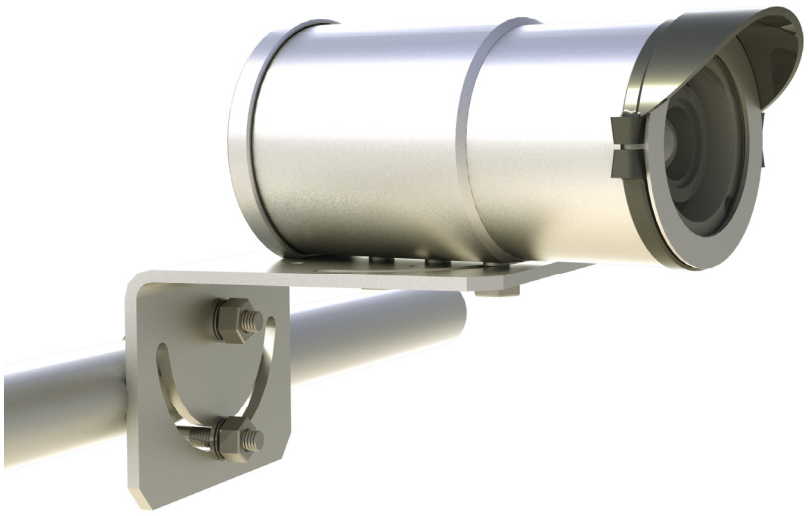
INSTRUCTION MANUAL

CC5MPX and CC5MPXWD Digital Network Cameras

Revision: 3/12



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CAMPBELL SCIENTIFIC, INC.
RMA#_____
815 West 1800 North
Logan, Utah 84321-1784

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Section 1. Introduction

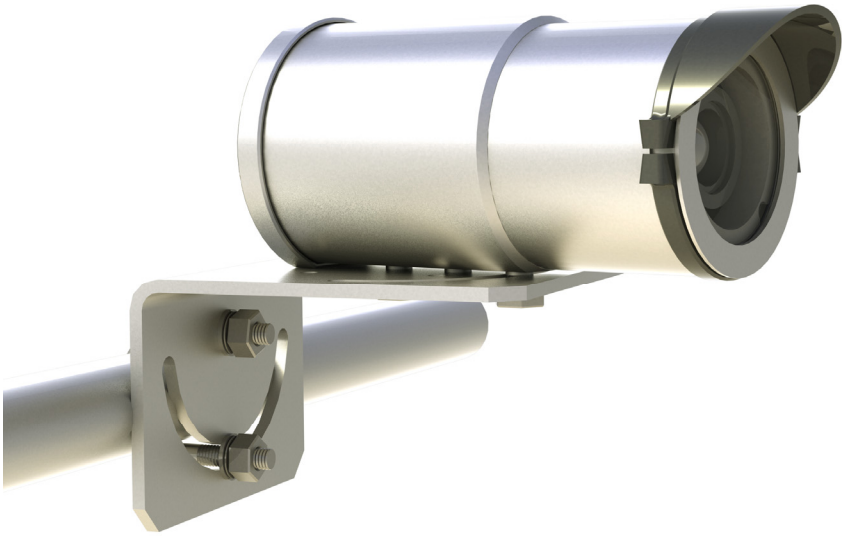


FIGURE 1-1. CC5MPX Camera

The CC5MPX and CC5MPXWD are essentially the same camera, except the CC5MPXWD includes a window defroster that removes light frost and icing from the camera's window. A more detailed description of the defroster is provided in Appendix B.

NOTE For readability purposes, CC5MPX will refer to both cameras throughout this document unless specified otherwise.

The CC5MPX digital network camera was designed to meet the stringent operational requirements necessary for remote battery powered installations while producing images of up to 5 megapixels. The CC5MPX can operate over a wide temperature range and has several advanced power saving modes to suit a variety of needs.

The CC5MPX incorporates an integrated rugged environmental enclosure to reduce cost and installation time. Communication options include Ethernet, RS-232, and RS-485. The CC5MPX is fully web-enabled with FTP and Email capabilities. Campbell Scientific's PakBus protocol is supported by the CC5MPX for integration with Campbell Scientific dataloggers.

An SD memory card is available as an option. This card enables the CC5MPX to archive images and videos internally, creating a powerful image and video logger.

The CC5MPX can operate in a stand-alone mode with image acquisitions triggered by the camera's own precision real-time clock. Image and video acquisitions can also be triggered by events through an external signal or motion detection.

Section 2. Specifications

CC5MPXWD Heating Element Resistance:	18 Ohms
Operating Power	
CC5MPX:	9 to 30 Vdc
CC5MPXWD:	9 to 16 Vdc

CAUTION Operating the CC5MPXWD camera and defroster at voltages higher than 16 Vdc may damage the camera.

Current Drain	
Operating (camera only):	250 mA maximum @ 12 Vdc
Quiescent:	≤1 mA (off power mode)
CC5MPXWD defroster on:	1.2 A (maximum @ 16 Vdc); 1 A (typical @ 12 Vdc)
Operating Temperature:	-40° to +60°C
Clock Accuracy:	±2 minutes/year (-40° to 60°C)
Lens	
Mount:	C-type
IRIS:	DC compatible
Standard Lens:	4 to 12 mm, 27° to 80° field of view (FOV)
Zoom Lens:	10 to 40 mm, 9° to 35° FOV (ordered as a special; contact Campbell Scientific for more information)
Image or Video Capture Triggers:	Two independent self timers Motion detection Web page control External trigger
Still Image Resolution (JPEG):	2592x1944 640x352 1280x960 320x240 1280x720 320x176 640x480
Video:	Capable of 720P - 1280x720 (MPEG4), 640x480 (Live Video Only/MJPEG), 320x240 (MPEG4)
Ext. Input Signal	
Logic Low Level:	<0.65 V (-20 Vdc absolute minimum)
Logic High Level:	>2.0 Vdc (+20 Vdc absolute maximum)
Minimum Pulse Width:	10 ms
Communication Interfaces:	Ethernet 10/100 RS-232 port RS-485 port

Communication Protocols:	Web page interface via web browser FTP Email PakBus (for Campbell Scientific Dataloggers)
Communication Switched Power Output:	Maximum Output Current: 750 mA
RS-232 and RS-485:	Max. BAUD Rate: 115.2 kbps
Memory Card Interface	
Type:	Secure Digital (SD)
File System:	FAT32
File Type:	JPEG (image), AVI (video)
Size:	Verified up to 16GB
Dimensions	
Length:	220 mm (8.7 in); 229 mm (9.0 in) with special zoom lens
Width:	93 mm (3.7 in)
Weight:	1.06 kg (2.34 lb)

Section 3. Getting Started

Ensure that the pigtail end of the power cable is properly terminated (see Wiring, Section 4) before connecting the power cable connector to the camera. If the power supply has an on/off switch, it is also recommended to switch the power off before connecting the power connector to the camera.

For the initial power up and set up of the camera, it is also useful to unscrew the protective cap that protects the push button and LED indicator.

3.1 Factory Setup

The following table outlines some of the CC5MPX settings that are relevant for initially communicating with the CC5MPX camera:

TABLE 3-1. CC5MPX Default Configuration

Configuration Setting	Value
Power Mode	Fully On
Network IP Address	192.168.1.90 (Static)
Network Mask	255.255.255.0
Serial I/O Port	RS-232
RS-232 Baud Rate	115200
PakBus Address	55

There are two different ways to set up the parameters in the CC5MPX. The Ethernet network interface can be used with a web browser or the RS-232 serial lines can be used with Campbell Scientifics' Device Configuration utility (version 2.0 or greater). The use of the RS-232 serial lines need to be terminated with the socket version of the SC110 or use of the DB9M-TERM in order to connect to a PC (Section 4, TABLE 4-1).

When power is first applied to the camera, the LED will turn on and remain steadily on for about 90 seconds. Once the LED starts flashing, the camera has initialized properly and is ready for operation.

3.2 Installing Multimedia Player

NOTE The multimedia player needs to be installed where there is access to the Internet.

The use of a multimedia player is required on your computer to properly display the video from the CC5MPX. We recommend the use of the VideoLAN VLC media player, which is free, open-source software to ensure that the proper video codecs are available on your computer. The download is available online at the follow address:

http://www.videolan.org/vlc/

Prior to installing the camera in the field, download and install the appropriate VLC media player to the PC that will be interfacing with the CC5MPX.

3.3 ActiveX Controls in Internet Explorer

Currently the CC5MPX is only fully supported using the Windows Internet Explorer browser.

The web interface for the CC5MPX will require the use of ActiveX controls when using Internet Explorer. These add-ons allow Windows to interact with objects in the web interface through Internet Explorer.

When connecting to the CC5MPX via the web interface for the first time, you should be prompted to run the ActiveX add-ons. This typically occurs the first time you access a webpage. The prompt is in the form of a "pop-up" in Internet Explorer and should be allowed.

3.4 Setup Using Ethernet

It may be beneficial to speak with someone in your IT department if you are not familiar with configuring devices for operation on a network.

If the standard assigned static IP address is compatible with your current network, you may simply plug the camera into the network and its IP address will be 192.168.1.90. If this IP address is not compatible with your network, then you will have to change the setting by connecting the camera directly to your computer's Ethernet port.

The easiest way to connect to the CC5MPX for changing its default IP settings is to manually configure your computer's Ethernet IP address to be compatible with the factory default address assigned to the CC5MPX.

The following shows how to change your network setting using Windows XP:

Click on *Network Connections* via the Control Panel.

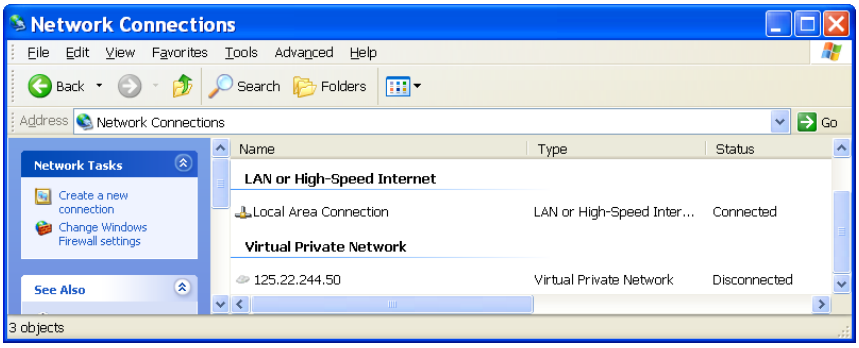


FIGURE 3-1. Network Connections

Right click on the Local Area Connection and select *Properties*.

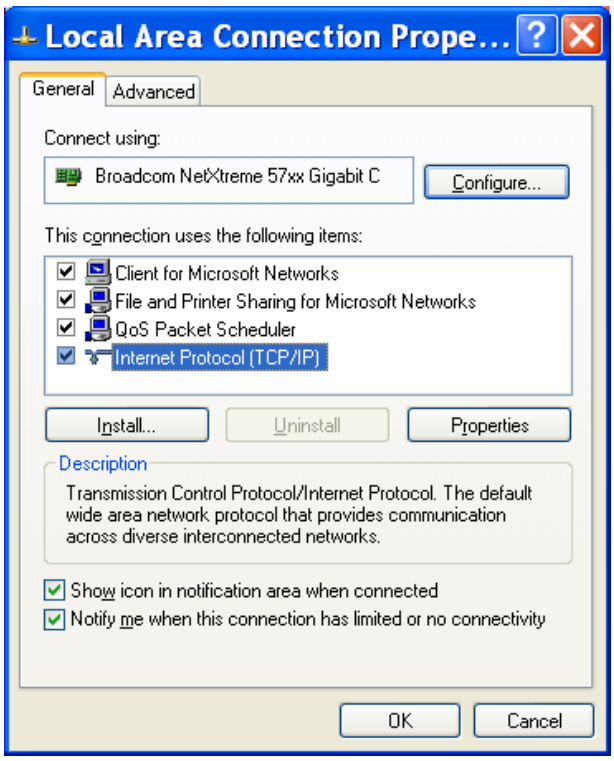


FIGURE 3-2. Local Area Connection

Highlight the Internet Protocol (TCP/IP) selection and click on Properties.

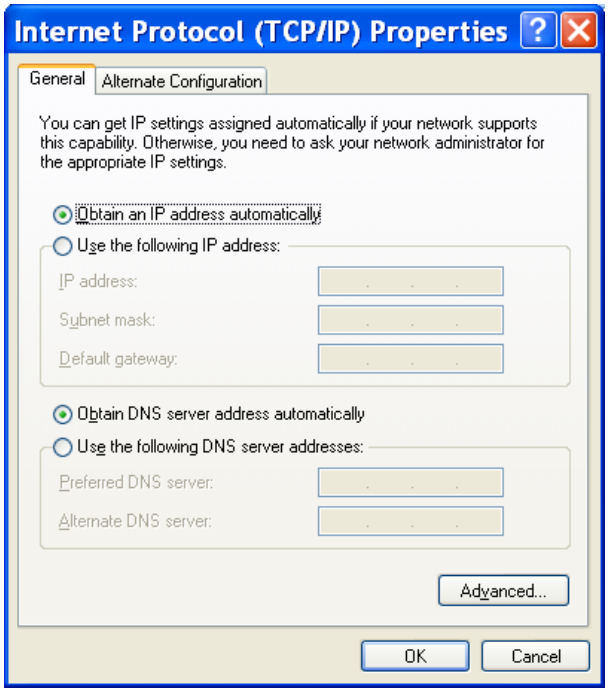


FIGURE 3-3. Internet Protocol Properties

You should record the existing settings that are used on the computer to restore the connection back once the CC5MPX setup is completed. In the screen shown above, the computer is set to *Obtain the IP address* automatically which is quite common.

At this point you will also want to disconnect your computer from the network and connect it directly to the CC5MPX camera. You do not need to use a crossover cable as the CC5MPX has an auto MDIX feature that will allow the camera to automatically connect with or without a crossover cable.

Change the settings by assigning a manual IP address. In this case, we will assign an address of 192.168.1.91 with a Subnet mask of 255.255.255.0. The default gateway could also be set to 192.168.1.1.

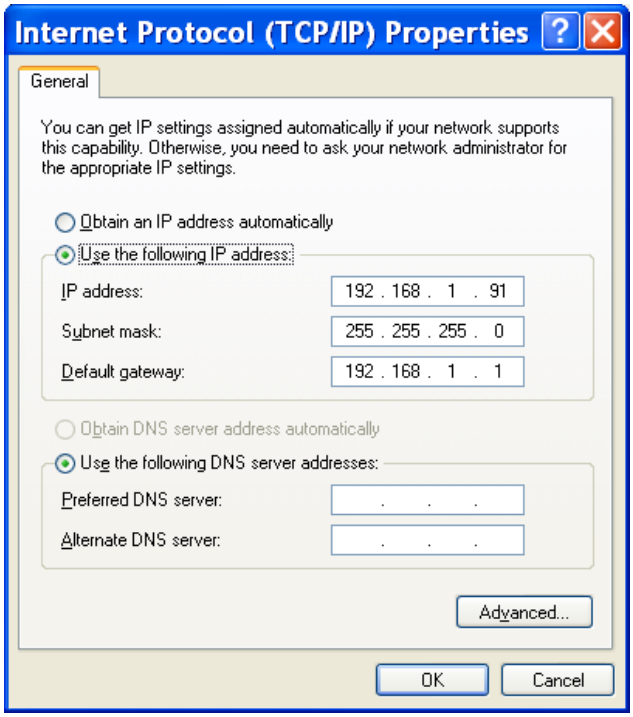
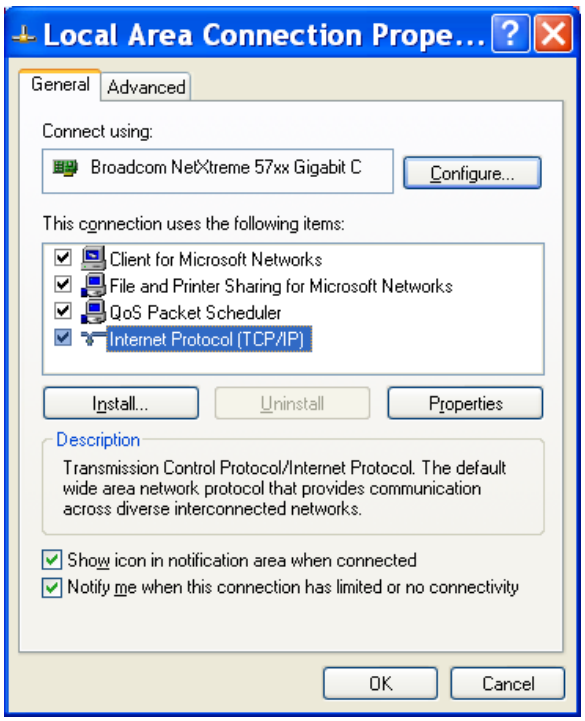
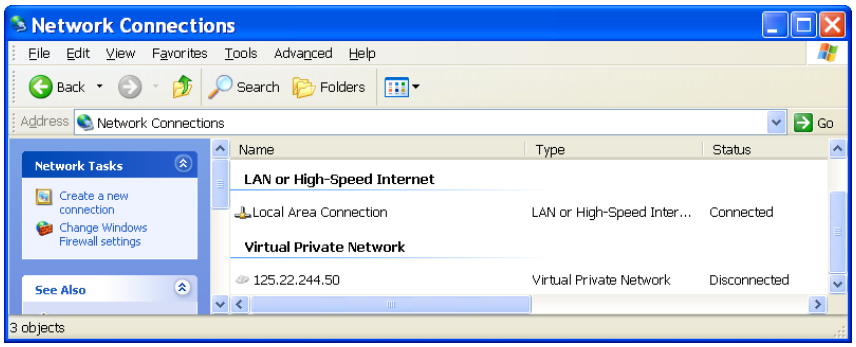


FIGURE 3-4. IP Address Configuration

Click OK.



Click OK again here.



Right click on the Local Area connection again and select repair.

You should now be able to open your web browser and access the camera by typing http://192.168.1.90. In the above example, your computer was configured to 192.168.1.91 and the camera is set to at 192.168.1.90. Since you want to connect to the camera, the 192.168.1.90 is entered into the browser.

Once the computer establishes a connection with the camera, the following page should be displayed in your Internet Browser.

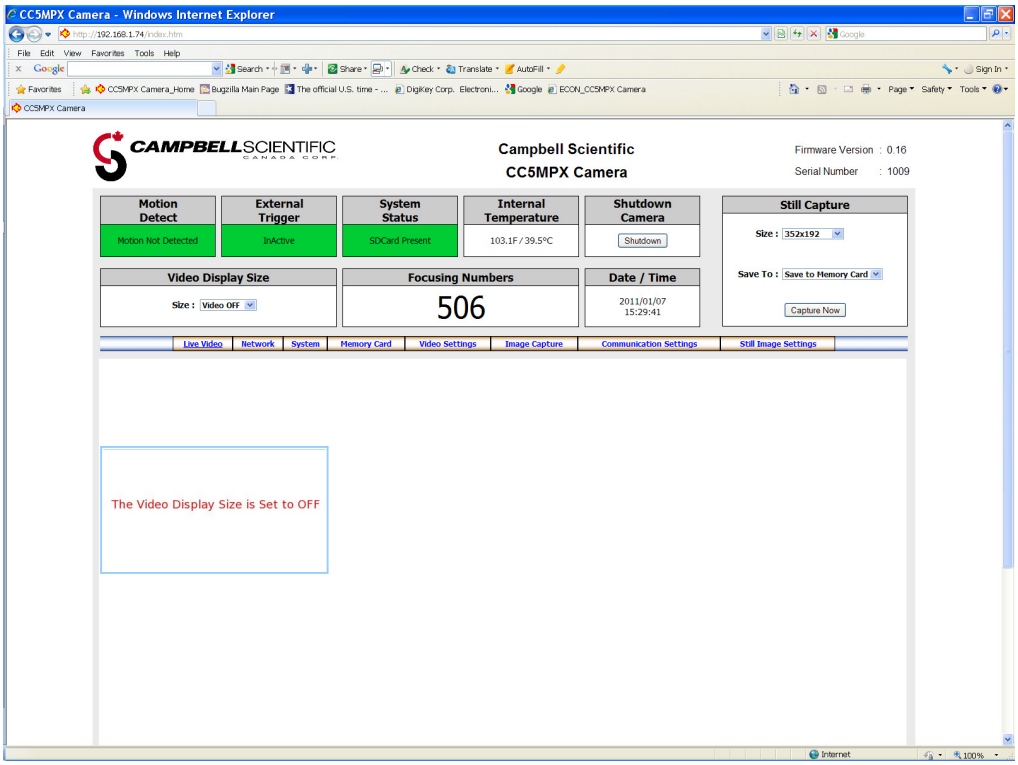


FIGURE 3-5. Web Interface Live Video Home Page

If you select a video format to display from the *Video Display Size* drop down box, you should be prompted to install an Active X control. Your browser may be configured by default to block pop-ups. You will need to enable the pop up for the camera.

3.5 Setup Using Device Configuration Utility

Campbell Scientific provides a free software program called the *Device Configuration Utility* that supports the configuration of a variety of equipment. The CC5MPX can also be configured with the Device Configuration Utility. Please visit Campbell Scientific's web site to ensure that you have the most recent version of the utility.

The CC5MPX ships from the factory with the communication lines configured for RS-232. The green wire on the cable is the CC5MPX RS-232 TX (output) line, the white wire is the CC5MPX RS-232 RX (input) line and connection will also need to be made from the CC5MPX black ground to the RS-232 ground.

The CC5MPX comes with a DB9M-TERM that facilitates the connection of the CC5MPXCBL1-L cable to a 9-pin RS-232 connector. See Section 4 for wiring details.

