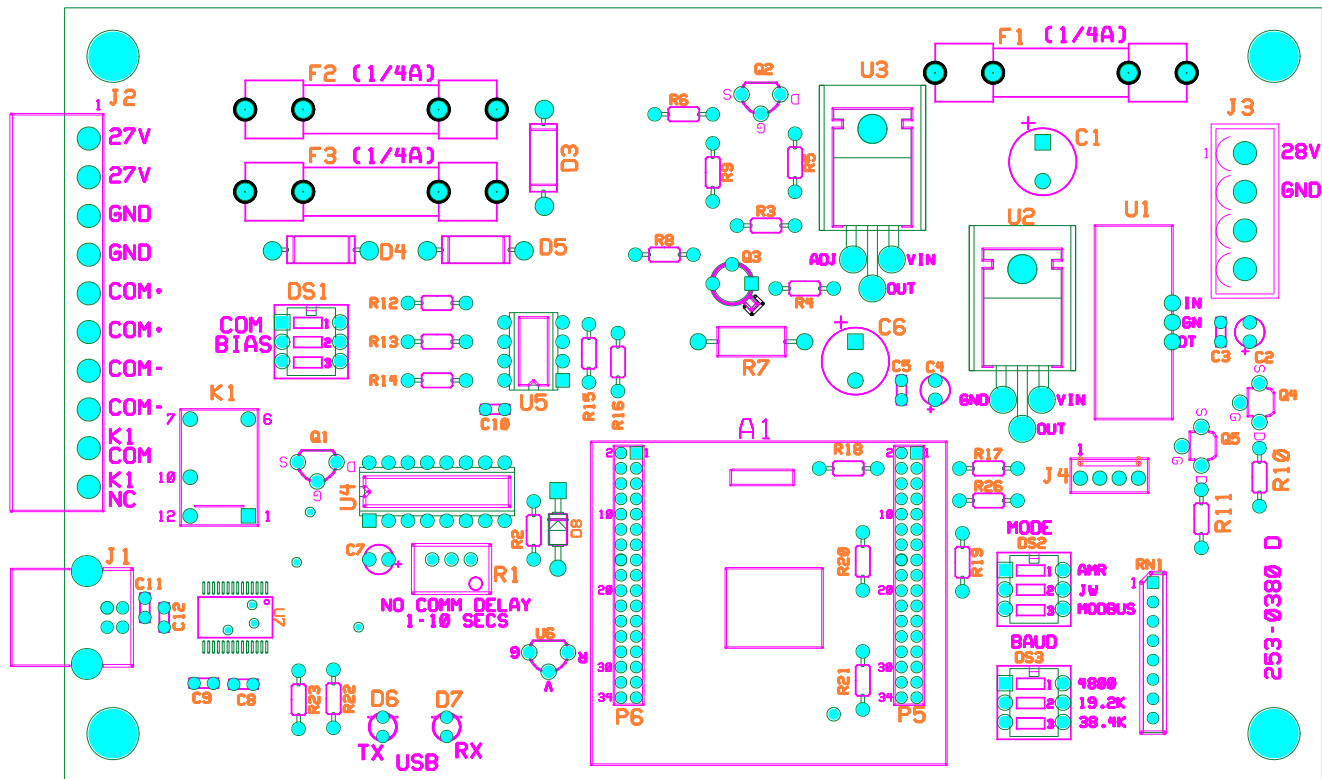
Turn the interface on and allow a few seconds for Windows to recognize the device and then start the application software (WinMac or MineNet).
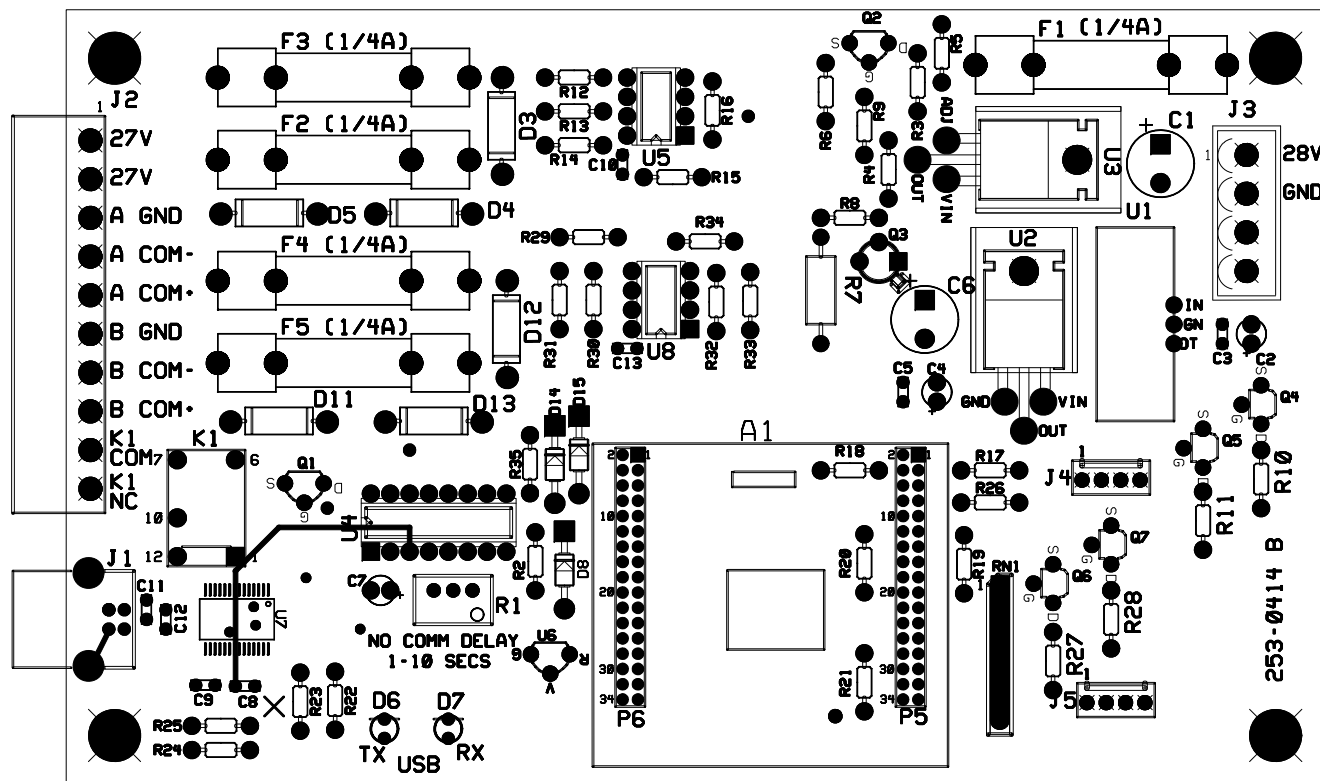
Troubleshooting