When power is first applied to the camera, the LED will turn on and remain steadily on for about 90 seconds. Once the LED starts flashing, the camera has initialized properly and is ready for operation.

The Device Configuration Utility can now be invoked. Select the CC5MPX as the device type and the appropriate COM port.

Once the appropriate selections are made, click the connect button.

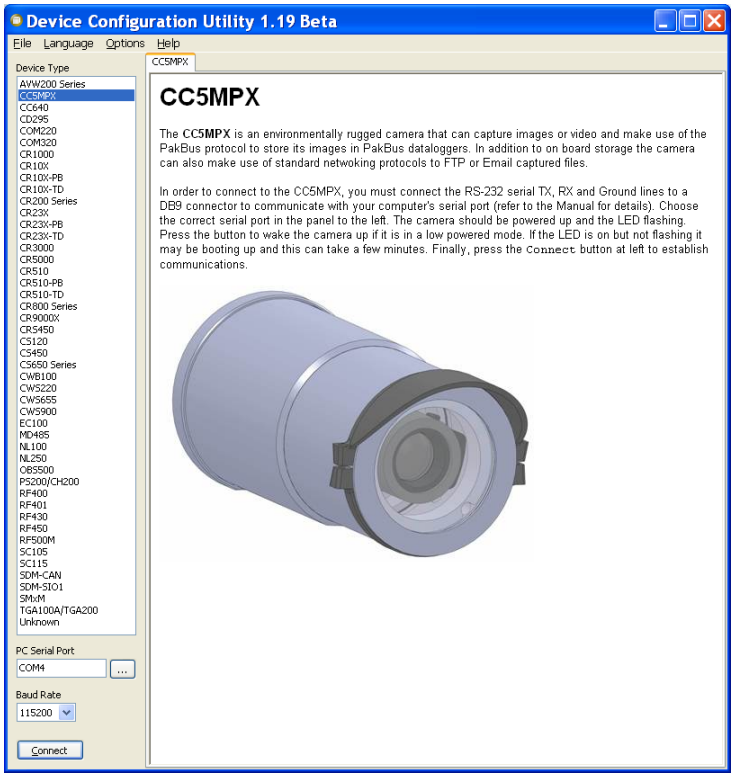


FIGURE 3-6. CC5MPX Shown in Device Configuration Utility

The camera has a large number of variable information so it may take about 30 seconds for this process to complete. Once the settings are loaded, clicking the tabs located near the top of the page will allow navigation to the various settings.

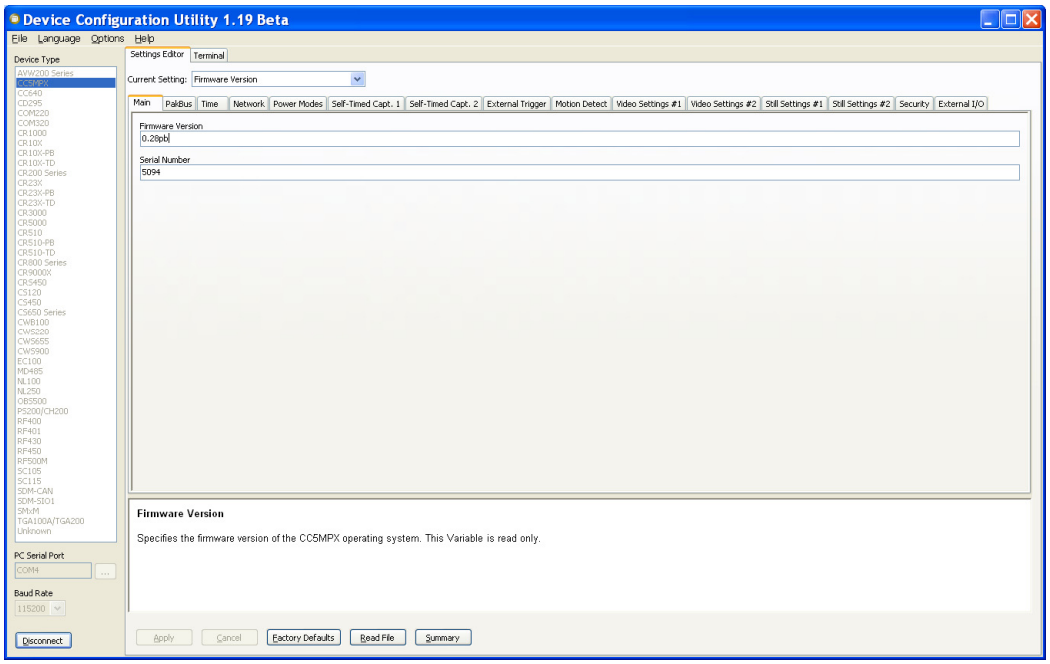


FIGURE 3-7. CC5MPX Device Configuration Utility Settings Editor

Section 4. Cables/Wiring

4.1 Power and I/O Cable Connections

The wiring for the CC5MPXCBL1-L Power and I/O Cable is as shown in TABLE 4-1 and FIGURE 4-1 through FIGURE 4-4.

NOTE It is essential that the Ground cable be connected first when wiring the camera to the datalogger or the power supply.

TABLE 4-1. CC5MPXCBL1-L Power and I/O Cable Color Connections

Color	Function	Connection
Black	Power Ground	System Ground
Red	Input Power	Power Source 9-30 VDC
Green	RS-232 TX (Output)	RS-232 Input (Pin 2 of a computer (DTE) DB-9 connector or even-numbered control port of a TX/RX pair on a CR800, CR1000, or CR3000) RS-485A when configured to RS-485
White	RS-232 RX (Input)	RS-232 Output (Pin 3 of a computer (DTE) DB-9 connector or odd-numbered control port of a TX/RX pair on a CR800, CR1000, or CR3000) RS-485B when configured to RS-485
Yellow	Communication Switched Power (Output)	This line is intended to power a communication device. The camera switches the Input Power voltage to this line.
Blue	Enable	Wakes up or initiates image/video acquisition.
Clear	Shield	Shield/Earth Ground

Refer to Section 8 Internal Jumpers if the current RS-232 or RS-485 interface option needs to be changed in the camera.

Refer to TABLE 4-2 to help determine which wires will need to be connected for your camera application.

TABLE 4-2. CC5MPXCBL1-L Power and I/O Cable Wire Usage

Wire Color	Function	Connection Required	When not Used
Black	Power Ground	Always	
Red	Input Power	Always	
Green	RS-232 TX (Output) or RS-485 A	Green wire only needs to be connected when RS-232 or RS-485 communications are used with PakBus or the Device Configuration Utility.	Connect to a gray terminal block
White	RS-232 RX (Input) or RS-485 B	White wire only needs to be connected when RS-232 or RS-485 communications are used for PakBus or the Device configuration Utility.	Connect to a gray terminal block
Yellow	Communication Switched Power (Output)	Yellow wire only needs to be connected if the camera will control power that is supplied to a communications modem. For solar powered sites, the camera can remove power from the modem when communications are not required.	Connect to a gray terminal block
Blue	Enable	Blue wire is used when another device will be triggering the camera to capture an image or video. Another device can also keep the camera in the Fully On Power mode by leaving the External Trigger Input asserted.	Connect to a gray terminal block or Connect to ground if left in Factory Default settings
Clear	Shield	Always	

CC5MPXCBL1 Wire Color	Connection
Black	CR1000 Power G
Red	CR1000 12V
Green	CR1000 C2
White	CR1000 C1
Yellow	Gray Terminal Block
Blue	Gray Terminal Block
Clear	CR1000 G

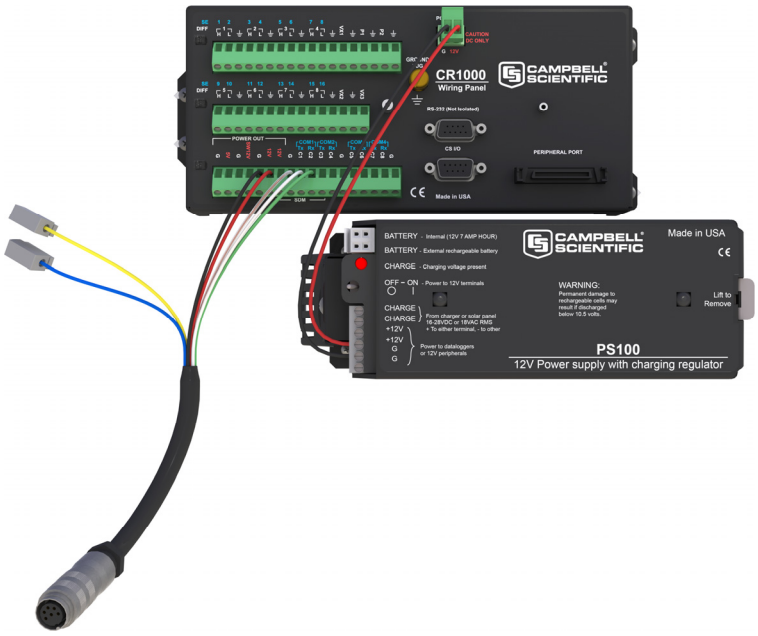


FIGURE 4-1. Camera Connected to CR1000

CC5MPXCBL1 Wire Color	Connection
Black	CR1000 Power G
Red	CR1000 12V
Green	CR1000 C2
White	CR1000 C1
Yellow	Gray Terminal Block
Blue	CR1000 C4
Clear	CR1000 G

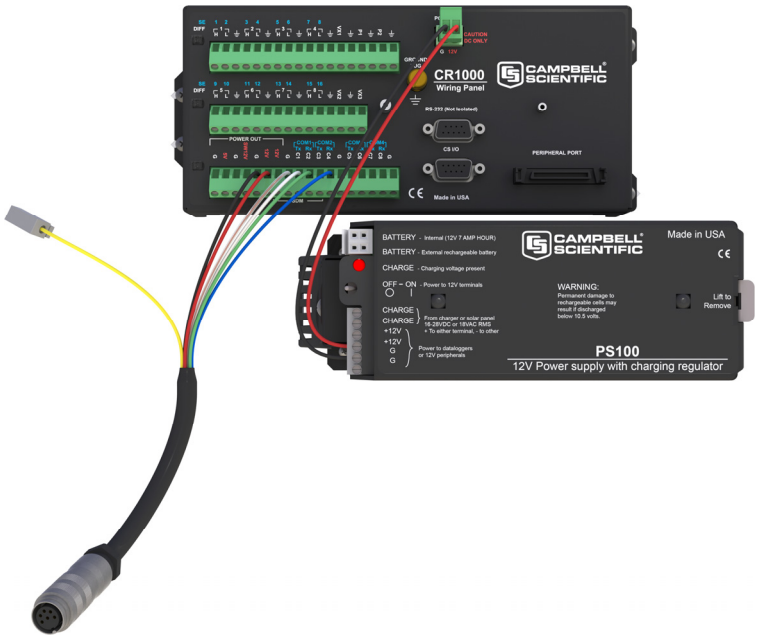


FIGURE 4-2. Connection Allows CR1000 to Trigger the Camera

CC5MPXCBL1 Wire Color	Connection
Black	PS100 G
Red	PS100 +12V
Green	Gray Terminal Block
White	PS100 G
Yellow	Gray Terminal Block
Blue	Gray Terminal Block
Clear	PS100 G

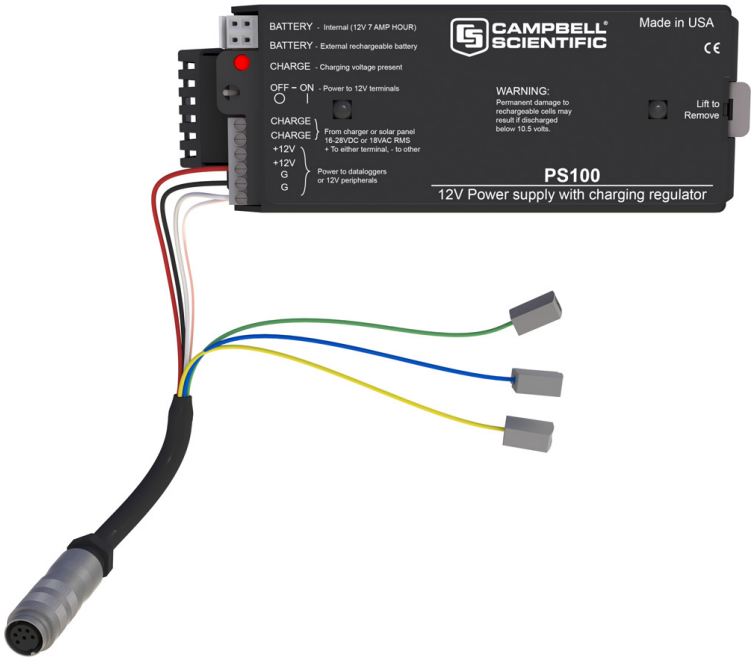


FIGURE 4-3. Camera wired for stand-alone operation without datalogger. For example, network connection only.

CC5MPXCBL1 Wire Color	Connection
Black	CR1000 Power G
Red	CR1000 12V
Green	MD485 A
White	MD485 B
Yellow	Gray Terminal Block
Blue	Gray Terminal Block
Clear	MD485 G

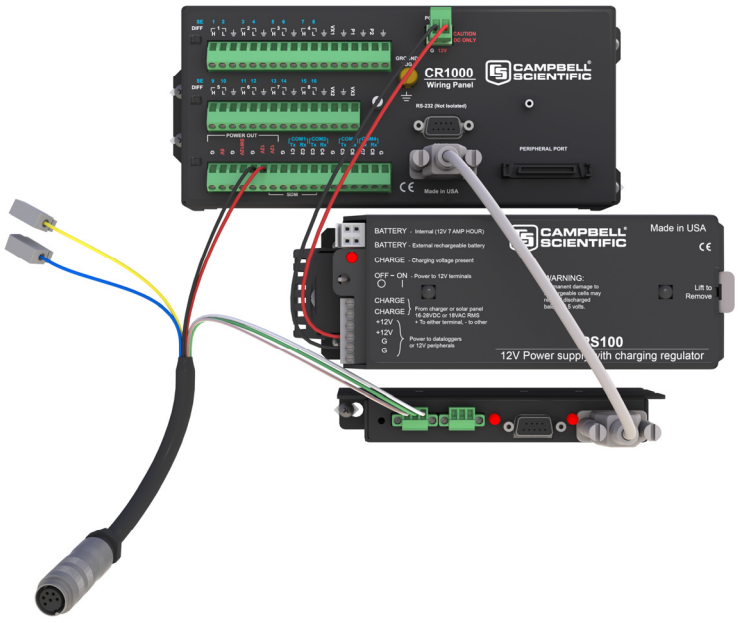


FIGURE 4-4. CC5MPX Connected to MD485 Multidrop Modem

4.2 CC5MPXCBL1-L Power and I/O Cable Details

The CC5MPXCBL1 cable has an outdoor environmentally rated screw type connector on one end and discrete wire pigtails on the other end that allow for flexible termination. When connecting the cable to the camera, the notch positions should always be lined up and care should be taken to not cross thread the connector.

The details of the cable are as follows:

- 24-AWG three pair (6 conductor) individually shielded cable with Santoprene jacket
- Weather-proof connector
- 10 inch pigtail for termination
- Maximum recommended cable length 100 ft (30 m).

Longer cable lengths can be used; however, a heavier gauge of wire is suggested. It is recommended that the individual wire resistance on the +12 Vdc and Ground conductors not exceed 2.7 ohms. Using a longer cable in conjunction with RS-232 communications will require slower baud rates. Depending on the cable length and type of cable, RS-232 may not be suitable for communications and the use of RS-485 should be considered.

4.3 Ethernet Cables

The Ethernet connection is used to configure the camera settings as well as for targeting and focusing the camera. The Ethernet port of the CC5MPX is auto MDIX, therefore an Ethernet crossover cable is not required when connecting the camera to other devices.

A standard CAT5 (or better) Ethernet cable with RJ45 connectors can be used to interface to the camera in indoor conditions or for temporary connection outdoors when conditions permit. When an Ethernet connection is required for permanent outdoor installations or when a connection to the camera is required in wet or harsh conditions, the CC5MPXCBL2-L Environmental Ethernet Cable needs to be used.

The CC5MPXCBL2-L Environmental Ethernet Cable includes on one end an environmental connector that provides a weather proof connection when properly mated to the camera. On the other end, the cable is fitted with a standard RJ45 connector. This is meant to provide an Ethernet connection between the CC5MPX and a network router, cellular modem, or laptop.

Below are details of the CC5MPXCBL2-L Environmental Ethernet:

- CAT5E Shielded cable with polyurethane jacket
- Weather-proof RJ45 connector on one end and a regular RJ45 connector on the second end.
- Maximum recommended cable length 230 ft (70 m)

Section 5. Camera Hardware Description

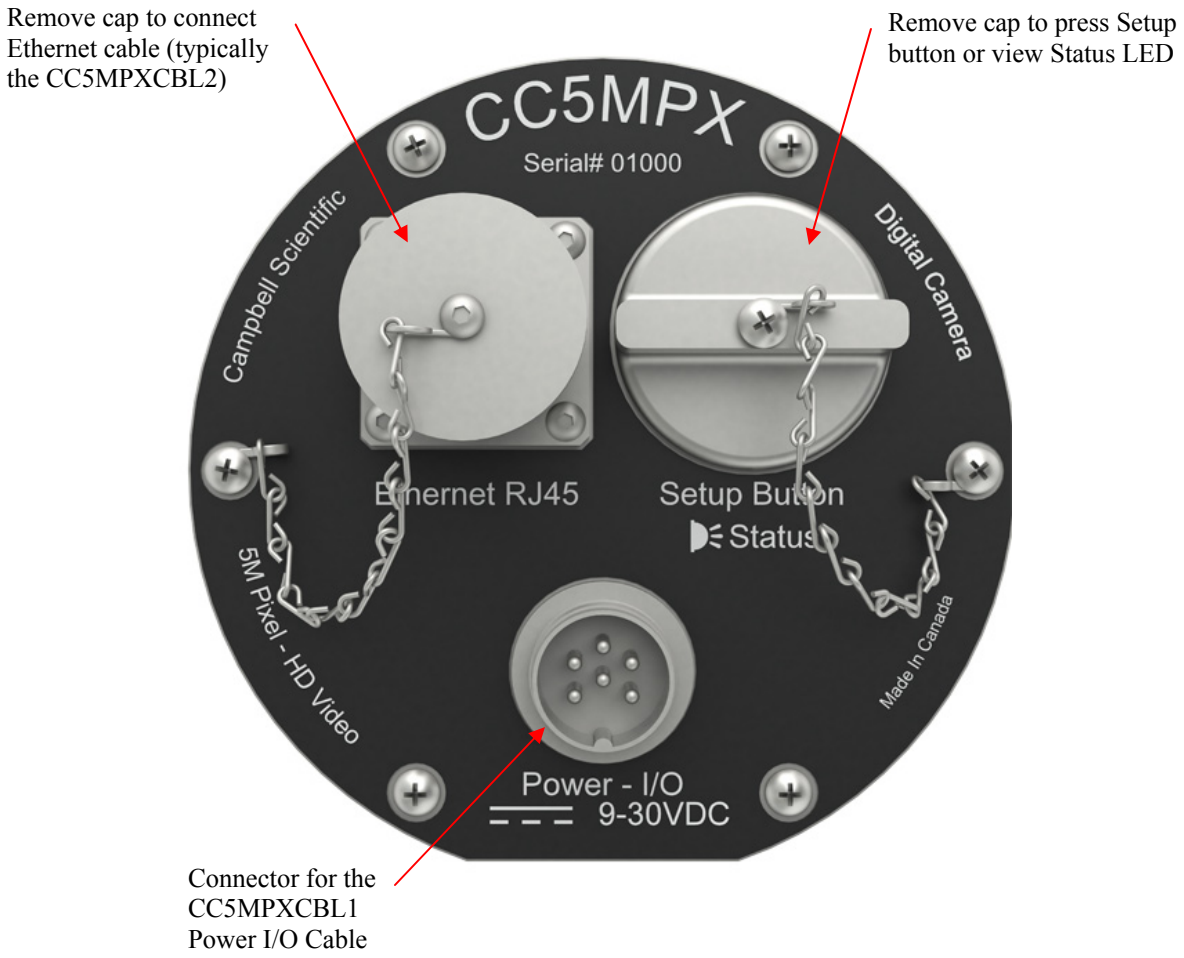


FIGURE 5-1. CC5MPX Connector Layout

5.1 Ethernet RJ-45 Connection

The RJ45 connector on the camera is meant to interface the CC5MPX with either a network router, cellular modem, or directly to a laptop.

If a permanent Ethernet connection is not required for an outdoor environment, then the protective cap must be securely attached to the Ethernet connector to provide an environmental seal.

When the protective cap is removed, a standard cable with an RJ45 connector can be used to connect the camera to another device in an indoor environment or temporarily outdoors if weather permits.

If a permanent Ethernet connection is required outdoors or if a connection is required in wet or harsh locations, the CC5MPXCBL2-L Environmentally Rated Ethernet cable must be used.

The maximum cable length for the Ethernet cable is 70 m (230 ft).

NOTE The CC5MPX does not support the PakBus communication protocol over Ethernet.

5.2 Power I/O Connection

The CC5MPXCBL1 cable must be attached to the Power I/O connector for camera operation. It is the only means to supply power to the camera. The connector that connects to the Power I/O connector provides a weather tight connection.

When making the cable connection to the camera the notch positions should always be lined up and care should be taken to not cross thread the connector.

5.3 Setup Button/Status LED

The Setup button is located behind a protective metal cap on the camera. The Setup button also contains an integrated Status LED for user feedback.

To access the LED unscrew the protective cap to expose the Button/LED. It is highly recommended to place the protective cap back on for improved environmental protection.

5.3.1 Status LED

The Status LED located in the center of the button provides some useful diagnostic information about the camera. The following table describes the LED behavior.