A properly operating MC-4011-USB is quickly recognized by observing the front panel LEDs. A flashing TX LED indicates that the system is attempting communications with the field devices. For dual port units, the TX will alternate flashing each cycle from A to B (top set to bottom set of LEDs) when properly configured in MineNet. Any RX flashing indicates that a field device is responding to the transmitted request and the MC-4011-USB is likely OK.

If a problem is suspected with the MC-4011 use the following guidelines to determine the problem:

1. Determine if the computer recognizes the device – If not:
   a. Check all connections
   b. Check for AC power indication on the front panel
   c. Remove the cover and check the DC power fuse F1
   d. Insure that the proper drivers are installed for the device
   e. For MineNet system, insure proper setting in Configure\System for device type
2. Communication issues
   a. Determine if the TX LED(s) are flashing
   b. Check communication fuses F2 & F3, and F4 & F5 for dual port interfaces
   c. Replace communication chips U5 and U8 for dual port interfaces
   d. Remove all data cables and separately connect a known good device (sensor, reader)

J2
- 27V
- 27V
- GND
- GND
- COM•
- COM•
- COM-
- COM-
- K1 COM
- K1 NC

J3 28V GND

F2 (1/4A)
F3 (1/4A)
F1 (1/4A)

D3

D4   D5

DS1
COM
BIAS

R12
R13
R14

K1

Q1

U4

U5

C10

R15 R16

C7

R2

D8

R1

NO COMM DELAY
1-10 SECS

R6   Q2
R9

R3

R8   Q3

R4

R7

C6
C5 C4

U3

C1

U2

ADJ   VIN
OUT

GND   VIN
OUT

U1

IN
GN
DT

C3 C2

Q4
R5

R11 R10

A1

R18

R17
R26

J4

R20

R19

MODE
DS2
AMR
JW
MODBUS

BAUD
DS3
4800
19.2K
38.4K

RN1

P6   P5

R21

C9 C8

R23 R22

D6   D7
TX USB RX

253-0380 D

6/5/2010   REV D
  1) REMOVE R24 AND R25
  2) CONNECT U7-4,20 TO 5VDC
  3) CONNECT J1 SHIELD TO CIRCUIT GND

J1
C11
C12

U7

This is a PCB silkscreen/assembly drawing (part number 253-0414 B). Component designators visible include:

J2, 27V, 27V, A GND, A COM-, A COM+, B GND, B COM-, B COM+, K1 COM, K1 NC, J1

F3 (1/4A), F2 (1/4A), F4 (1/4A), F5 (1/4A), F1 (1/4A)

D3, D5, D4, D11, D13, D12, D14, D15, R12, R13, R14, C10, R15, R16, U5, R29, R34, R31, R30, C13, U8, R32, R33, R35, R2, D8, C7, R1

NO COMM DELAY 1-10 SECS

K1, Q1, U4, U7, C11, C12, C9, C8, R23, R22, R25, R24, D6, D7, TX, USB, RX, U6

Q2, R6, R9, R3, R5, R4, U3, C1, J3, 28V, GND, R8, Q3, C6, R7, U1, U2, IN, GN, DT, C3, C2, C5, C4, GND, VIN, OUT

A1, P6, P5, R18, R17, R26, R28, R20, R19, RN1, R21, J4, Q4, Q5, R10, R11, Q7, Q6, R28, R27, J5

253-0414 B

Appendix A

Driver Installation

Purpose

A step by step guide on installing the USB drivers. The guide was written with Windows XP as the installation walkthrough so it may be slightly different with newer versions of Windows.

For Use With

MC-4011-USB
MC-4011-USB-Dual Port
Charge Comm. Board

Date
5/9/2011

Materials Required

1. USB Cable
2. A MC-4011-USB
3. Device drivers for the associated board (located in the driver folder of the Mine Net or WinMac installation location)
4. Computer

1) the power on the device or remove the USB cable and plug it back in, this process will allow windows to enumerate the new device.
2) When the new device is found windows will display a message saying it found the new hardware device and the Found New Hardware Wizard will show up. Follow figures four through 15 for a visual step by step guide on installing the drivers.

Figure 4
Click the circle pointed to by arrow A and then the Next button pointed to by arrow B.
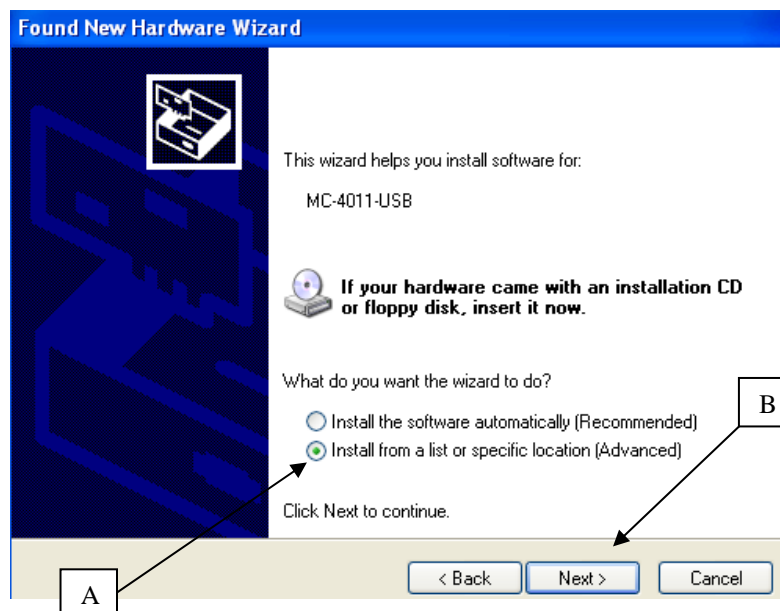
Figure 5
Click the circle pointed to by arrow A and then click the next button pointed to by arrow B.
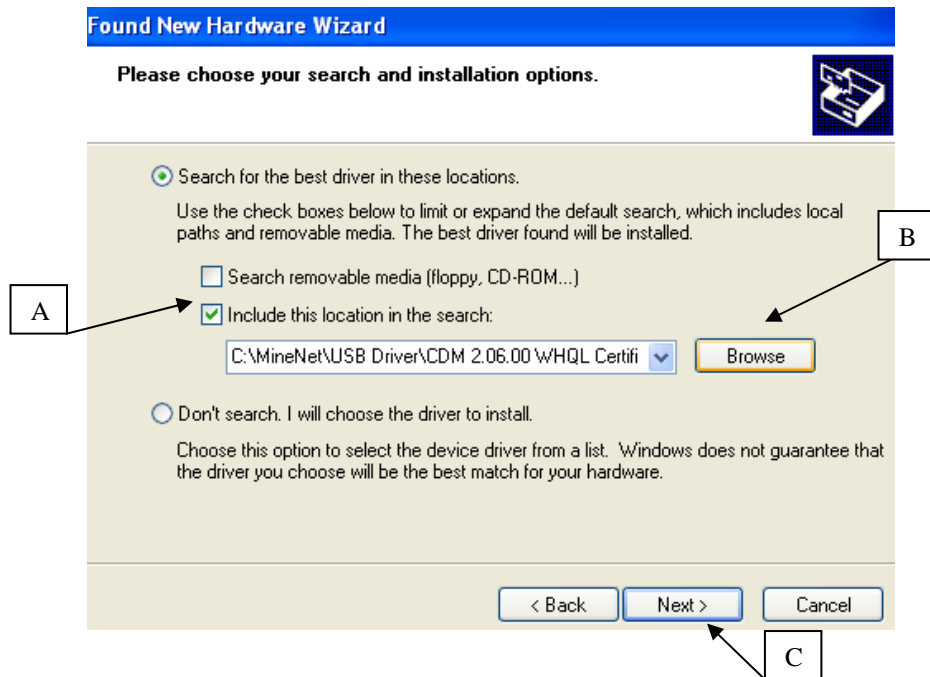
Figure 6
Click the box at arrow A, then browse to the desired driver folder located in the Mine Net or WinMac installation folder\USB Driver\. There are three different folders, one for each device. For example if you are installing a standard 4011-USB device then select the folder named MC-4011-USB DRIVERS.

Once the driver location is found click the next button at arrow C.

Figure 7
Click the Continue Anyway button to proceed.
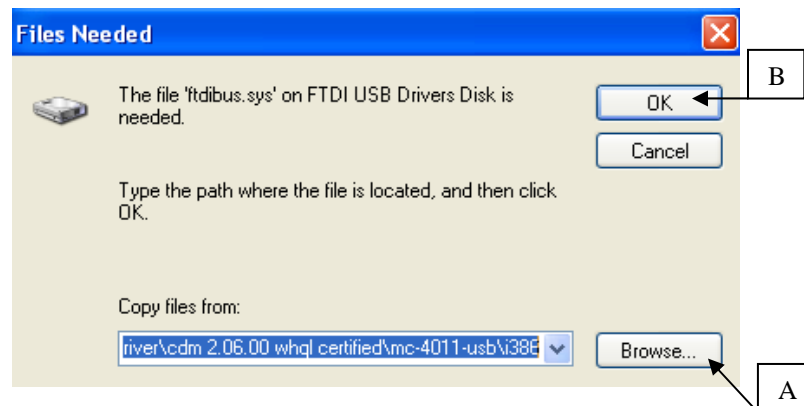
Figure 8
There will be a window that comes up aksing for more files which are in the same folder, you will need to browse back to folder within Mine Net's Driver folder for the paticular device you are installing. For example if you are installing the 4011-USB browse to the Mine Net installation folder\USB Driver\MC-4011-USB.