TABLE 5-1. Setup Button LED Indicator		
LED	**CC5MPX State**	**Other**
Continuously Off	No power or the camera is in one of the following low powered modes: • Partially On • Deep Sleep • Off Mode	Pressing the Setup button will force the camera to exit any of the low powered modes and remain fully on for a period of 5 minutes with the LED rapidly flashing.
Slow Flash 1 second on 3 seconds off	Normal operation in fully on power mode	
Rapid Flash 2 times per second	Exited from a low power state. The camera is being kept on by: • timeout (from the Setup Button press) • communications • asserted external trigger • image or video acquisition	
Continuously On	The camera is booting up. The boot-up process takes approximately 90 seconds.	The camera will be required to boot up whenever: • Power is first applied to it. • The camera is exiting the off power mode to perform an operation.

5.3.2 Setup Button

The primary function of the Setup button is to wake the camera from any of the power saving modes that it may be in. Once the Setup button is pushed, the CC5MPX enters a fully on power mode for a period of 5 minutes. During this interval, you are able to access the camera via either Ethernet or RS-232/485 and make any necessary configuration changes. If no communications occur during the 5 minute window, the camera will return to its configured power saving mode and continue normal operation.

The secondary function of the Setup button is to facilitate a power down procedure. If the button is held for a period of 10 seconds, the camera will completely shut down for a period of 10 minutes. During this interval you are able to remove power from the camera and avoid possible corruption of the memory card. This function is also available through the camera web interface via the “Shutdown Camera” button box.

5.4 SD Memory Card

The camera is internally equipped to use an SD memory card, which is available as an option for the CC5MPX.

If you choose to use your own memory card, the memory card will need to be formatted with a PC using the FAT32 format.

Image files can be stored on the SD memory card as JPEG files and video files are stored as AVI files. Individual image and video files are uniquely named with a sequence number, or with a date and time stamp. The directory location will correspond to the camera capture configuration and the method of triggering (i.e., motion detection).

The use of the card for image and video storage is entirely configurable to fit the needs of a given application. Each individual image or video capture feature can be configured to manage memory card files as either fill and stop, or with a ring memory.

Access to the SD card requires the removal of the camera backplate. Insertion or removal should only be done when power is removed. See Section 5.4.2 for more information on image and video retrieval from the SD card. It is generally recommended to delete older image files from the memory card after downloading them to a permanent storage location.

5.4.1 Accessing SD Memory Card

In order to access an SD memory card, you will need to remove the backplate of the CC5MPX. Before starting this process, press the setup button for 10 seconds, which will power down the camera. While the camera is powered down, remove the CC5MPX from any power supply and disconnect any attached cabling.

Refer to Section 20 for details on removing the camera backplate.

The SD memory card is installed by placing it into the housing and pushing it in until you hear a click (see FIGURE 5-2). The SD card can be removed by first pressing the card into the housing until you hear a click. The card can now be pulled from the card housing.

Once finished with the SD card, replace the backplate. First ensure that the O-ring is still seated properly on the backplate (refer to Section 19.3). This is very important as the O-ring is required to properly seal the camera.

The backplate can only be seated in the orientation that aligns the flat surfaces of the backplate and the bottom of the camera body. This will also help align the screw holes. The six screws can now be threaded and hand tightened. Be sure the two plastic washers are located between the tether chains and the backplate.

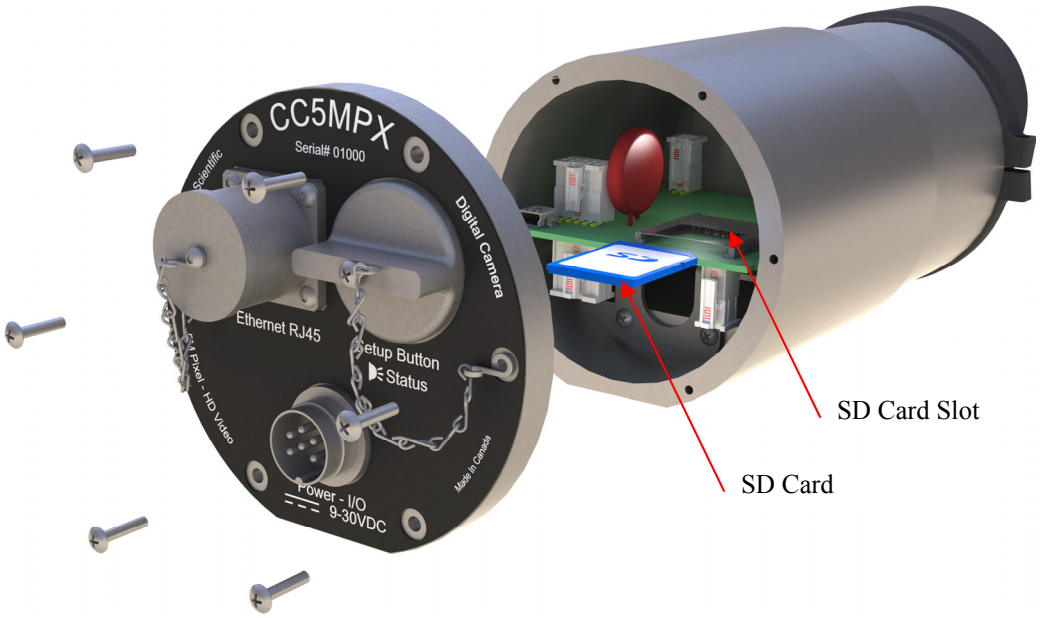


FIGURE 5-2. SD Card Insertion (wires not shown)

5.4.2 FTP Image Collection from the Memory Card

If the camera is setup to store images to the memory card, it may be necessary to collect all the images from the memory card. The web interface does provide a user friendly method of viewing and saving select files from the memory card. However, if it is desired to collect a large number of files from an entire folder then using the web interface is very cumbersome.

It is recommended to access the CC5MPX memory card by using the FTP file transfer process. On most windows machines, this is easily done by simply typing the following ftp://192.168.1.90:85 into Windows Explorer where "192.168.1.90" is the IP address of your camera and the ":85" is the port used for FTP access. The camera supports FTP access to the memory card on port 85 of the camera. This will require an Ethernet connection to the camera.

Clicking a directory such as SelfTimed1Still will begin the navigation into that directory. Whole directories or files can be saved just like any other Windows folder.

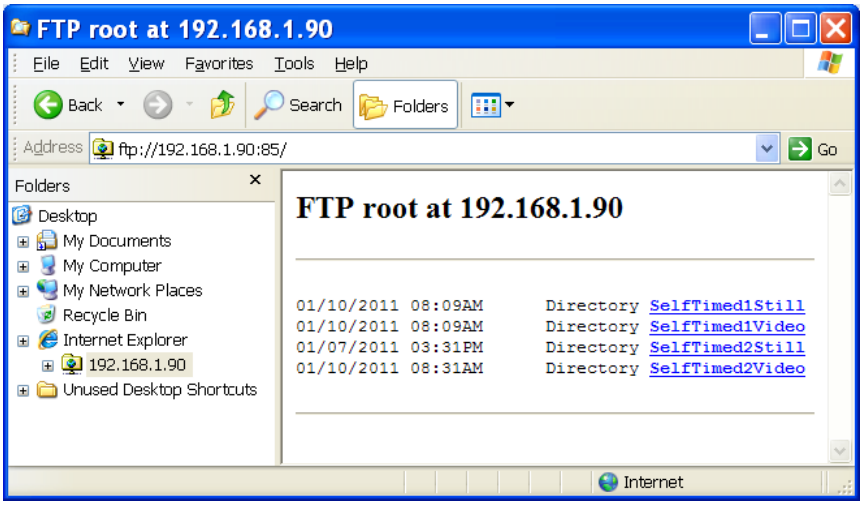


FIGURE 5-3. Image Collection from Installed SD Card

5.5 Switched Power Output

The intended purpose of the switched power output is to control the power for a communication device. One common application is to have the camera control the power to a communication modem at a solar-powered site. Refer to Section 7.3.5 for details on configuring the switched power output via the web interface.

This power management feature can greatly reduce the system power requirements by only turning on the modem when required to transmit an image or video.

The switched power output will turn on under the following conditions:

- The camera is in one of its low power modes and the Setup button is pressed. The camera will exit the low power mode and stay awake for 5 minutes with the Switched Power output on.

- A low power mode is selected and the camera wakes up from an event where communications are required. This will include FTP, SMTP (EMAIL), or PakBus Transfers. Events requiring memory card storage only will not turn on the switched power output as these events would not require a modem for communications.

Section 6. Camera Configuration

There are two methods for a user to configure the CC5MPX camera.

The first is by using the web interface of the camera. This is the best way to set up a camera. Normally most users will need to communicate with the camera via the Ethernet connection in order to facilitate focusing and targeting of the camera when installed.

The other means of setting up the camera is to connect the RS-232 serial lines on the CC5MPXCBL1 Power and I/O Cable and use Campbell Scientifics' Device Configuration software to change configuration parameters in the camera (Section 9). Device Configuration Utility is a free download from any Campbell Scientific website.

If you are not able to connect to the camera via the Local Area Connection due to a loss of configuration information, you will need to use the Device Configuration Utility. A third method is available as well that involves opening up the camera to access the internal USB connector. Please refer to Section 22 Internal USB Function.

Section 7. Camera Operation Using Web Browser Interface

The web interface allows the user to:

- Fully configure the CC5MPX as required.
- View information, system status, date and time.
- View live video for the purpose of targeting and focusing the camera.

The camera ships with the default static IP address of 192.168.1.90 and a Network Mask of 255.255.255.0. It is highly recommended to keep track of any changes made to the network settings.

Refer to Section Setup Using Ethernet for details on making the initial network connection to the camera.

Currently only the Windows Internet Explorer web browser is fully supported for use with the CC5MPX camera. To establish communications with the camera enter the IP address of the camera in the address bar of Internet Explorer. If left at factory defaults, the IP address is 192.168.1.90. After typing the address you should get the home page of the CC5MPX camera as shown below.

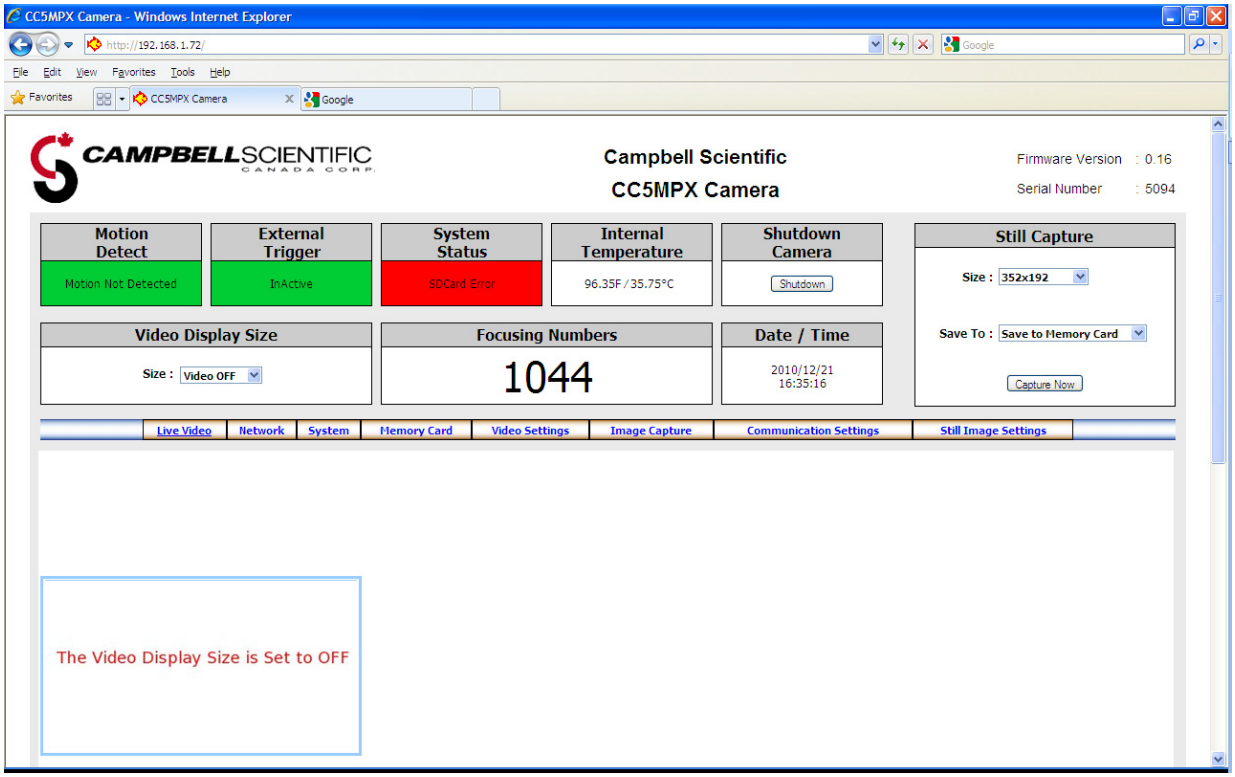


FIGURE 7-1. CC5MPX Web Interface Homepage

Some general items to remember about the web interface are as follows:

- The home page of the camera is the Live Video page. There are no operational settings to change on the Live Video page.
- If any settings are changed or added on any of the other pages, then the Submit button must be keyed to accept the changes. If the submit button is not keyed the changes will not be saved.

7.1 Live Video Homepage

The Live Video Homepage of the CC5MPX is shown in (FIGURE 7-2).

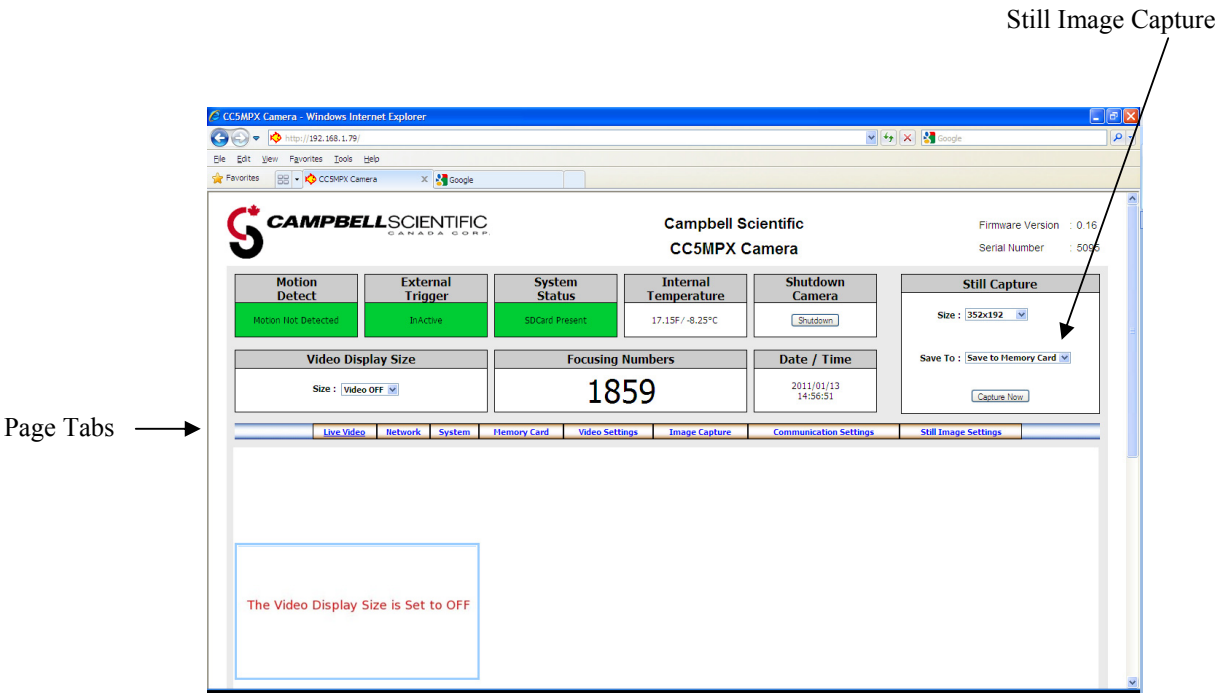


FIGURE 7-2. Live Video (Homepage)

The Homepage allows the user to manually capture still images or view real time video. The use of these features aid in the installation of the camera and testing the images.

When the Video Display Size is changed from Off to one of the video size settings, video will be displayed in the video display area. If you are not able to view video please review Section 3. Getting Started.

The Still capture box allow the manual capture of Still images. Select the desired size and the method of capturing. The two methods of capturing include storing the image to the SD card in the directory ManualStill or the Save as File option which enables the picture to be saved to the computer.

The “Shutdown Camera” button provides a safe power down sequence. If at all possible, the Shutdown button should be used any time power needs to be

removed from a camera that is actively collecting and storing images or video. It will completely shut down for a period of 10 minutes and ensure the memory card is not corrupted. An alternate way of shutting down the camera is to hold the Setup Button down for a period of at least 10 seconds.

Information features on the Live Video page include:

- Motion Detect Indicator
  - Turns from green to red when motion is detected.
  - This will indicate even if the motion capture is not enabled.
- External Trigger Status
  - Reflects the state of the External Trigger signal on the Power I/O cable.
- System Status
  - Indicates the SD card presence or absence and system messages.
- Internal board temperature value
  - When fully on, the internal temperature can be 10° to 15°C (18° to 27°F) above ambient.
- Focusing numbers
  - Facilitates focusing (see section Using the Focusing Number)
- Date and Time

The Live video page, as well as every other page, also contains a navigation bar with tabs that allow navigation to the other CC5MPX web pages. These are called Page Tabs.

NOTE Any configuration changes made in the web interface of the CC5MPX must be "Submitted" in order to save and activate changes. If you navigate away from the page before submitting changes they will be lost.

7.2 Network Configuration

To access the main Network Configuration page, simply click the Network page tab.

When you first enter the Network page, you will receive the following prompt as a warning (FIGURE 7-3). If changes are made to the camera that affects the access to the web interface, you will need to restart the browser with the new configuration.

For example if you change the IP address of the camera, the changes will be accepted by clicking on the submit button and the new IP address will be in effect.

FIGURE 7-3. Network Configuration Warning

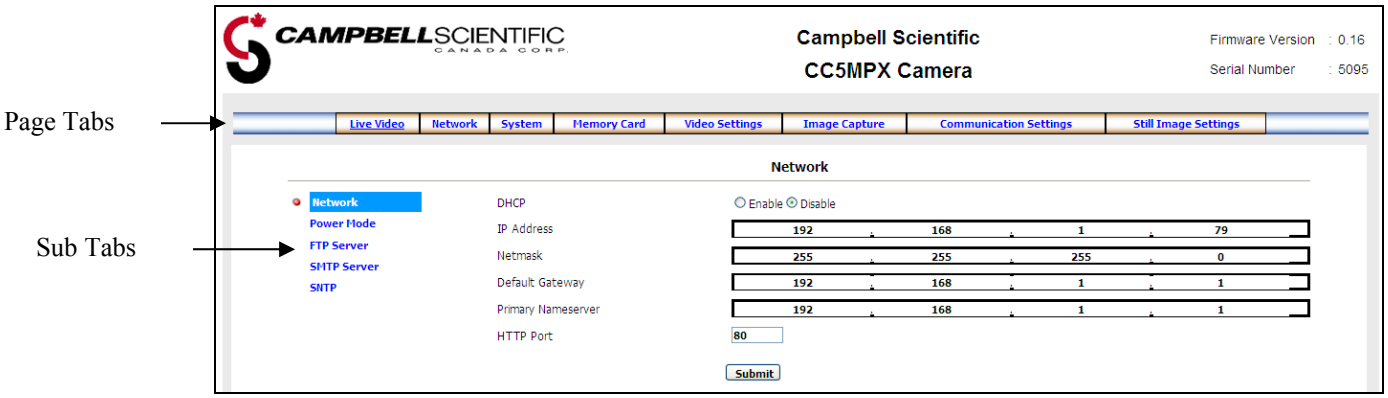


FIGURE 7-4. Network Configuration Page

The Network page displayed in FIGURE 7-4 allows the user to configure settings that are related to the CC5MPX network connectivity.

To clarify some terminology, this manual will refer to the selection tabs that are located on the left of some of the pages as Sub Tabs.

The main Network Page has 5 Sub Tabs as follows:

- Network
- Power Mode
- FTP Server
- SMTP Server
- SNTP

7.2.1 Network Settings

The most common network settings are displayed first in the Network sub tab. These settings are summarized in the following table.

TABLE 7-1. Network Settings

Configuration Setting	Description	Default Value
DHCP	Enables DHCP operation of the network interface. Operates as a Static IP address if Disabled.	Disabled
Network IP Address	Only set if DHCP is Disabled	192.168.1.90 (Static)
Network Mask	Only set if DHCP is Disabled	255.255.255.0
Default Gateway	Only set if DHCP is Disabled	192.168.1.1
Primary Name Server	Only set if DHCP is Disabled	192.168.1.1
HTTP Port	Alternate ports can be used for the http interface. Options are 80 or values between 1025 and 65535.	80

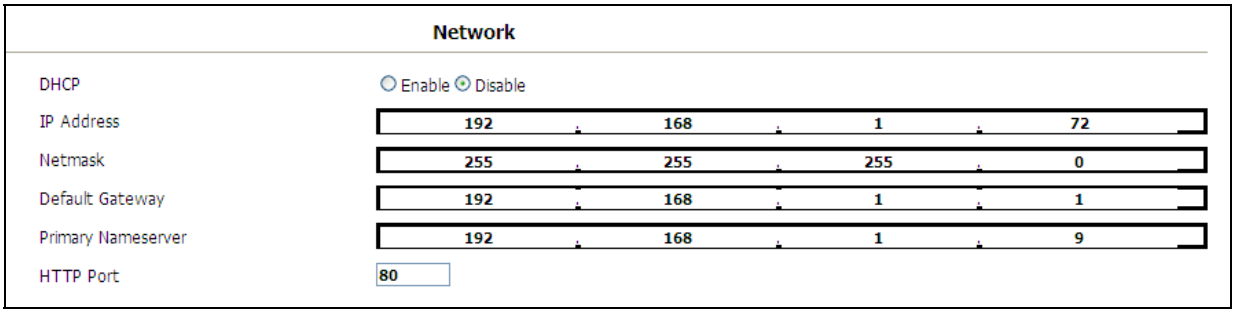


FIGURE 7-5. Network Settings

7.2.2 Ethernet Power Mode Settings

Clicking on the Power Mode sub tab will allow the user to edit the Ethernet Power Mode setting. To reduce power consumption, the CC5MPX includes the ability to control the power characteristics of the Ethernet port. Three options are available (see FIGURE 7-6):

- Always On

  This power mode offers the maximum availability of the Ethernet port. If the camera is in the Fully On power state or the Partially On power state then the Ethernet port will always be on and available for communications.

- Moderate

  This power mode offers some power savings on the Ethernet port. This mode is only recommended if the camera is being used in the Partially On power mode. If the camera is in the Partially On power mode, then incoming data packets will wake up the camera for communications.

- Full Power Save

  This power mode should be used if the lowest power consumption is desired and incoming Ethernet communications are not required.

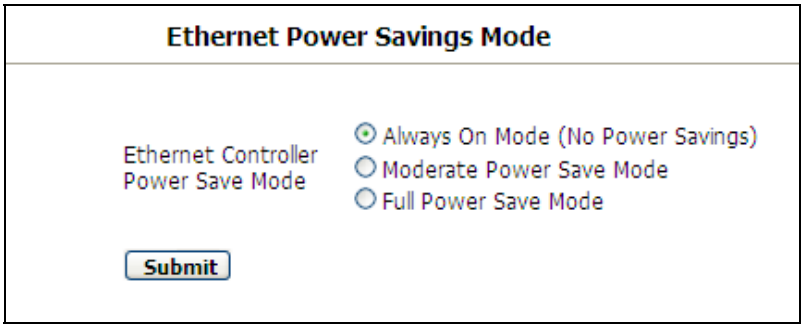


FIGURE 7-6. Ethernet Power Savings Settings

The specific behavior of the camera's Ethernet Power save is also influenced by the Power Mode of the camera. TABLE 7-2 will help to outline the Ethernet Power saving features versus various Power Modes of the camera.

TABLE 7-2. Ethernet Power Save Modes

Camera Power Mode	Ethernet Power Save Mode	Operating Characteristics
Fully On	Always On	• Camera is always on • Highest Power Consumption • Ethernet is on and always available for incoming communications.
	Moderate Power Save Mode	• Not recommended
	Full Power Save Mode	• Camera is always on. • Average power consumption is reduced by 50mA @12VDC • The Ethernet is normally turned off and is only enabled when outgoing communications are required (Email or FTP). • User needs to push the Setup button to temporarily enable the Ethernet port for Web page access.
Partially On	Always On	• The camera is effectively off in a low powered state. • Typical Power consumption is 80mA @12VDC • Ethernet is on and always available for incoming communications. • The camera will temporarily wake up to the fully on power mode when traffic occurs on the network. In situations where there is constant network traffic then the camera may effectively be in the fully On Power mode.
	Moderate Power Save Mode	• The camera is effectively off in a low powered state. • Typical Power consumption is 80mA @12VDC • Ethernet is always off. • Disconnecting and connecting the camera to another Ethernet device will momentarily wake up the camera to allow it to process incoming communications. The camera will go into the low powered mode again if no communications occur.

	Full Power Save Mode	• The camera is effectively off in a low powered state. • Average Power consumption is typically 10 mA @ 12VDC. • The Ethernet is normally turned off and is only enabled when outgoing communications are required (Email or FTP). • User needs to push the Setup button to temporarily enable the camera and Ethernet port for Web page access. • The camera can respond to RS-232 and RS-485 communications in this mode.
Deep Sleep	Always On	• The Deep Sleep power consumption(6mA typical) is not affected by the Ethernet Power Mode • Ethernet, RS-232 and RS-485 communications are non responsive in the Deep Sleep State.
	Moderate Power Save Mode	• Not recommended
	Full Power Save Mode	• The Deep Sleep power consumption(6mA typical) is not affected by the Ethernet Power Mode • If Ethernet communications are not used this can reduce the power consumption of the camera by 50 mA when the camera exits the deep sleep state.
Off State	Always On	• The Off State power consumption(1mA typical) is not affected by the Ethernet Power Mode • Ethernet, RS-232 and RS-485 communications are non responsive in the OFF State.
	Moderate Power Save Mode	• Not recommended
	Full Power Save Mode	• The Off State power consumption(1mA typical) is not affected by the Ethernet Power Mode • If Ethernet communications are not used this can reduce the power consumption of the camera by 50 mA when the camera exits the deep sleep state.

7.2.3 FTP Server Setting

Clicking on the FTP Server sub tab will display the FTP Server settings (see FIGURE 7-7).

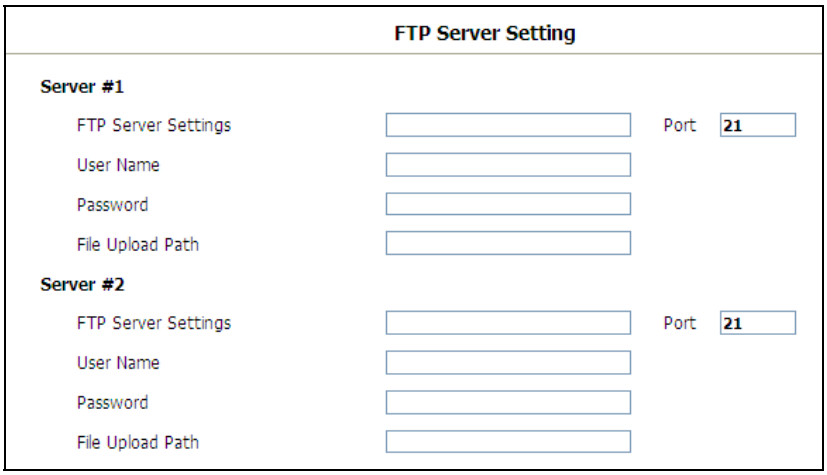


FIGURE 7-7. FTP Server Settings

These settings configure the CC5MPX to be able to act as an FTP client to send image files to an FTP server. There are settings for two different servers.

These settings simply configure the parameters that the camera will use to connect to the server. The FTP transfers must be enabled in the Image Capture menus.

The CC5MPX can also act as an FTP server to enable images and video to be transferred from the memory card. See section FTP Image Collection from the Memory Card for more details on this.

7.2.4 SMTP (Email) Server Settings

Clicking on the SMTP Server sub tab will display the SMTP (email) Server settings (see FIGURE 7-8).

The CC5MPX can send images or video via email by using two different email servers.

The details on the settings are as follows:

- My server requires authentication

  Check off this setting if the email server requires authentication. This usually means that a login is required with a username and password.

- Account Name

  The Account Name is required only if Authentication is used.

- Password

  The Password is required only if Authentication is used.

- Sender

  The EMAIL address associated with the account is normally used here. (The CC5MPX cannot receive emails)

- SMTP Sever

  Enter the address of the SMTP server that is being used.

- Email Address

  Enter the destination email addresses that are to receive the emails. Multiple email addresses can be included. There is a limit of 255 characters in total.

For multiple email addresses, use a space, comma or semicolon as a separator between addresses. For example:

test1@somewhere.com;john@email.com

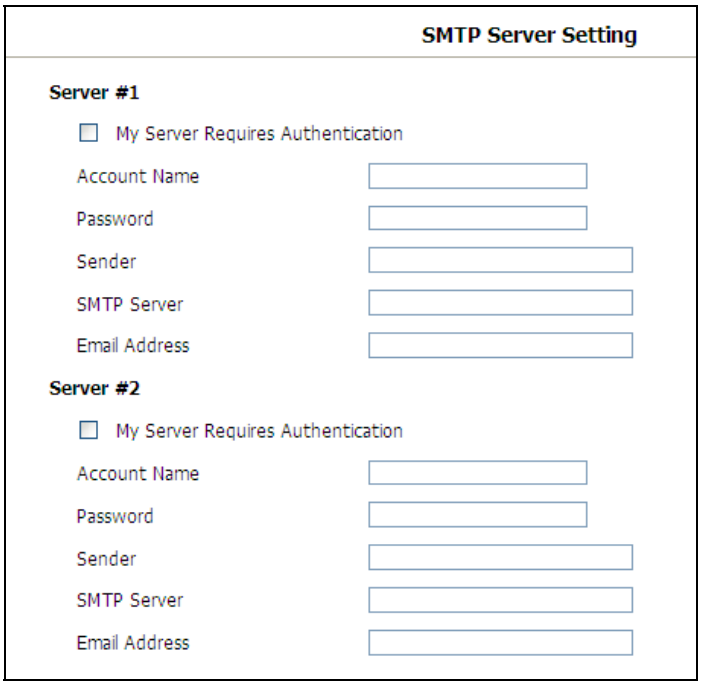


FIGURE 7-8. SMTP Server Settings

7.2.5 SNTP (TIME) Server Setting

Clicking on the SNTP Server sub tab will display the SNTP (TIME) Server settings (see FIGURE 7-9).

The configuration of an SNTP server will provide a means of synchronizing the onboard clock of the CC5MPX with the specified SNTP server. This will ensure that the camera clock is always accurate. It is also possible to configure a time zone offset for the camera.

Other than the address of the SNTP server the Time zone needs to be selected and the Automatic adjustment of the Daylight savings Time can be selected as well.

Two examples of SNTP servers which can be used are listed below:

Canadian address for the SNTP time servers:
ca.pool.ntp.org

The United States address for the SNTP time servers:
us.pool.ntp.org

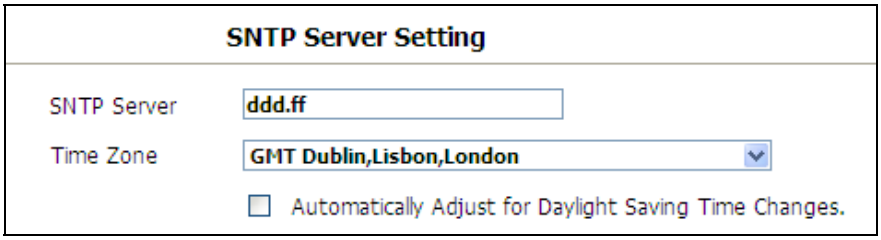


FIGURE 7-9. SNTP Server Settings

7.3 System Configuration

Selecting the System tab will activate the System Settings page (see FIGURE 7-10). The main System settings page has 7 Sub Tabs as follows:

- Date and Time
- Automatic Date and Time Update
- Site Name
- Users/Security
- Digital I/O
- Update
- Events

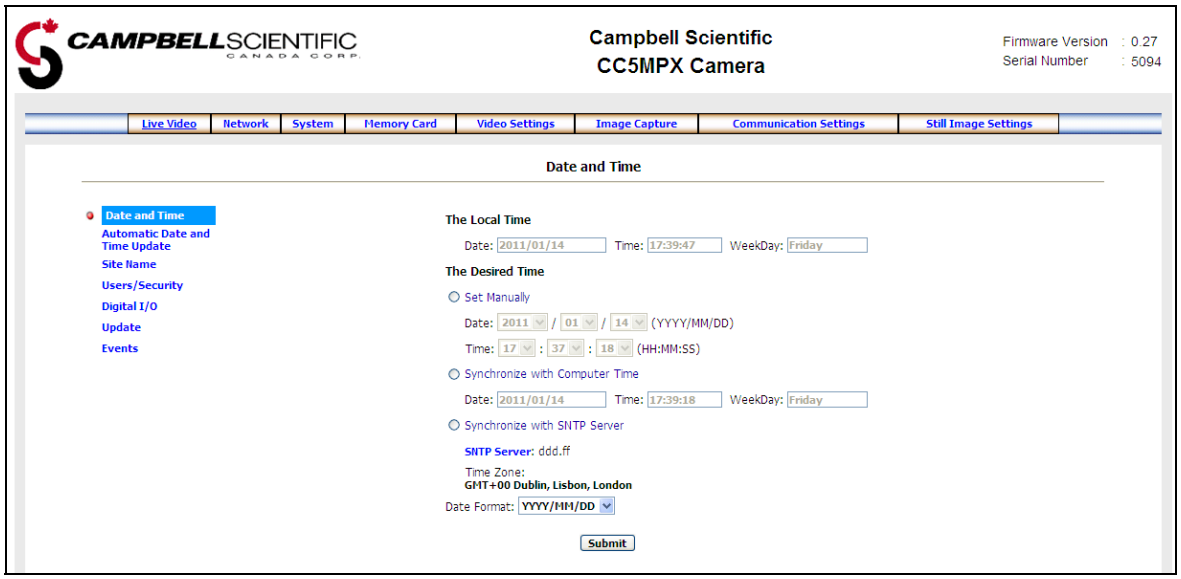


FIGURE 7-10. System Settings

7.3.1 System Date and Time

The Date and Time sub menu (see FIGURE 7-11) provides a means for viewing and setting the current Date and Time of the camera. The available options include:

- Setting the Time Manually

  To set the date and time manually select the Set Manually button and then select the date and time values from the drop down boxes. You must click on the Submit button for the settings to take effect.

- Synchronize with Computer Time

  The web page also displays the time reported by your computer. If this is the desired time, simply select the button and click on the Submit button. The camera time will be updated with the computer time.

- Synchronize with SNTP Server

  If an appropriate SNTP Time server is set up in the Network Settings, then this button can be selected to use an Internet SNTP time server. Clicking on the Submit button will start the process.

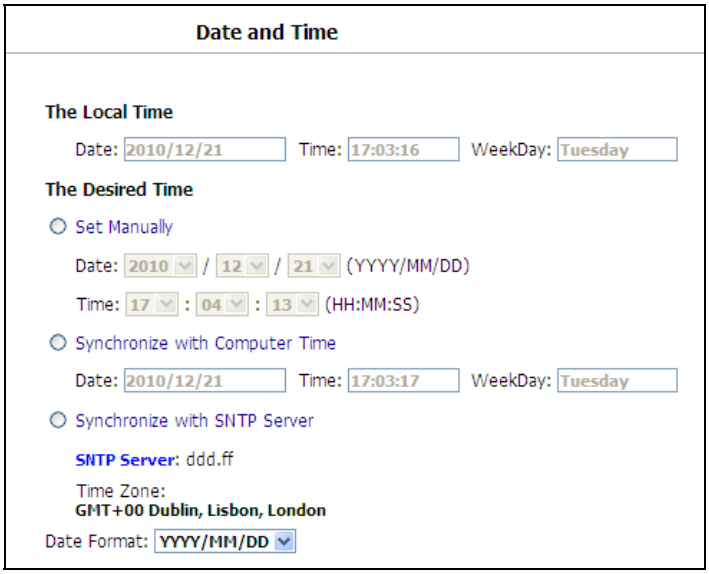


FIGURE 7-11. Date and Time Settings

7.3.2 Automatic Date and Time Update

The Automatic Date and Time sub menu (see FIGURE 7-11) configures the camera for automatic date and time updates. The setting parameters are as follows:

- Time Variance in Seconds to Perform clock update

  Select the minimum allowable variance that will result in the camera's time being changed.

- Source

  Select one of 3 options for the Automatic Time updates. The possibilities are:

  - None

    The camera's clock is highly accurate and its drift is normally less than 2 minutes per year.

  - PakBus Port

    Normally this is a datalogger. The actual time update occurs only when a file transfer occurs to the datalogger from the camera

  - SNTP Server.

    The camera will use the SNTP Time server that is specified under Network settings (see SNTP (TIME) Server Setting). A proper Network connection is required as well.

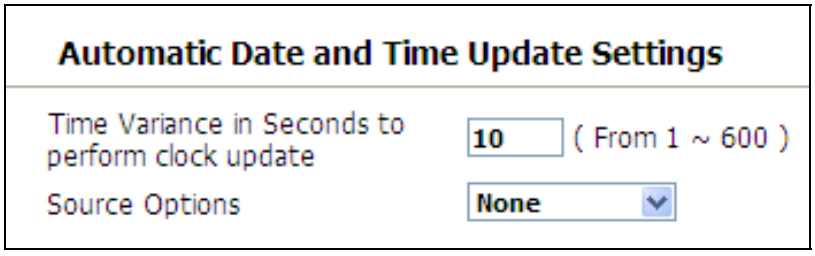


FIGURE 7-12. Automatic Date and Time Update

7.3.3 Site Name

The Site Name sub menu (see FIGURE 7-13) allows a site name to be used for the web page headings. By default the Site Name is set to Campbell Scientific. This is useful in providing an easy way of confirming the camera that you are connected to in the web interface. The Site Name is limited to 32 characters.

Refer to FIGURE 7-14 for the location of the Site Name on the web pages.

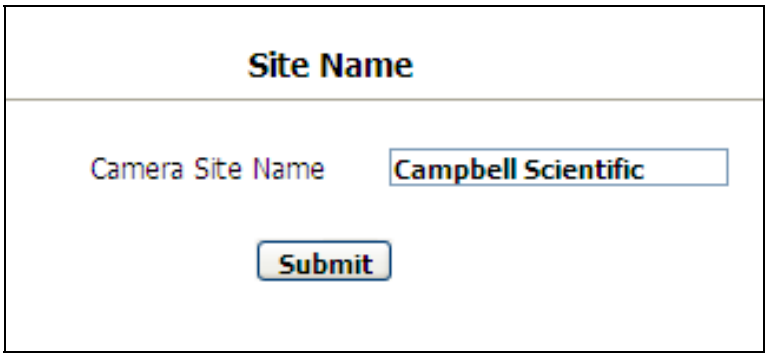


FIGURE 7-13. Site Name

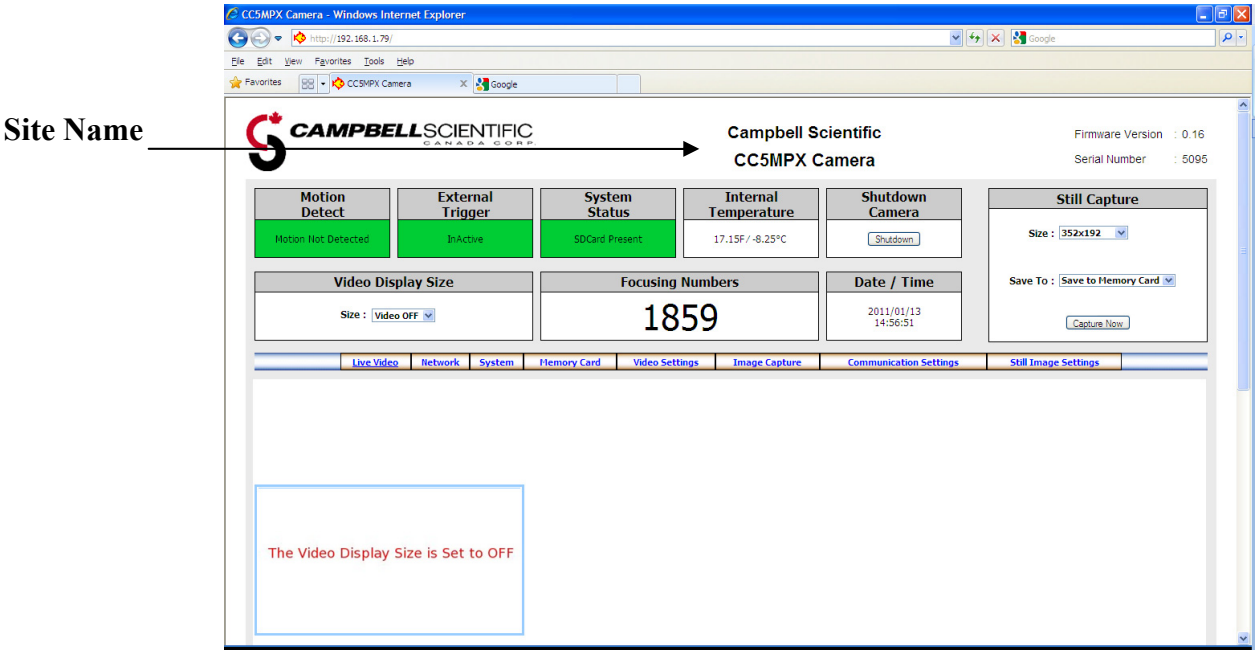


FIGURE 7-14. Location of Site Name

7.3.4 Users and Security

The Users/Security sub menu (see FIGURE 7-15) allows the setting of security features in the CC5MPX.

By default, the cameras are shipped with the security Authentication disabled. When the Authentication setting is set to Enable, users will be prompted for a User Name and Password before access is given. By default one user is set up with the user name of Admin and the password of 9999. Please ensure that a record of the User names and passwords are kept. In the event this information is lost and you can no longer access your camera, the settings can be viewed or changed by connecting the camera using the RS-232 port to a computer with the Device Configuration utility.

In order to add a user, you will need to fill out the "Add/Modify User" parameters, select the required Authority level, and submit the new user. Once

the camera saves the action, the user list will show the user name and their authority level. The user name and password must both be 4 to 32 characters in length.

Authority Level Access:

- Admin
  - Full camera access
  - Can create and edit users and disable security
- Operator
  - Full camera access
  - Only restrictions are Security Settings
- Viewer
  - Only access to the Live Vide (home page) and the Memory Card Page is given.
  - No settings can be changed.
  - Only read access to the Memory Card is allowed.