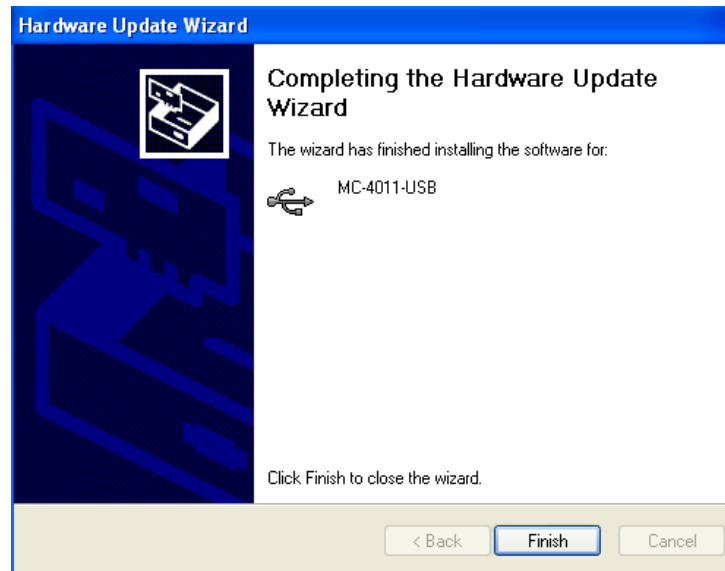Once the location is entered, click the OK button as shown at arrow B.

Figure 9
If everything went correctly the device is installed. Click the Finish Button.

Figure 10
There is a second device that may need to be installed and the Hardware Wizard will come up as shown.

As before click the circle at arrow A and then the Next button at arrow B.
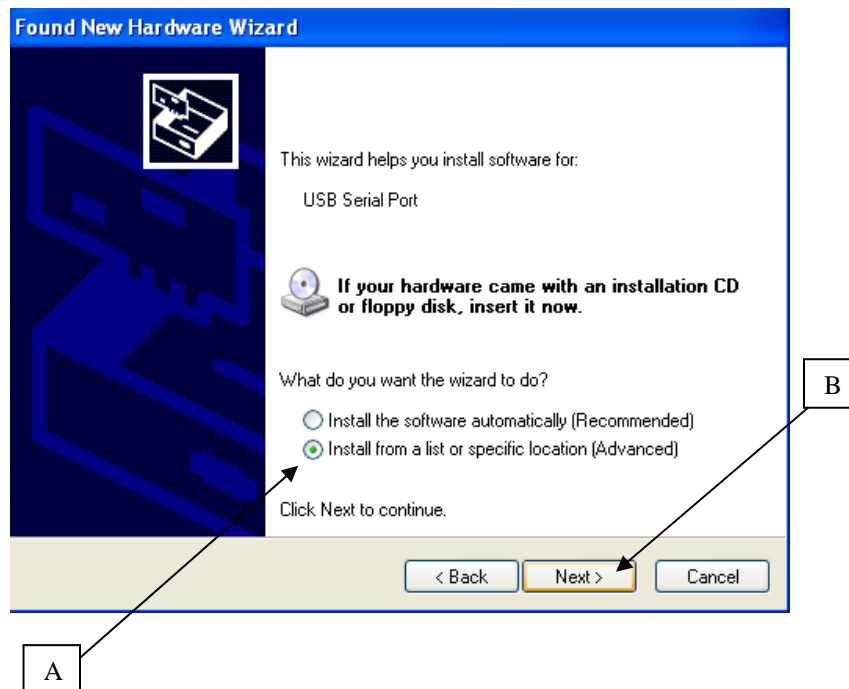
Figure 11

Once again click the circle at arrow A and then the Next button at arrow B.
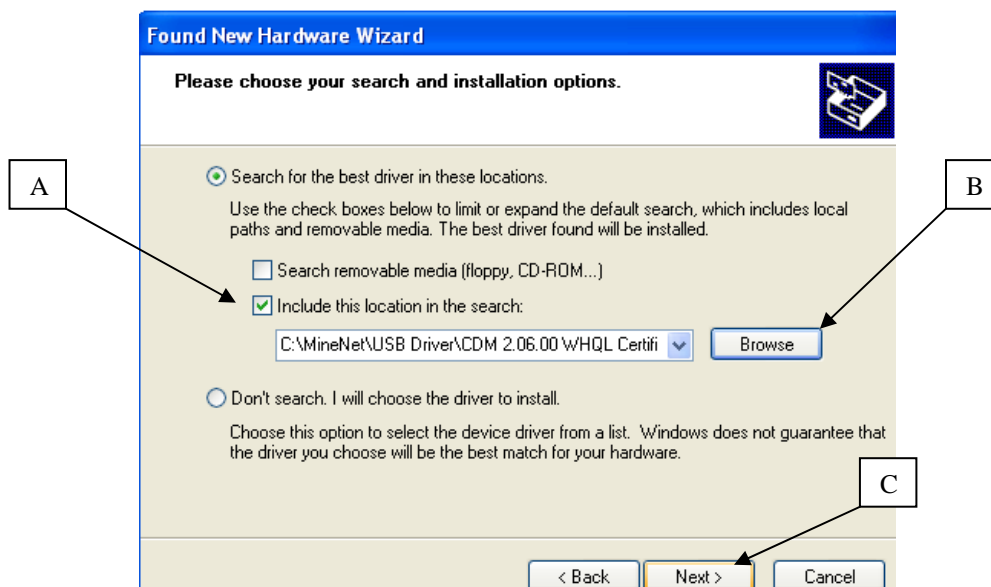