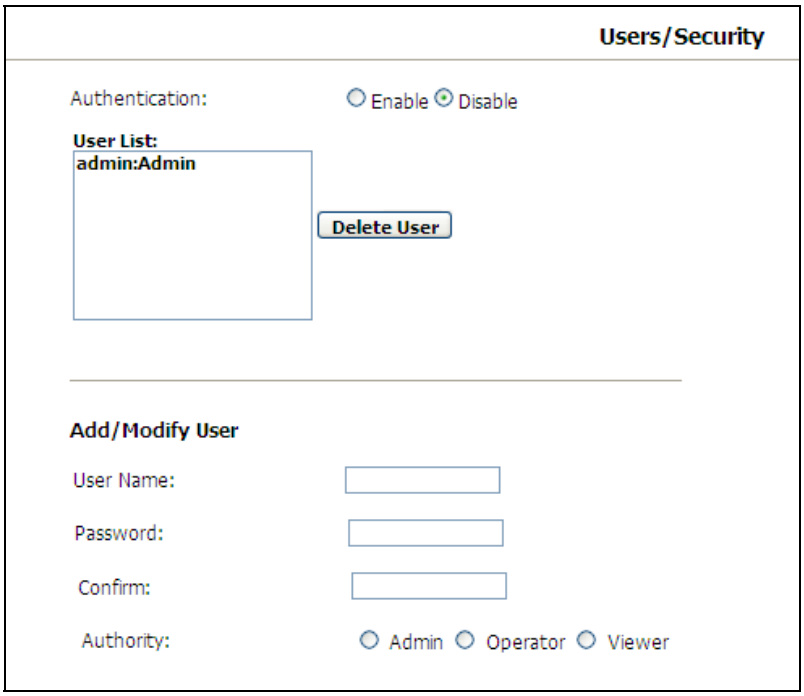


FIGURE 7-15. Users and Security Settings

A user with Admin access can remove users from the user list. Remember that deletions or other changes are only saved when the Submit button is clicked.

7.3.5 Digital I/O Settings

The Digital I/O sub menu (see FIGURE 7-16) allows the configuration of some of the camera's I/O signals.

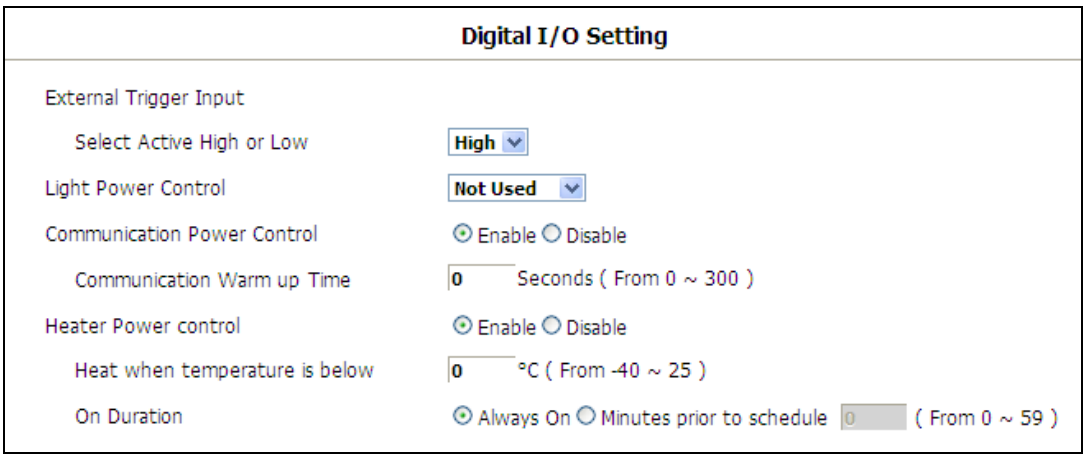


FIGURE 7-16. Digital I/O Settings

7.3.5.1 External Trigger Input Settings

The external Trigger Input can be configured to Active High or Active Low. When set to Active High, 0 volts will be the inactive state and a positive voltage will be the active state.

The CC5MPX is shipped from the factory by default with a pull-down resistor connected to the External Trigger Input and the External Trigger set to Active High. With this default setting, when no signal is applied to the input the External Trigger is inactive. A positive voltage is required to change to the active state.

7.3.5.2 Light Power Control Settings

This feature had not yet been implemented at the time this manual was written. Check the Campbell Scientific website for any possible updates.

7.3.5.3 Communication Power Control

The Communication Power Control setting controls the Communication Switched Power Output line on the Power I/O cable of the CC5MPX camera.

The switch output is intended to manage the power to a communication device such as a cell modem. This is useful in a solar powered site when there is a need to limit power consumption of communication devices.

This option enables the CC5MPX to supply up to a maximum of 750 mA of current. The voltage level will be the same as the camera's input power (i.e., 12 Vdc).

Some modems will require a warm up time or a period to time to register on a network. The Communication Warm up Time parameter allows an appropriate time to be entered for this purpose.

7.3.5.4 CC5MPXWD Heater Power Control

The Heater Power Control settings control the operation of the CC5MPXWD window defroster. If enabled, the camera will only turn on the heater if the CC5MPXWD's internal temperature is below the threshold setting. The temperature threshold values are limited to -40°C to +25°C.

If the option Always On is selected, the heater will be on whenever the temperature is below the threshold and the camera is not in a low powered state.

If Minutes prior to schedule is selected, then the camera will wake up prior to any of the Self-Timed schedules and turn on the heater if the temperature is below the threshold settings. This feature does not work with motion detection or external trigger modes.

This is useful for a remote site that may be prone to riming and frost. A camera that is setup to take hourly pictures can be configured to turn on the defroster several minutes prior to the scheduled picture to defrost the window.

7.3.6 Update

The Update I/O sub menu (see FIGURE 7-17) provides the ability to update the firmware in the camera. It is recommended to check for firmware updates on the Campbell Scientific website to ensure that the camera has the most recent version of firmware.

Once a file is downloaded, simply click on the Browse button to select the new firmware update file. Once the proper file is selected, click on the Update button and the process will begin.

WARNING

During the update process, DO NOT disconnect power, close the web browser, or navigate away from the Update page

Once the firmware update process is completed, a web page will be displayed indicating that the process has completed. The camera will reboot itself and it will take a few minutes for the camera to operate as normal again.

The firmware update process normally keeps all configuration settings in the camera. It is recommended to verify the settings after an update.

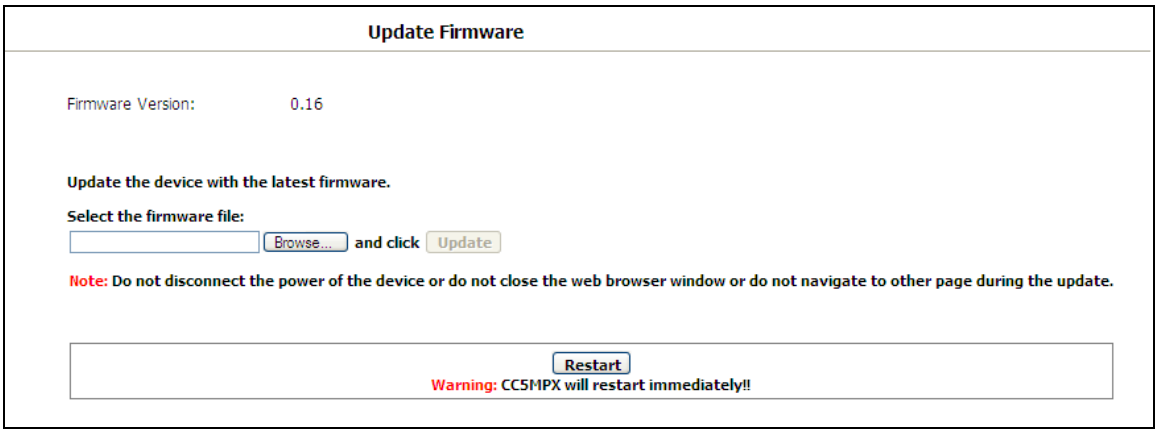


FIGURE 7-17. Update Menu

7.3.7 Events

The Events sub menu (see FIGURE 7-18) provides a list of system events. If the System Status box is red in the Live Video page, the details are logged in the Events Log. One of the most common recorded events is the indication that a memory card is properly present after a power up. The message confirms that the memory card is functioning and it also indicates the size of the memory card.

Other types of event messages include:

- The memory card or the allocated memory is full (when fill and stop memory management is used)
- Communication errors that include
  - FTP
  - EMAIL
  - PakBus
- User logins (if security is enabled)

Item	Date and Time	Events
1.	2011-01-28 10:56:08	SDCard Fill and Stop - Self-timed 1 Still
2.	2011-01-28 10:50:51	SDCard Present (3979 Mbytes)
3.	2011-01-28 09:10:07	SDCard Fill and Stop - Self-timed 1 Still
4.	2011-01-28 09:00:21	SDCard Present (3979 Mbytes)
5.	2011-01-28 08:40:00	SDCard Fill and Stop - Self-timed 1 Still
6.	2011-01-28 08:39:59	EMAIL File TX Fail - Trigger Still
7.	2011-01-28 08:35:54	SDCard Present (3979 Mbytes)
8.	2011-01-28 08:32:52	EMAIL File TX Fail - Trigger Still
9.	2011-01-28 08:10:00	SDCard Fill and Stop - Self-timed 1 Still
10.	2011-01-28 08:04:28	SDCard Present (3979 Mbytes)
11.	2011-01-27 16:36:19	EMAIL File TX Fail - Trigger Still
12.	2011-01-27 16:20:00	SDCard Fill and Stop - Self-timed 1 Still
13.	2011-01-27 16:09:12	SDCard Present (3979 Mbytes)
14.	2011-01-27 15:04:58	james login on 192.168.1.130
15.	2011-01-27 15:01:00	user1 login on 192.168.1.130
16.	2011-01-27 09:10:01	SDCard Fill and Stop - Self-timed 1 Still
17.	2011-01-27 09:04:34	SDCard Present (3979 Mbytes)
18.	2011-01-26 17:30:00	SDCard Fill and Stop - Self-timed 1 Still
19.	2011-01-26 17:21:34	SDCard Present (3979 Mbytes)
20.	2011-01-26 13:50:07	FTP File TX Fail - Self-timed 2 Still

First Page | Previous 20 | Next 20

FIGURE 7-18. Event Logs

7.4 Memory Card

Selecting the Memory Card tab will bring up the Memory Card page (see FIGURE 7-19) and allow access to the internal SD Card.

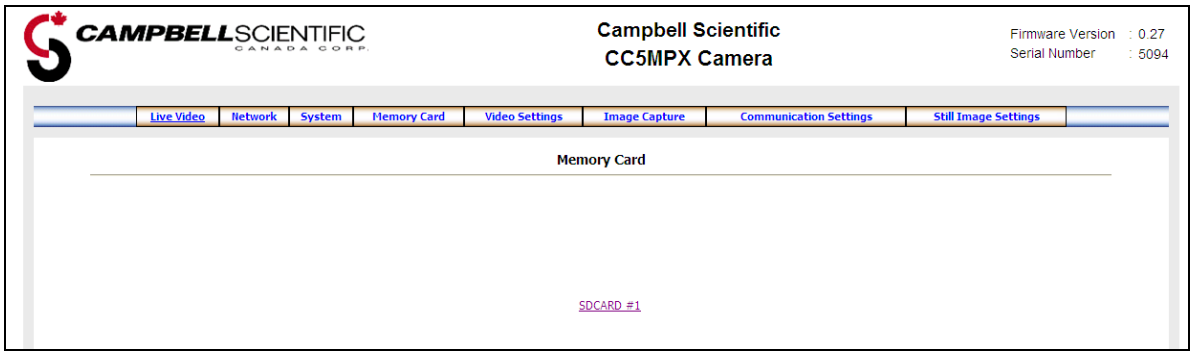


FIGURE 7-19. Memory Card Page

You will need to click on SDCARD #1. If there is no memory card installed, the camera a page will come up saying that the SD Card is not present. Otherwise you will see the root directory of the Memory cards (see FIGURE 7-20).

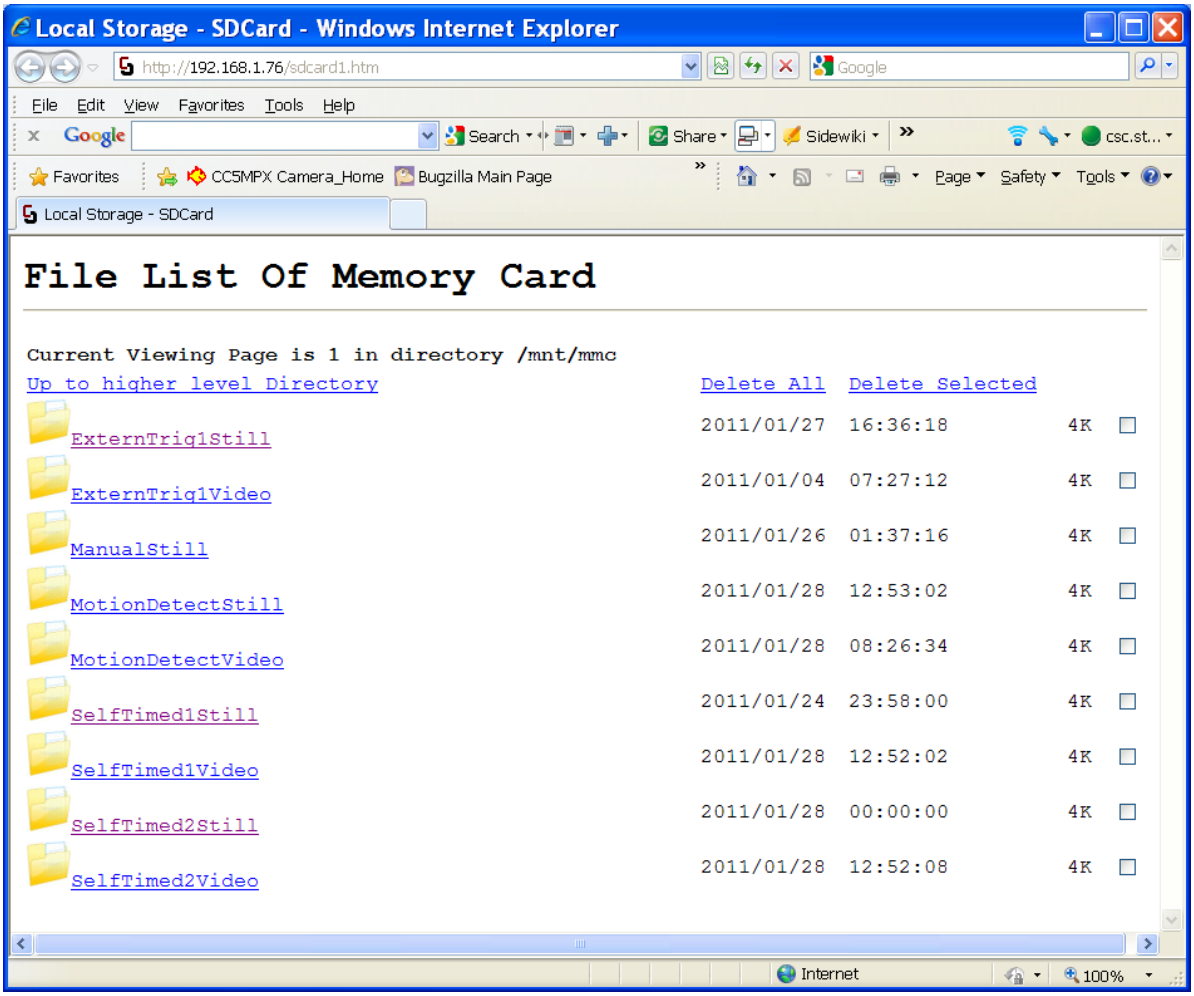


FIGURE 7-20. Memory Card Directory Listing

There are a possibility of nine main directories that are created for image and video storage on the Camera. There is a still image and video directory for each type of capture methods and a directory for manually captured stills. A directory will not be created by the camera if the capture method is not used.

The directory names are as follows:

- ExternTrig1Still
- ExternTrig1Video
- ManualStill
- MotionDetectStill
- MotionDetectVideo
- SelfTimed1Still

- SelfTimed1Video
- SelfTimed2Still
- SelfTimed2Video

Clicking on one of the main folders will display the contents inside of that folder. Normally another set of sub folders will be displayed. The camera creates sub folders that are named by date. The date sub folders can be configured to store images in folders named either by Year_Month or Year_Month_Day (see FIGURE 7-21).

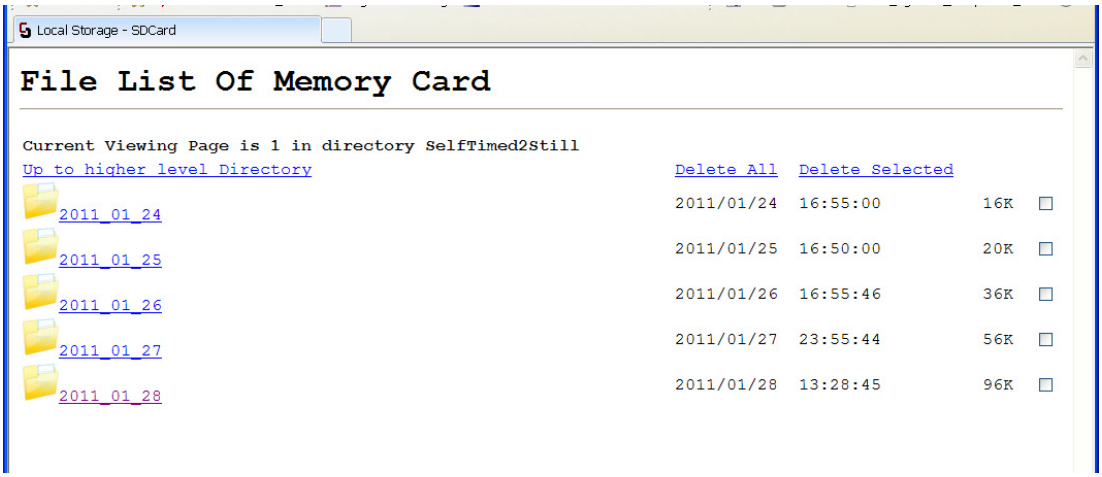


FIGURE 7-21. Date Subfolders

Actual pictures and video will be located in these subfolders and can be viewed as shown in FIGURE 7-22.

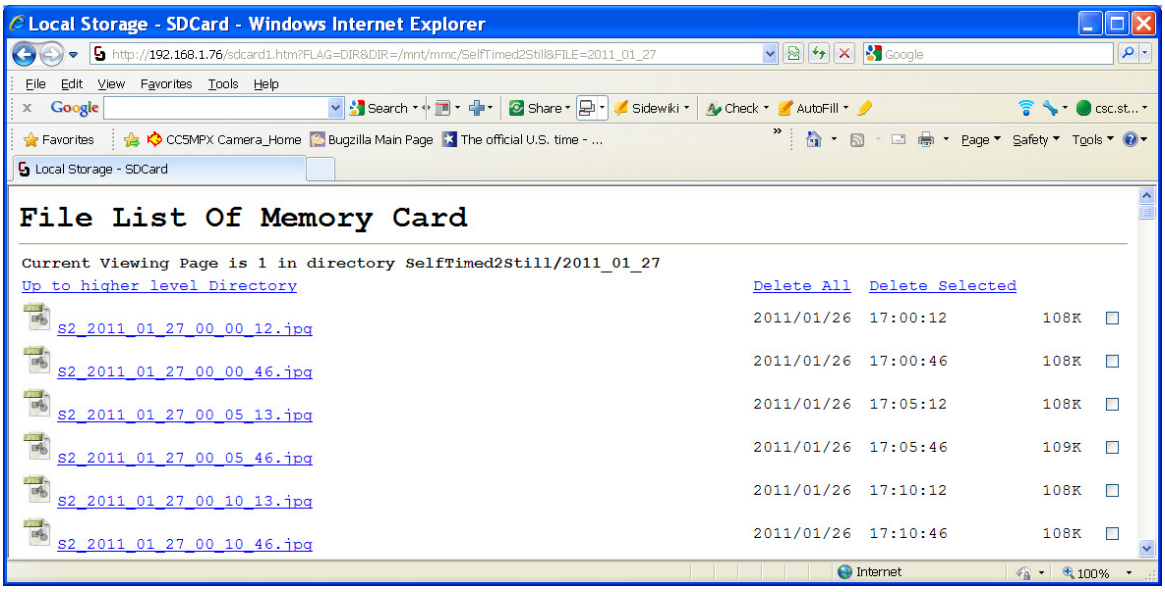


FIGURE 7-22. Example Display of Files

The web interface will display up to 200 files per page. If more files are in the directory, select "*page* ▼" to view the additional files (see FIGURE 7-23).

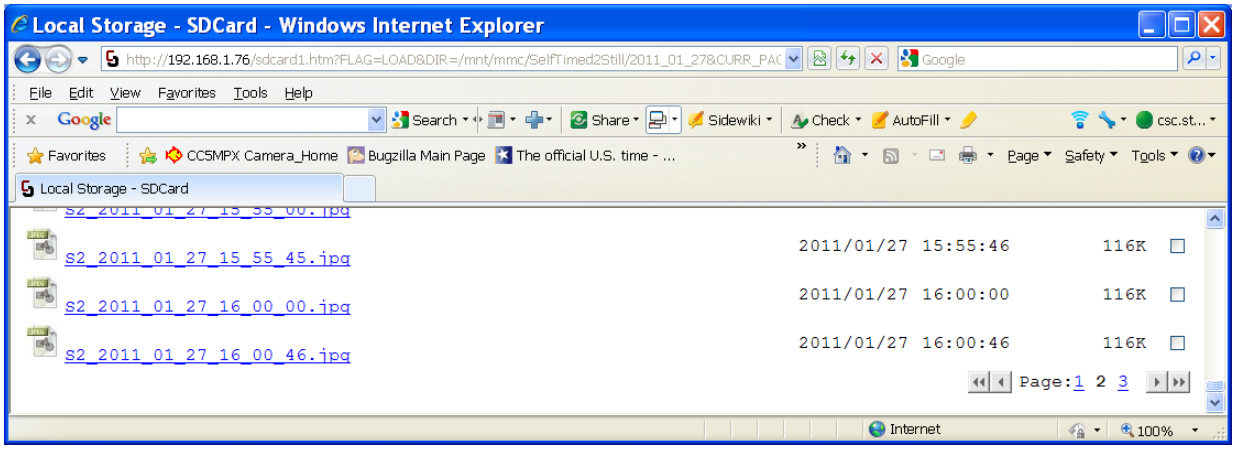


FIGURE 7-23. Example of Multiple Page Viewing

The web interface provides a method of viewing or deleting images and video from the memory card. It is possible to delete either complete or portions of Directories or Subfolders as well as individual images or videos. Be cautious when using the Delete All function.

7.5 Video Settings

Selecting the Video Settings tab will bring up the Video Settings page (see FIGURE 7-24). There are two sub tabs that provide two independent types of video to be recorded.

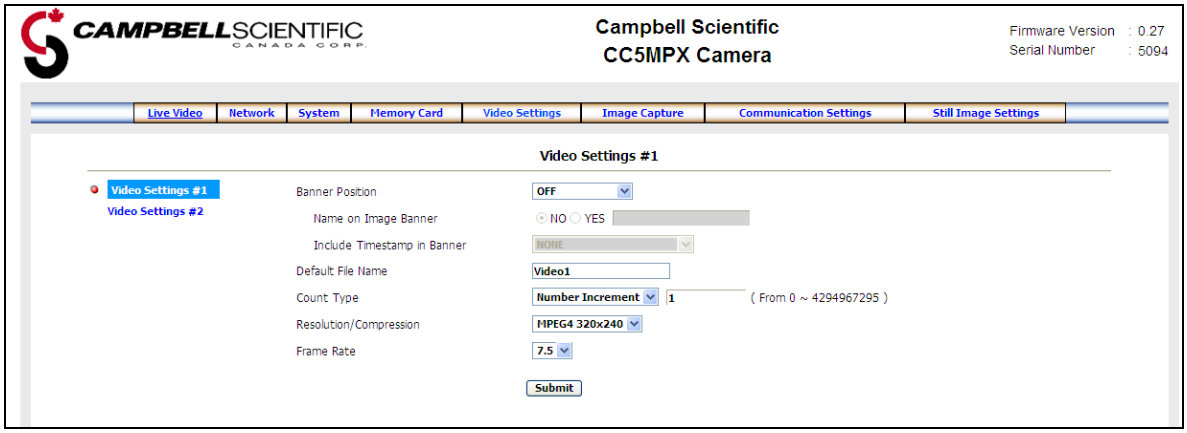


FIGURE 7-24. Video Settings Page

The Video Settings consist of the following parameters:

- Position Banner

  3 options available are:

  - OFF
  - Inside Top
  - Inside Bottom

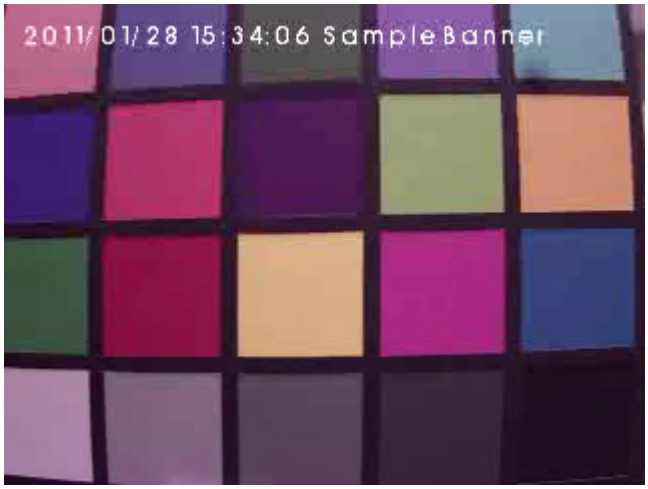


FIGURE 7-25. Video Banner Inside Top with Time Stamp and Text

- Name on Image Banner
  If YES is selected, text can by typed in which would appear in the video banner.

- Include Timestamp in Banner
  The options are NONE or the Time Stamp format of YYYY/MM/DD HH:MM:SS.

- Default File Name
  A more meaningful file name can be assigned to the files. The maximum number of characters is 31. No spaces are allowed within the file name.

- Count Type
  There are 3 options for the count type. The options are:

  - None
    When using None the same file will simply be over-written on the memory card every time a video is recorded. This may also happen for the transmitted files that are sent via FTP.

- Number Increment
  A unique number is appended to each file name. When the Number Increment is selected an additional box will allow a starting number to be entered. An example of a file name with the count type is:
  Video1_0000001994.avi

- Date and Time
  Each file name will have a time stamp appended to it. An example of a file name with the Date and Time option is:
  Video1_2011_01_28_14_22_10.avi
  Video1_YYYY_MM_DD_HH_MM_SS.avi

- Resolution/Compression
  Currently there are two options for the video capture format. Both options encode the video using MPEG4. The options are 1280x720 (720P) or 320x240.

- Frame Rate
  There are three frame rate options of 30, 15 and 7.5 FPS (Frames Per Second). Lower frame rates can reduce the file sizes.

The video resolution and frame rate are the two factors that determine the file size for video files. TABLE 7-3 shows the approximate files size for every second of recorded video. The largest file sizes are produced by the 720P 30FPS video, which is 500 kbytes per second of video. The smallest video files are produced by the 320x240 7.5 FPS video which is 9 kbytes per second of video.

TABLE 7-3. Typical Video File Sizes

Resolution	Frames Per Second	Kbytes Per Second
720P 1280x720	7.5	125 Kbytes/Sec
	15	250 Kbytes/Sec
	30	500 Kbytes/Sec
320x240	7.5	10 Kbytes/Sec
	15	20 Kbytes/Sec
	30	65 Kbytes/Sec

7.6 Image Capture

Selecting the Image Capture tab will bring up the Image Capture Settings page (see FIGURE 7-26). The image capture settings are the most significant settings in determining how the camera will operate.

There are five sub tabs that include:

- Power Modes
- Self Timed Capture1
- Self Timed Capture2

- External Trigger
- Motion Detection

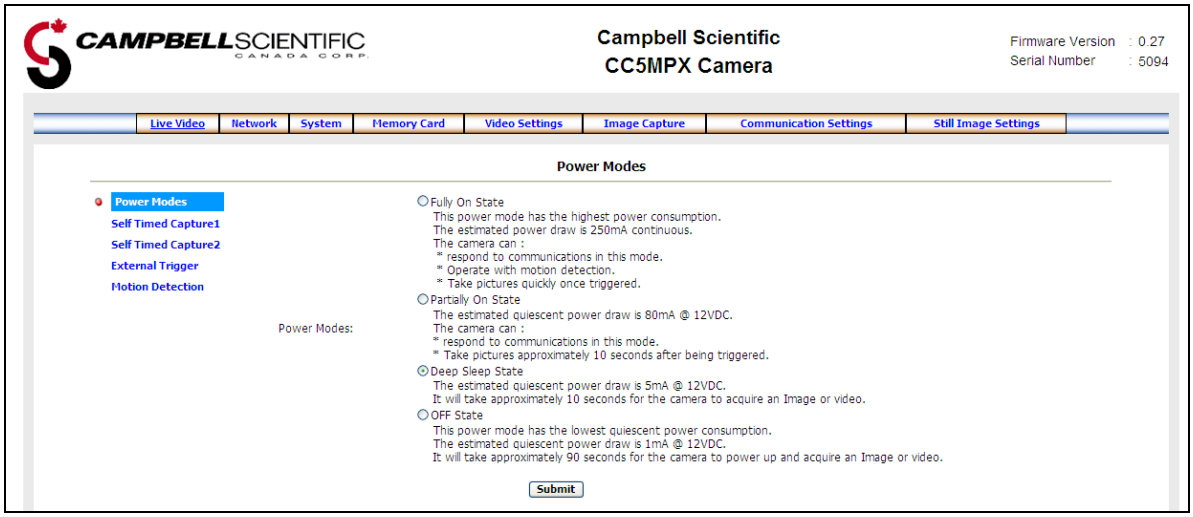


FIGURE 7-26. Image Capture Page

7.6.1 Power Modes

The Power Modes sub tab (see FIGURE 7-27) allows the selection of the type of power management that will be used.

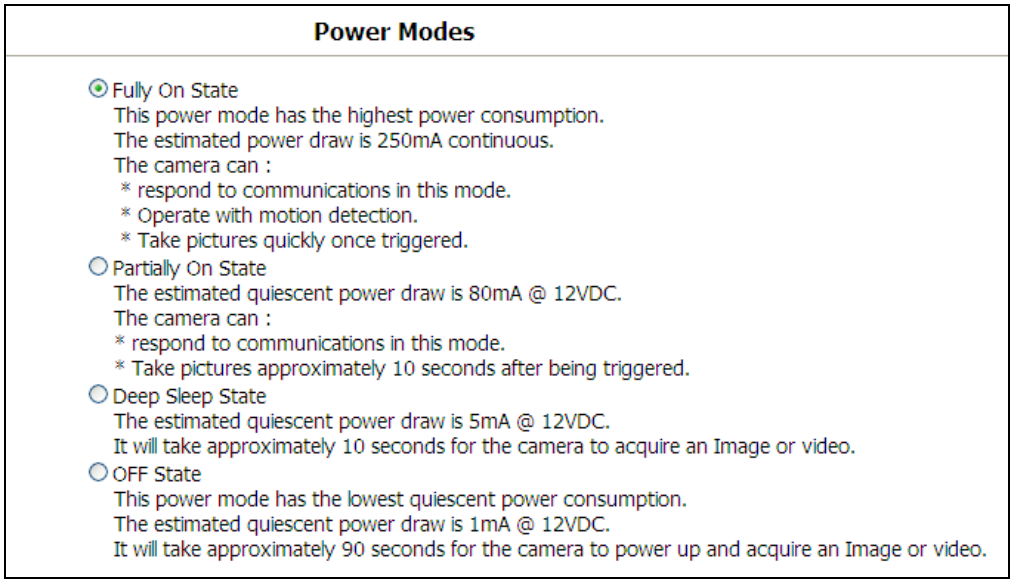


FIGURE 7-27. Power Modes

One of the main factors in determining which power mode to use is the power consumption budget that is available for the camera.

If the camera is operating from an AC main power supply, then the camera will have the best performance characteristics in the Fully On State. On the other hand if the camera needs to operate from a battery for long periods of time, then the OFF state will be more suitable.

TABLE 7-4 outlines the operational characteristics of each power mode.

TABLE 7-5 shows typical response times from when a trigger occurs to the time that a picture or video is taken. The OFF state takes the most time as the Main processor is not powered on in this state and it must completely boot up to operate again from the OFF state.

TABLE 7-4. Power Modes

Power Mode	Ethernet Power Save Mode	Operating Characteristics
Fully On	Always On	• Camera is always on • Highest Power Consumption • Ethernet is on and always available for incoming communications.
	Moderate Power Save Mode	• Not recommended
	Full Power Save Mode	• Camera is always on. • Average power consumption is reduced by 50mA @12VDC • The Ethernet is normally turned off and is only enabled when outgoing communications are required (Email or FTP). • User needs to push the Setup button to temporarily enable the Ethernet port for Web page access.
Partially On	Always On	• The camera is effectively off in a low powered state. • Typical Power consumption is 80mA @12VDC • Ethernet is on and always available for incoming communications. • The camera will temporarily wake up to the fully on power mode when traffic occurs on the network. In situation where there is constant network traffic then the camera may effectively be in the fully On Power mode.
	Moderate Power Save Mode	• The camera is effectively off in a low powered state. • Typical Power consumption is 80mA @12VDC • Ethernet is always off. • Disconnecting and connecting the camera to another Ethernet device will momentarily wake up the camera to allow it to process incoming communications. The camera will go into the low powered mode again if no communications occur.
	Full Power Save Mode	• The camera is effectively off in a low powered state. • Average Power consumption is typically 10 mA @ 12VDC. • The Ethernet is normally turned off and is only enabled when outgoing communications are required (Email or FTP). • User needs to push the Setup button to temporarily enable the camera and Ethernet port for Web page access. • The camera can respond to RS-232 and RS-485 communications in this mode.

Deep Sleep	Always On	• The Deep Sleep power consumption(6mA typical) is not affected by the Ethernet Power Mode • Ethernet, RS-232 and RS-485 communications are non responsive in the Deep Sleep State.
	Moderate Power Save Mode	• Not recommended
	Full Power Save Mode	• The Deep Sleep power consumption(6mA typical) is not affected by the Ethernet Power Mode • If Ethernet communications are not used this can reduce the power consumption of the camera by 50 mA when the camera exits the deep sleep state.
Off State	Always On	• The Off State power consumption(1mA typical) is not affected by the Ethernet Power Mode • Ethernet, RS-232 and RS-485 communications are non responsive in the OFF State.
	Moderate Power Save Mode	• Not recommended
	Full Power Save Mode	• The Off State power consumption(1mA typical) is not affected by the Ethernet Power Mode • If Ethernet communications are not used this can reduce the power consumption of the camera by 50 mA when the camera exits the deep sleep state.

NOTE See the Section 7.2.2 Ethernet Power Mode Settings for other settings that influence the power consumption.

TABLE 7-5. Capture Response Times

Power Mode	Typical Capture Time from Trigger Event
Fully On	<1 Second
Partially On	10 Seconds
Deep Sleep	15 Seconds
Off State	90 Seconds

7.6.2 Self Timed Capture1

The Self Timed Capture1 sub tab (see FIGURE 7-28) is used to configure the camera to capture still images or video by using the internal clock of the CC5MPX.

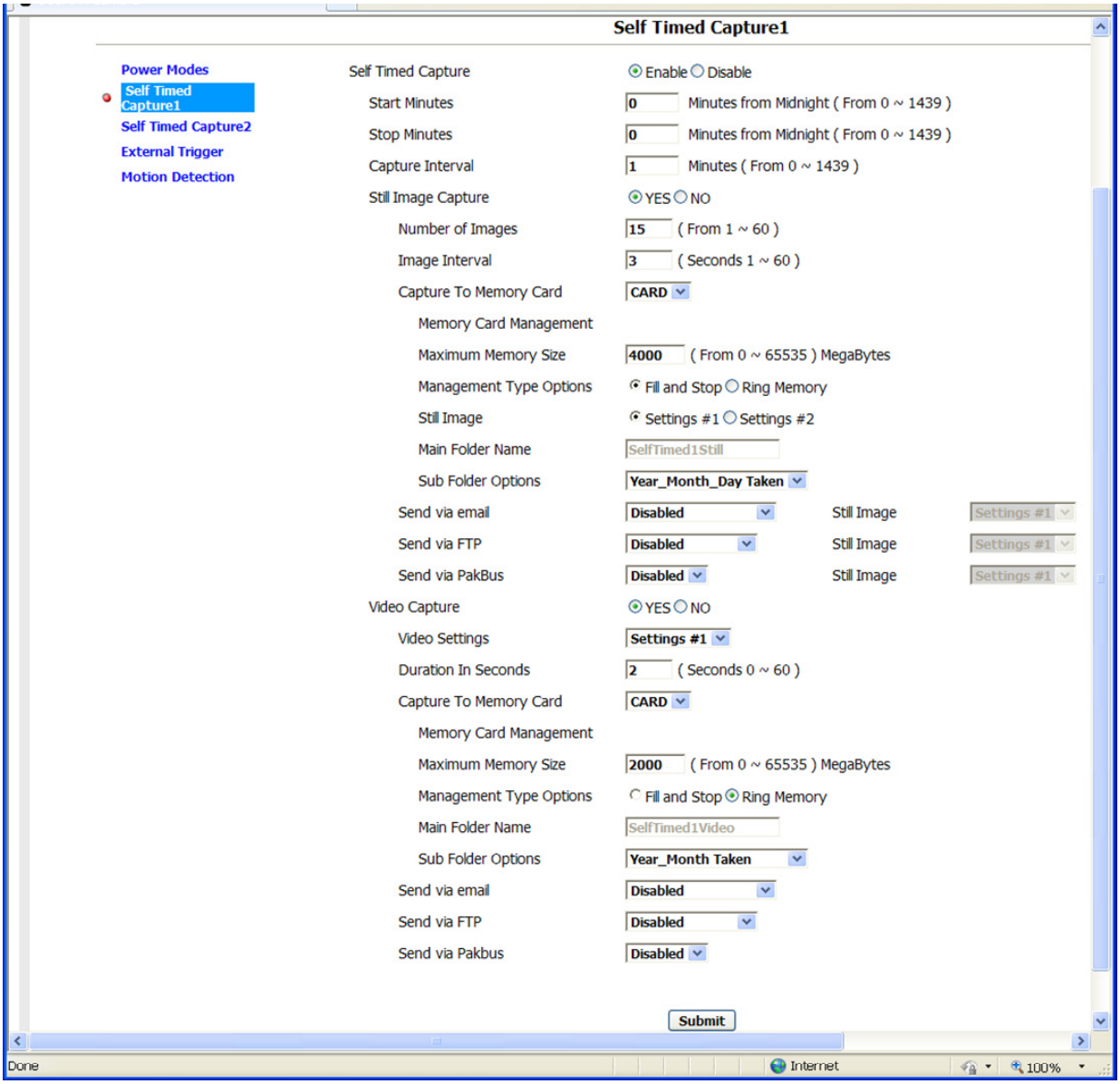


FIGURE 7-28. Self-Timed Capture Page

When either of the Self Timed Capture triggers is enabled, the CC5MPX uses its internal clock as a trigger to initiate the capture of still images or video. In addition to the Self Timed Capture1, there is also a second independent Self Timed Capture2. Each configuration is independent of the other, but overlapping events may delay or prevent one or the other from occurring. For example, two video recordings or still image captures cannot occur at the same time.

The first step in setting up the Self Timed Capture is to select the Enable option for the capture method (see FIGURE 7-29). Once Enable is selected, parameters for the capture method can be edited.

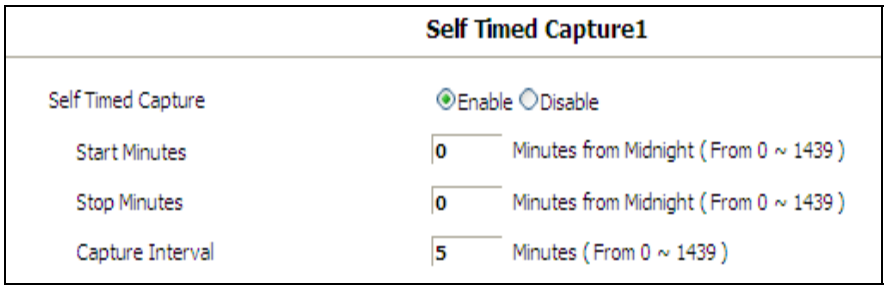


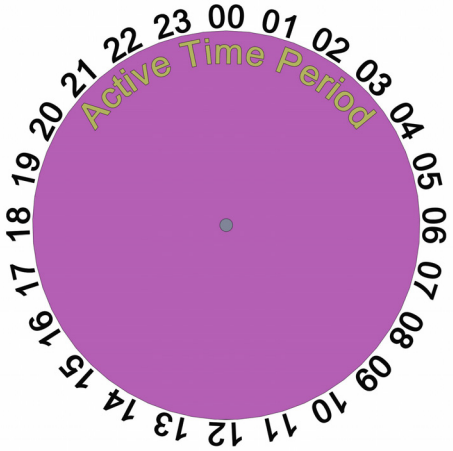
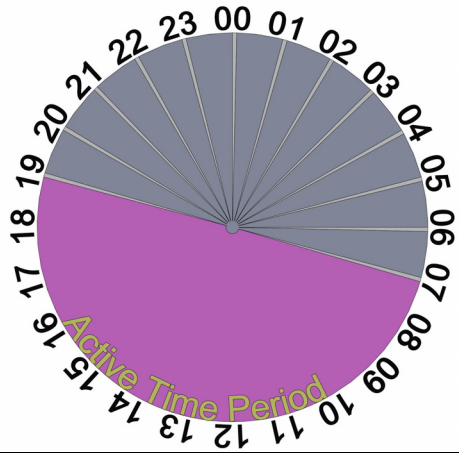
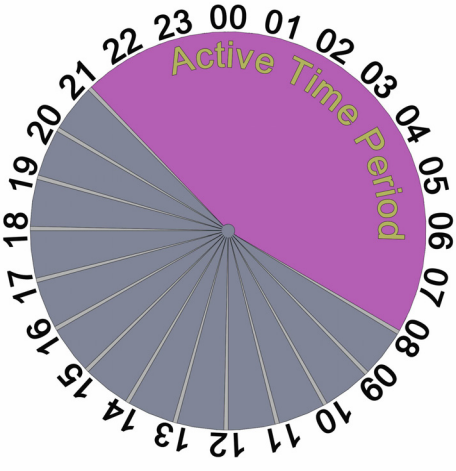
FIGURE 7-29. Enable and Capture Time Values

The Self Timed Capture triggers are set up with the timing relative to midnight. The first parameter to enter is the Start Minutes relative to midnight. The Start Minutes parameter is the first occurrence of a capture event after Midnight. If the first timed event is to begin right at midnight, then set this parameter to zero. If the first timed event is at 7:00 a.m. then the Start Minutes would be set to 420 as there are 60 minutes per hour and the start time is 7 hours past midnight (7 hours * 60 minutes/hour = 420 minutes).