Figure 12

Once again check the box at arrow A and then click on the Browse button at arrow B. You want to go back to the driver folder which is found in the Mine Net installation folder\USB Driver\. There are three different folders, one for each device. For example if you are installing a standard 4011-USB device then select the folder named MC-4011-USB.

Once the driver location is found click the next button at arrow C.

Figure 13
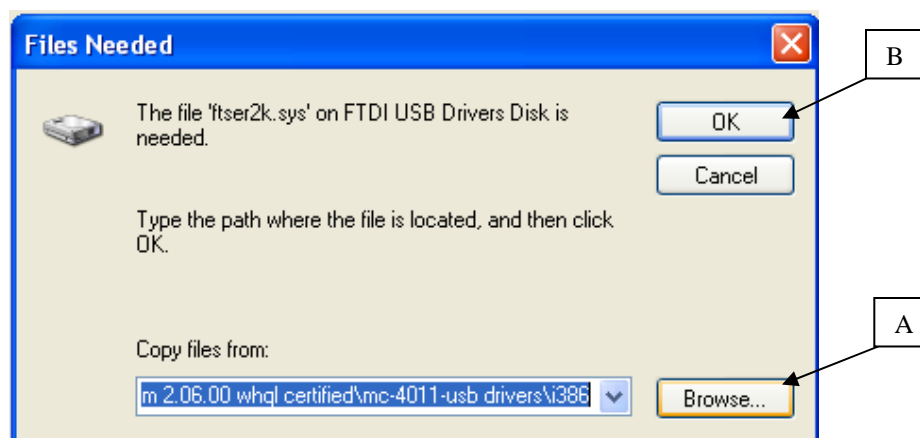Click the Continue Anyway button to proceed.

Figure 14

Once again, there will be a window that comes up aksing for more files which are in the same folder, you will need to browse back to folder within Mine Net's Driver folder for the paticular device you are installing. For example if you are installing the 4011-USB browse to the MineNet installation folder\USB Driver\MC-4011-USB.

Once the location is entered, click the OK button as shown at arrow B.
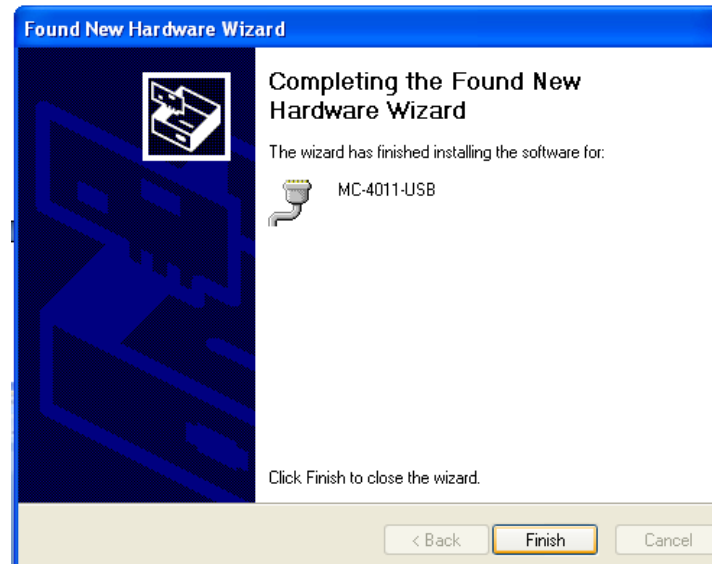
Figure 15

If everything went correctly the device is installed. Click the Finish Button.

3) Windows should display a Balloon pop up, as showin in figure 16, in the lower right corner of the monitor to alert you that the device is installed properly and is ready for use.

Figure 16