Similarly the Stop Minutes specifies when the capture events are to stop relative to midnight. Set the Stop Minutes to 0 if there is no stop time. If a stop time such as 7 p.m. (19:00 H) is desired then enter the value of 1140 as there are 60 minutes per hour and the stop time of 7:00 p.m. is 19 hours past midnight (19 hours * 60 minutes/hour = 1140 minutes).

Illustrations of the Start and Stop Times are shown in TABLE 7-6.

TABLE 7-6. Start and Stop Time Examples

Start and Stop Time Settings	Graphical Illustration on a 24 Hour Clock
Start Minutes = 0 Stop Minutes = 0	
Start Minutes = 420 (07:00H) Stop Minutes = 1140 (19:00H)	
Start Minutes = 1260 (21:00H) Stop Minutes = 480 (08:00H)	

The Capture Interval is the time between capture events once the Start Minutes value is reached. For hourly pictures a value of 60 can be entered. If a value of 0 is entered, (not recommended) the Image Interval time will apply to still images and video of the specified duration will be captured repeatedly.

The following table summarizes all the parameters associated with the Self Timed Capture.

TABLE 7-7. Self Time Capture Variables

Variable	Allowable Values	Description
Self Timed Capture Enable	• Enable • Disable	Enables or Disables the Self Timed Capture Trigger
Start Minutes	0 to 1439	Start time in minutes relative to midnight
Stop Minutes	0 to 1439	Stop time in minutes relative to midnight
Capture Interval	0 to 1439	Interval between capture times in minutes. To initiate a capture interval every 5 minutes set the variable to 5.
Still Image Capture	• Yes • No	Select Yes to include still image captures
Number of Images	1 to 60	Determines how many still images will be taken when the capture time is reached.
Image Interval	1 to 60	If the Number of Images (above parameter) is greater than 1. Then this parameter is the time spacing between images.
Capture To Memory Card	• CARD • No	Selecting CARD will enable the still images taken to be stored to the memory card.
Maximum Memory Size	0 to 65535	This is the allowable space on the memory card that will be reserved for Still Images taken by this Self Timed Capture. The value is in Megabytes. A value of 1000 will reserve 1000 Mbytes. A value of 0 will have the camera automatically allocate the memory.
Management Type Options	• Fill and Stop • Ring Memory	There are 2 methods of managing files on the memory card: • Fill and Stop will stop recording additional images once the memory card is full or the allocated memory size is reached. • Ring Memory management will start deleting the oldest files once the memory card is full or the allocated memory size is reached.
Still Image Settings	• Settings #1 • Settings #2	Still Images for this Self Timed Capture can use 1 of 2 settings. Settings #1 and Settings #2 can be setup with various banner, resolution and compression values. Refer to Section 7.8.
Main Folder Name	Read Only Field	This is a read only field. The Name of the Main Folder where the still image files will be stored (SelfTimed1Still).
Sub Folder Options	• Year_Month_ Day_Taken • Year_Month_ Taken	An option is given to store images in a subfolder named by Year_Month or Year_Month_Day. Selecting the Year_Month_Day option will have some performance advantages when a large number of images are taken. Reducing the number of files in a folder will speed up the storing and file management process. Speed advantages are only noticeable if the number of files in the Year_Month folder will exceed 1000.
Send via email	• Disabled • EMAIL Settings#1 • EMAIL Settings#2	Selecting One of the EMAIL Settings will enable the camera to transmit the still images via EMAIL. The selected EMAIL Settings should be properly configured before using the option.
Email Still Image Settings	• Settings #1 • Settings #2	One of two Still Image Settings can be used for the still images that are sent using EMAIL.

Send via FTP	• Disabled • FTP Settings#1 • FTP Settings#2	Selecting one of the FTP Settings will enable the camera to transmit the still images to an FTP Server. The selected FTP Settings should be properly configured before using the option.
FTP Still Image Settings	• Settings #1 • Settings #2	One of two Still Image Settings can be used for the still images that are sent using FTP.
Send via PakBus	• Disabled • Enabled	Used to enable the still images to be sent to a PakBus compatible device. The PakBus settings should be properly configured in the Communications Page before enabling this option.
PakBus Still Image Settings	• Settings #1 • Settings #2	One of two still image settings can be used for the still images that are sent using PakBus.
Video Capture	• Yes • No	Select Yes to Include Video capturing.
Video Settings	• Settings #1 • Settings #2	One of two video settings can be used for the video capture.
Duration In Seconds	0 to 60	The length of time the video is recorded for.
Capture To Memory Card	• CARD • No	Selecting CARD will enable the video taken to be stored to the memory card.
Maximum Memory Size	0 to 65535	This is the allowable space on the memory card that will be reserved for videos taken by this Self Timed Capture. The value is in Megabytes. A value of 1000 will reserve 1000 Mbytes. A value of 0 will have the camera automatically allocate the memory.
Management Type Options	• Fill and Stop • Ring Memory	There are 2 methods of managing files on the memory card: • Fill and Stop will stop recording additional video once the memory card is full or the allocated memory size is reached. • Ring Memory management will start deleting the oldest files once the memory card is full or the allocated memory size is reached.
Main Folder Name	Read Only Field	This is a read only field. The Name of the Main Folder where the still image files will be stored (SelfTimed1Video).
Sub Folder Options	• Year_Month_ Day_Taken • Year_Month_ Taken	An option is given to store Videos in a subfolder named by Year_Month or Year_Month_Day. Selecting the Year_Month_Day option will have some performance advantages when a large number of Videos are taken. Reducing the number of files in a folder will speed up the storing and file management process. Speed advantages are only noticeable if the number of files in the Year_Month folder will exceed 1000.
Send via email	• Disabled • EMAIL Settings#1 • EMAIL Settings#2	Selecting one of the EMAIL Settings will enable the camera to transmit the video files via EMAIL. The selected EMAIL Settings should be properly configured before using the option.
Send via FTP	• Disabled • FTP Settings#1 • FTP Settings#2	Selecting one of the FTP Settings will enable the camera to transmit the video files to an FTP Server. The selected FTP Settings should be properly configured before using the option.
Send via PakBus	• Disabled • Enabled	Used to enable the video files to be sent to a PakBus compatible device. The PakBus settings should be properly configured in the Communications Page before enabling this option.

7.6.3 Self Timed Capture2

Refer to the previous section as the settings and parameters are the same.

7.6.4 External Trigger

The External Trigger sub tab (see FIGURE 7-30) is used to configure the camera to capture still images or video by using an external signal that is applied to the External Trigger input line.

The External Trigger can be configured for an active HIGH signal or an active LOW signal (see Digital I/O Settings). The Capture is triggered by the transition from the inactive state to the active state. The minimum required pulse period is 10 mSec. Preferably pulses should also be short in duration (only a few seconds). The voltage levels are as follows:

Low Level: < 0.65V (-20VDC Absolute Min)
High Level: >2.0 VDC (+20VDC Absolute Max)

Leaving the signal on the External Trigger in the active state will prevent the camera from entering into a low powered state. If an external device is allowed to keep the camera in its Fully On State, power consumption will be greatly affected.

When the camera is fully on and no other process is taking place, the time from the transition of the signal from inactive to active to the time a picture is captured or video is started is typically less than 100 msec.

The description of the parameters for the External Trigger setup are outlined in TABLE 7-8.

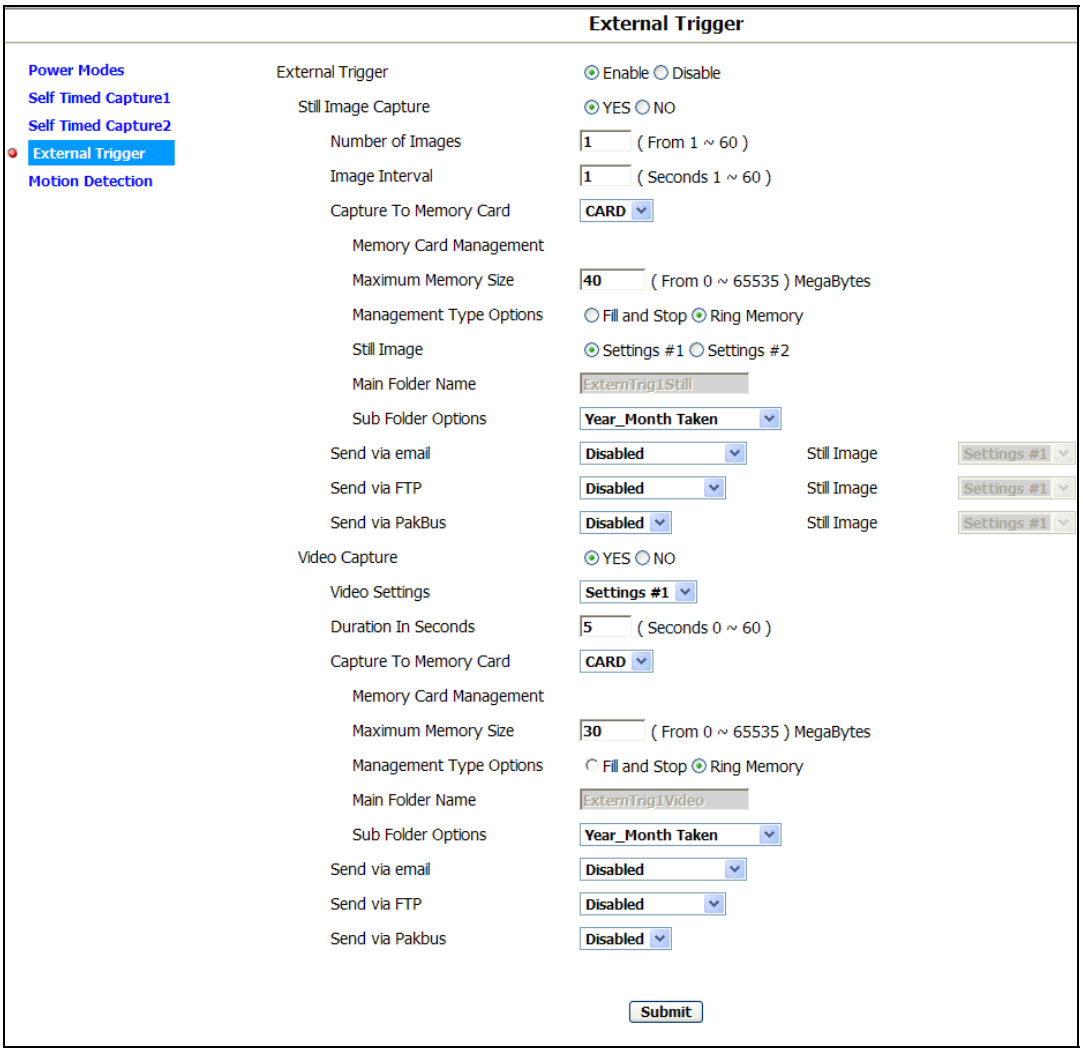


FIGURE 7-30. External Trigger Setup Page

TABLE 7-8. External Trigger Variables

Variable	Allowable Values	Description
External Trigger Enable	• Enable • Disable	Enables or Disables External Trigger Capture.
Still Image Capture	• Yes • No	Select Yes to include still image captures
Number of Images	1 to 60	Determines how many still images will be taken when the External Trigger is activated.
Image Interval	1 to 60	If the Number of Images (above parameter) is greater than 1. Then this parameter is the time spacing between images.
Capture To Memory Card	• CARD • No	Selecting CARD will enable the still images taken to be stored to the memory card.
Maximum Memory Size	0 to 65535	This is the allowable space on the memory card that will be reserved for Still Images taken by the External Trigger capture. The value is in Megabytes. A value of 1000 will reserve 1000 Mbytes. A value of 0 will have the camera automatically allocate the memory.
Management Type Options	• Fill and Stop • Ring Memory	There are 2 methods of managing files on the memory card: • Fill and Stop will stop recording additional images once the memory card is full or the allocated memory size is reached. • Ring Memory management will start deleting the oldest files once the memory card is full or the allocated memory size is reached.
Still Image Settings	• Settings #1 • Settings #2	Still Images for the External Trigger Capture can use 1 of 2 settings. Settings #1 and Settings #2 can be setup with various banner, resolution and compression values. Refer to Section 7.8.
Main Folder Name	Read Only Field	This is a read only field. The Name of the Main Folder where the still image files will be stored (ExternTrig1Still).
Sub Folder Options	• Year_Month_ Day_Taken • Year_Month_ Taken	An option is given to store images in a subfolder named by Year_Month or Year_Month_Day. Selecting the Year_Month_Day option will have some performance advantages when a large number of images are taken. Reducing the number of files in a folder will speed up the storing and file management process. Speed advantages are only noticeable if the number of files in the Year_Month folder will exceed 1000.
Send via email	• Disabled • EMAIL Settings#1 • EMAIL Settings#2	Selecting one of the EMAIL Settings will enable the camera to transmit the still images via EMAIL. The selected EMAIL Settings should be properly configured before using the option.
Email Still Image Settings	• Settings #1 • Settings #2	One of two Still Image Settings can be used for the still images that are sent using EMAIL.
Send via FTP	• Disabled • FTP Settings#1 • FTP Settings#2	Selecting one of the FTP Settings will enable the camera to transmit the still images to an FTP Server. The selected FTP Settings should be properly configured before using the option.
FTP Still Image Settings	• Settings #1 • Settings #2	One of two Still Image Settings can be used for the still images that are sent using FTP.
Send via PakBus	• Disabled • Enabled	Used to enable the still images to be sent to a PakBus compatible device. The PakBus settings should be properly configured in the Communications Page before enabling this option.
PakBus Still Image Settings	• Settings #1 • Settings #2	One of two Still Image Settings can be used for the still images that are sent using PakBus.

Video Capture	• Yes • No	Select Yes to include Video capturing.
Video Settings	• Settings #1 • Settings #2	One of two video settings can be used for the video capture.
Duration In Seconds	0 to 60	The length of time the video is recorded for.
Capture To Memory Card	• CARD • No	Selecting CARD will enable the video taken to be stored to the memory card.
Maximum Memory Size	0 to 65535	This is the allowable space on the memory card that will be reserved for videos taken by this External Trigger Capture. The value is in Megabytes. A value of 1000 will reserve 1000 Mbytes. A value of 0 will have the camera automatically allocate the memory.
Management Type Options	• Fill and Stop • Ring Memory	There are 2 methods of managing files on the memory card: • Fill and Stop will stop recording additional video once the memory card is full or the allocated memory size is reached. • Ring Memory management will start deleting the oldest files once the memory card is full or the allocated memory size is reached.
Main Folder Name	Read Only Field	This is a read only field. The Name of the Main Folder where the still image files will be stored (ExternTrig1Video).
Sub Folder Options	• Year_Month_ Day_Taken • Year_Month_ Taken	An option is given to store Videos in a subfolder named by Year_Month or Year_Month_Day. Selecting the Year_Month_Day option will have some performance advantages when a large number of Videos are taken. Reducing the number of files in a folder will speed up the storing and file management process. Speed advantages are only noticeable if the number of files in the Year_Month folder will exceed 1000. If speed is not an issue, then user preference is fine.
Send via email	• Disabled • EMAIL Settings#1 • EMAIL Settings#2	Selecting one of the EMAIL Settings will enable the camera to transmit the video files via EMAIL. The selected EMAIL Settings should be properly configured before using the option.
Send via FTP	• Disabled • FTP Settings#1 • FTP Settings#2	Selecting one of the FTP Settings will enable the camera to transmit the video files to an FTP Server. The selected FTP Settings should be properly configured before using the option.
Send via PakBus	• Disabled • Enabled	Used to enable the video files to be sent to a PakBus compatible device. The PakBus settings should be properly configured in the Communications Page before enabling this option.

7.6.5 Motion Detection

The Motion Detection sub tab (see FIGURE 7-31) is used to configure the camera to capture still images or video by using the Motion Detection capability of the camera.

Even if this feature is enabled, the motion detection will only operate when the camera is in the Fully On Power state.

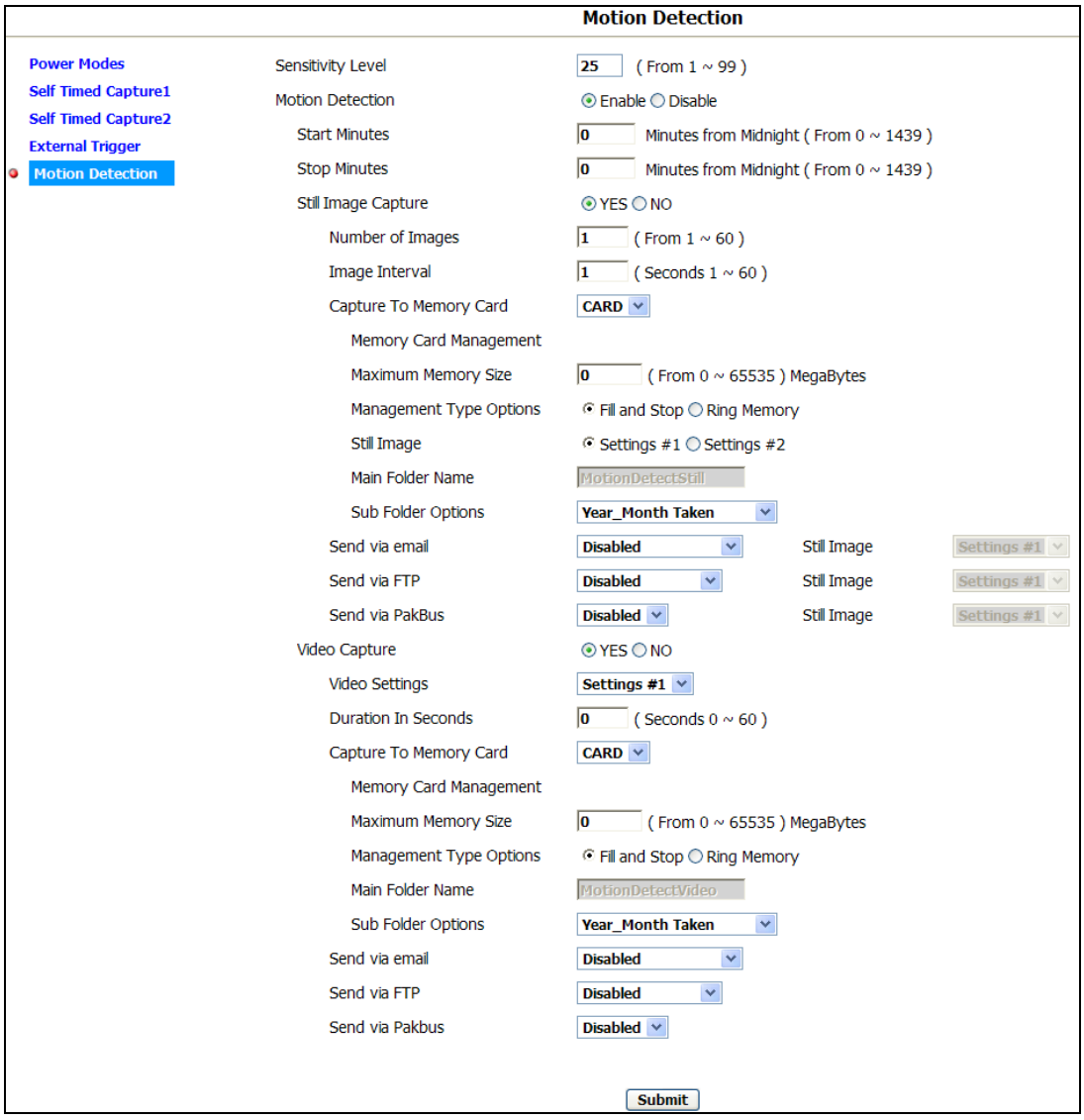


FIGURE 7-31. Motion Detection Page

TABLE 7-9. Motion Detection Settings

Variable	Allowable Values	Description
Sensitivity Level	1 to 99	The best method for determining where to set the level for your needs is to experiment with the values. The Value of 1 is the least sensitive value but less prone to false triggers. The value of 99 is the most sensitive value and is most susceptible to false triggers. You do not need to enable the motion detection to test its functionality. Simply set this parameter and observe the Motion Detect Status in the Live Video page.
Motion Detection Enable	• Enable • Disable	Enables or Disables Motion Detection Captures.
Start Minutes	0 to 1439	Start time in minutes relative to Midnight. The Motion Detection can be set to be active for a certain time period only. See TABLE 7-6 for more details.
Stop Minutes	0 to 1439	Stop time in minutes relative to Midnight. The Motion Detection can be set to be active for a certain time period only. See TABLE 7-6 for more details.
Still Image Capture	• Yes • No	Select Yes to include still image captures.
Number of Images	1 to 60	Determines how many still images will be taken when the Motion Detection is activated.
Image Interval	1 to 60	If the Number of Images (above parameter) is greater than 1. Then this parameter is the time spacing between images.
Capture To Memory Card	• CARD • No	Selecting CARD will enable the still images taken to be stored to the memory card.
Maximum Memory Size	0 to 65535	This is the allowable space on the memory card that will be reserved for Still Images taken by the Motion Detection capture. The value is in Megabytes. A value of 1000 will reserve 1000 Mbytes. A value of 0 will have the camera automatically allocate the memory.
Management Type Options	• Fill and Stop • Ring Memory	There are 2 methods of managing files on the memory card: • Fill and Stop will stop recording additional images once the memory card is full or the allocated memory size is reached. • Ring Memory management will start deleting the oldest files once the memory card is full or the allocated memory size is reached.
Still Image Settings	• Settings #1 • Settings #2	Still Images for the External Trigger Capture can use 1 of 2 settings. Settings #1 and Settings #2 can be setup with various banner, resolution and compression values.
Main Folder Name	Read Only Field	This is a read only field. The Name of the Main Folder where the still image files will be stored (MotionDetectStill).
Sub Folder Options	• Year_Month_ Day_Taken • Year_Month_ Taken	An option is given to store images in a subfolder named by Year_Month or Year_Month_Day. Selecting the Year_Month_Day option will have some performance advantages when a large number of images are taken. Reducing the number of files in a folder will speed up the storing and file management process. Speed advantages are only noticeable if the number of files in the Year_Month folder will exceed 1000.
Send via email	• Disabled • EMAIL Settings#1 • EMAIL Settings#2	Selecting one of the EMAIL Settings will enable the camera to transmit the still images via EMAIL. The selected EMAIL Settings should be properly configured before using the option.

Email Still Image Settings	• Settings #1 • Settings #2	One of two still image settings can be used for the still images that are sent using EMAIL.
Send via FTP	• Disabled • FTP Settings#1 • FTP Settings#2	Selecting one of the FTP Settings will enable the camera to transmit the still images to an FTP Server. The selected FTP Settings should be properly configured before using the option.
FTP Still Image Settings	• Settings #1 • Settings #2	One of two still image settings can be used for the still images that are sent using FTP.
Send via PakBus	• Disabled • Enabled	Used to enable the still images to be sent to a PakBus compatible device. The PakBus settings should be properly configured in the Communications Page before enabling this option.
PakBus Still Image Settings	• Settings #1 • Settings #2	One of two still image settings can be used for the still images that are sent using PakBus.
Video Capture	• Yes • No	Select Yes to include Video capturing.
Video Settings	• Settings #1 • Settings #2	One of two video settings can be used for the video capture.
Duration In Seconds	0 to 60	The length of time the video is recorded for.
Capture To Memory Card	• CARD • No	Selecting CARD will enable the video taken to be stored to the memory card.
Maximum Memory Size	0 to 65535	This is the allowable space on the memory card that will be reserved for videos taken by this Motion Detection Capture. The value is in Megabytes. A value of 1000 will reserve 1000 Mbytes. A value of 0 will have the camera automatically allocate the memory.
Management Type Options	• Fill and Stop • Ring Memory	There are 2 methods of managing files on the memory card: • Fill and Stop will stop recording additional video once the memory card is full or the allocated memory size is reached. • Ring Memory management will start deleting the oldest files once the memory card is full or the allocated memory size is reached.
Main Folder Name	Read Only Field	This is a read only field. The Name of the Main Folder where the video files will be stored (MotionDetectVideo).
Sub Folder Options	• Year_Month_ Day_Taken • Year_Month_ Taken	An option is given to store Videos in a subfolder named by Year_Month or Year_Month_Day. Selecting the Year_Month_Day option will have some performance advantages when a large number of Videos are taken. Reducing the number of files in a folder will speed up the storing and file management process. Speed advantages are only noticeable if the number of files in the Year_Month folder will exceed 1000. If speed is not an issue, then user preference is fine.
Send via email	• Disabled • EMAIL Settings#1 • EMAIL Settings#2	Selecting one of the EMAIL Settings will enable the camera to transmit the video files via EMAIL. The selected EMAIL Settings should be properly configured before using the option.
Send via FTP	• Disabled • FTP Settings#1 • FTP Settings#2	Selecting one of the FTP Settings will enable the camera to transmit the video files to an FTP Server. The selected FTP Settings should be properly configured before using the option.
Send via PakBus	• Disabled • Enabled	Used to enable the video files to be sent to a PakBus compatible device. The PakBus settings should be properly configured in the Communications Page before enabling this option.

7.7 PakBus Communication Settings

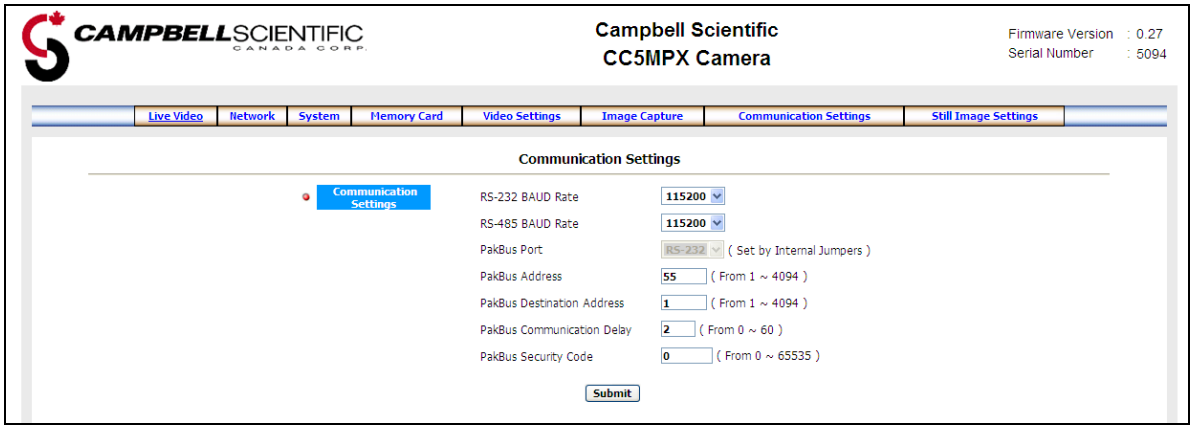


FIGURE 7-32. Communication Settings Page

Communications using the PakBus protocol can enable remote retrieval and/or storage of images or video to external devices such as compatible Campbell Scientific dataloggers.

The factory default communication interface is RS-232. If RS-485 is required the internal camera jumpers will need to be changed. See Section 8 Internal Jumpers for more details.

TABLE 7-10. PakBus Communication Settings

Variable	Allowable Values	Description
RS-232 BAUD Rate	• 115200 • 57600 • 38400 • 19200 • 9600	Select the desired BAUD rate. Once the BAUD rate is set it will always be fixed. The factory Default Setting is 115200 BAUD.
RS-485 BAUD Rate	• 115200 • 57600 • 38400 • 19200 • 9600	Select the desired BAUD rate. Once the BAUD rate is set it will always be fixed. The factory Default Setting is 115200 BAUD.
PakBus Port	Read Only	The value reflects the internal jumper settings of the camera. It will either read RS-232 or RS-485. See Section 8 Internal Jumpers if the jumpers need to be changed.
PakBus Address	1 to 4094	The desired PakBus address for this camera. The factory default is 55.
PakBus Destination Address	1 to 4094	The PakBus address of the device the camera will communicate with or send files to.
PakBus Communication Delay	0 to 16	Extra delays may be required for certain communication links such as satellite.
PakBus Security Code	0 to 65535	The factory default is 0. If a security code is not required by the PakBus destination device, set this parameter to 0. Otherwise set the security code as required by the destination device.

7.8 Still Image Settings

Selecting the Still Image Settings tab will bring up the Still Image Settings page (see FIGURE 7-33). The Still Image Settings allows the configuration of the still images that the camera will take.

There are two sub tabs that include two independent still settings:

- Still Settings #1
- Still Settings #2

TABLE 7-11 describes the variables used in the Still Images Settings.

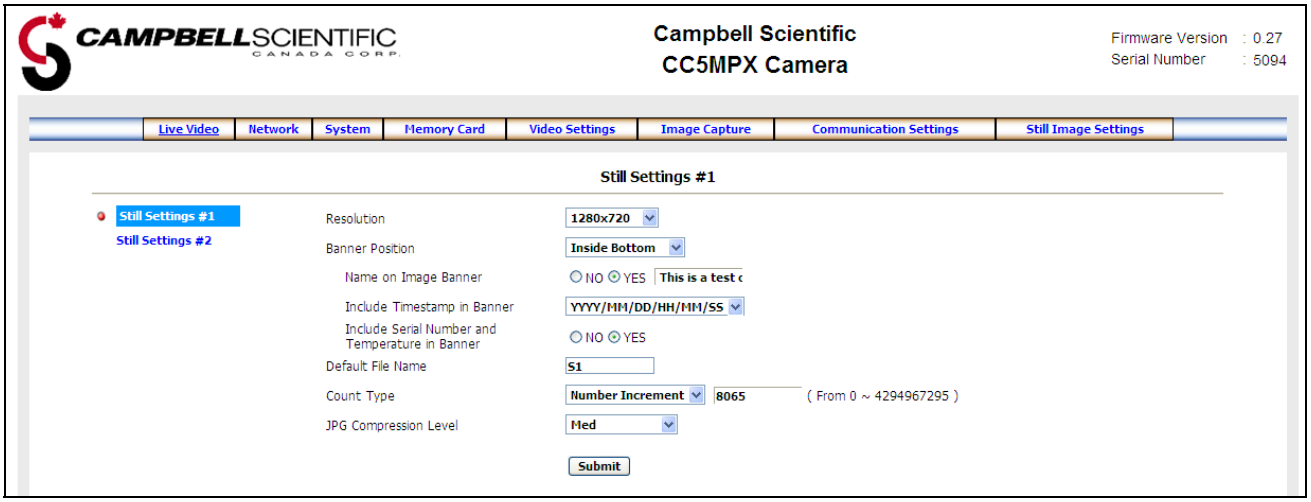


FIGURE 7-33. Still Images Settings Page

TABLE 7-11. Still Image Settings

Variable	Allowable Values	Description
Resolution	• 320x176 • 320x240 • 640x352 • 640x480 • 1280x720 • 1280x960 • 2592x1944	The resolution option is the resolution of the Still Image in pixels (Width x Height).
Banner Position	• OFF • Inside Top • Inside Bottom • Outside Top • Outside Bottom	Selecting the Inside banner will display the text within the image area either at the top or the bottom. The Outside banner is a text bar placed above or below the still image. The vertical height of the picture is increased to accommodate the outside banner. See TABLE 7-12 for the image sizes with outside banners.
Name on Image Banner	• NO • YES + Text	By selecting Yes a custom name can be placed on the Image Banner. See TABLE 7-12 for the number of characters that can fit on a specific image resolution size. The Actual Text field can hold 255 characters
Include Timestamp in Banner	• NONE • YYYY/MM/DD/HH/MM/SS	A Time stamp can be placed on the banner. The time stamp will occupy 20 characters and the format is as follows: YYYY/MM/DD HH:MM:SS 2011/01/30 14:54:07
Include Serial Number and Temperature in Banner	• NO • YES	By selecting YES the internal camera temperature and the Serial number of the camera will be placed on the Right hand side of the banner. The temperature is in degrees Celsius and the format is as follows: ±TT.T C / SSSS +25.0 C / 1000
Default File Name	Text Field	This text field allows a file name to be used for the still images produced. The text is limited to 32 characters.
Count Type	• NONE • Date and Time • Number Increment	• The NONE option will use the same file name for all pictures. Only one image name will appear in a directory or be transmitted out (EMAIL, FTP or PakBus). • The Date and Time option will append a Time stamp to the file name. The text entered in the above parameter (Default File Name) will be followed by the date and time: < Default File Name >_YYYY_MM_DD_HH_MM_SS.jpg • The Number Increment option will append a 10 digit counter to the file name. The files will be named with the following format after the Default File Name text: < Default File Name >_XXXXXXXXXX.jpg
JPG Compression Level	• NONE/Lossless • Low • Med • High • Very High	The None/Lossless compression level produces the largest JPEG files sizes with no loss of information. The Very High compression level produces the smallest file sizes but there will be noticeable distortions in the picture due to the compression. See TABLE 7-12 for typical file size information.

TABLE 7-12. Still Image Resolution Details

Resolution	Size with Outside Banner	Maximum Characters in Banner	Compression Type	Typical File Size
320x176	320x192	45	None/Lossless	32 Kbytes
			Low	16 Kbytes
			Medium	12 Kbytes
			High	8 Kbytes
			Very High	6 Kbytes
320x240	320x256	45	None/Lossless	40 Kbytes
			Low	20 Kbytes
			Medium	15 Kbytes
			High	10 Kbytes
			Very High	8 Kbytes
640x352	640x384	64	None/Lossless	120 Kbytes
			Low	40 Kbytes
			Medium	28 Kbytes
			High	20 Kbytes
			Very High	16 Kbytes
640x480	640x512	64	None/Lossless	132 Kbytes
			Low	48 Kbytes
			Medium	32 Kbytes
			High	25 Kbytes
			Very High	18 Kbytes
1280x720	1280x752	98	None/Lossless	448 Kbytes
			Low	128 Kbytes
			Medium	75 Kbytes
			High	54 Kbytes
			Very High	40 Kbytes
1280x960	1280x992	98	None/Lossless	580 Kbytes
			Low	164 Kbytes
			Medium	96 Kbytes
			High	68 Kbytes
			Very High	48 Kbytes
2592x1944	2592x1984	136	None/Lossless	1900 Kbytes
			Low	500 Kbytes
			Medium	264 Kbytes
			High	190 Kbytes
			Very High	150 Kbytes

Section 8. Internal Jumpers

There are two sets of jumpers that are internal to the camera. One set of jumpers is used to select either RS-232 or RS-485 communications on the Power I/O cable. The other jumper set is used to select a pull up or a pull down resistor on the External Trigger input line.

Refer to Section 20 Backplate Removal Procedures for details to remove the backplate to access the internal jumpers of the camera.

8.1 RS-232 / RS-485 Jumpers

The jumper locations are shown in FIGURE 8-1. There are three jumpers that can be moved from either the left or the right 2x3 jumper posts. When the jumpers are on the right 2x3 jumper posts then the RS-232 output is selected (Factory Default position). To change the serial output format from RS-232 to RS-485 move all three jumpers from the right to the 2x3 jumper posts located in the left position. Always move all three jumpers and never install additional jumpers.

The available communication interfaces can be configured with the cameras web interface or via the Device Configuration Utility. The RS-232 and RS-485 interfaces can be configured to a range of baud rates between 9600 and 115200 bps. Both interfaces support only the PakBus protocol.

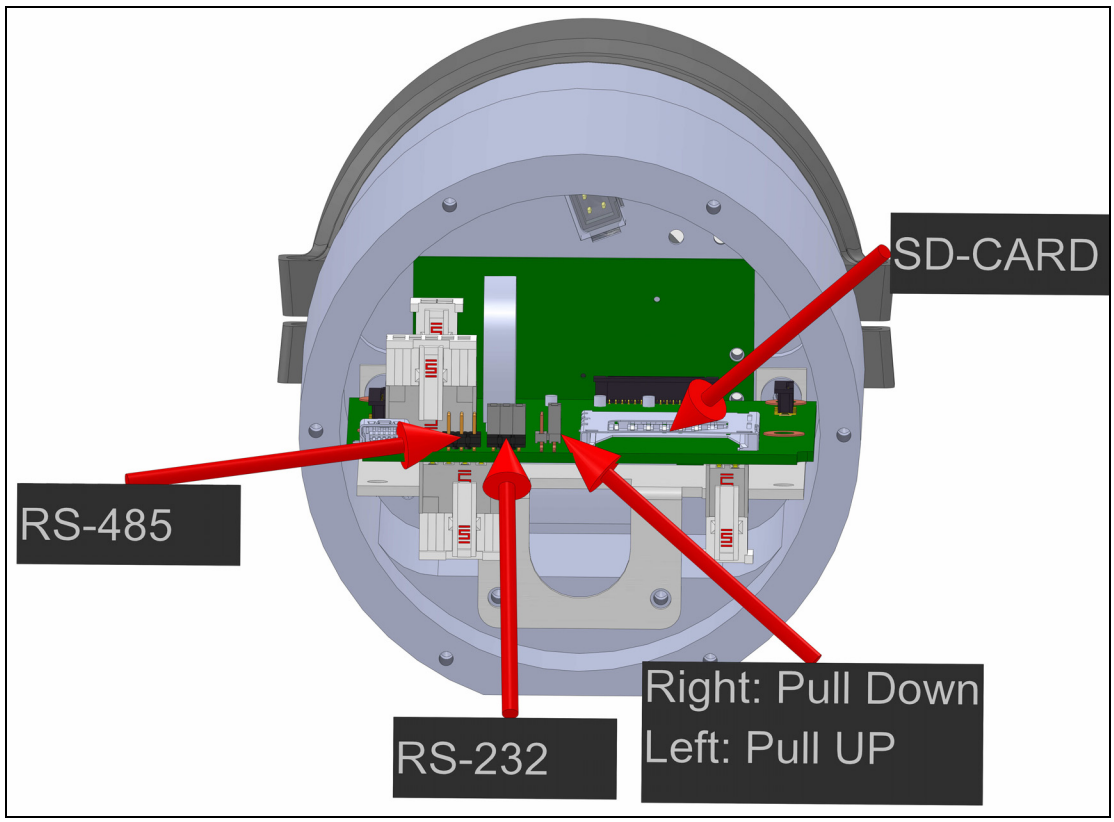


FIGURE 8-1. Internal Jumper Locations

8.2 External Trigger Pull-Up/Pull-Down Jumper

The jumper location for the External Trigger Pull-up/Pull-down location is shown in FIGURE 8-1. When the jumper is located on the right two pins of the header (factory default position), there is a 100 kohm pull-down resistor connected from the External Trigger line to ground. When the jumper is placed on the left two pins of the header, there is a 47 kohm pull-up resistor connected from the External Trigger line to 3.3 Volts.

The pull-up resistor would be useful for having contact closures or open collector output signals trigger the camera. In the case of a contact closure, the jumper would be moved to the pull-up position and then one end of the contact would connect to the External Trigger signal and the other end of the contact would connect to ground. A schematic representation is shown in FIGURE 8-2.

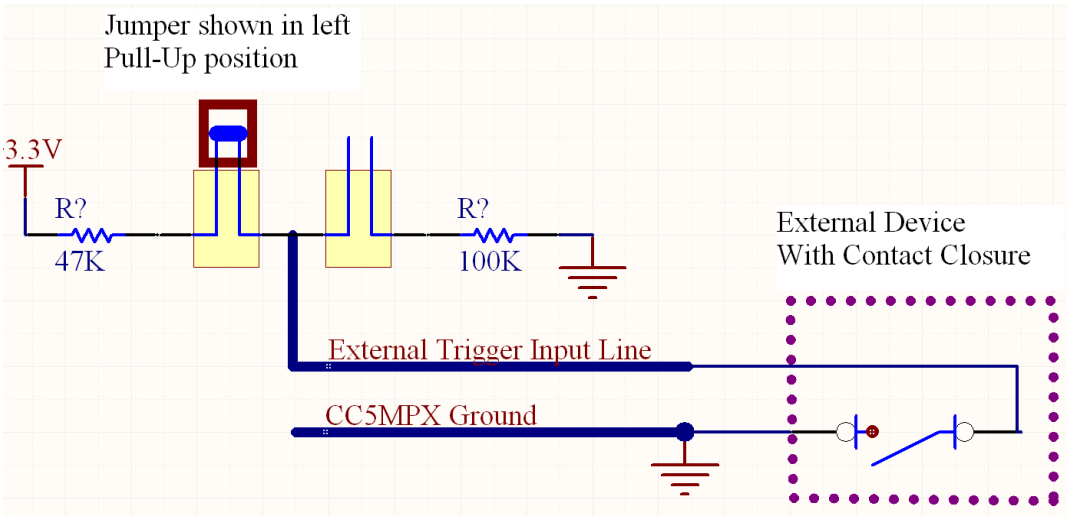


FIGURE 8-2. Schematic Showing External Contact Device

Section 9. RS-232 Communications

The RS-232 serial communications are used with the camera for two purposes. One is to configure and setup the camera using the Device Configuration Utility software that Campbell Scientific provides. The other purpose is to send image files from the camera to other devices using the PakBus protocol.

Check the PakBus Port value under the Communication Settings if you are not sure that your camera has its internal jumpers configured to RS-232 or RS-485 (see FIGURE 9-1).

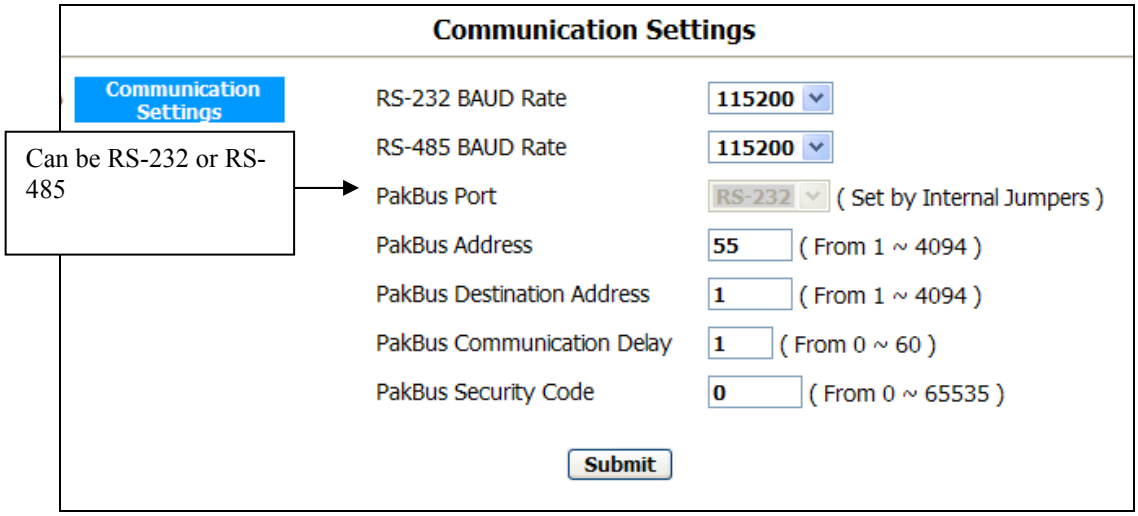


FIGURE 9-1. Serial PakBus Port Setting

The CC5MPX Power I/O port is configured by default to provide a 3-wire RS-232 connection (Tx, Rx, Ground). The wires can be terminated directly on the control ports of a compatible datalogger. For connection to a computer 9 pin serial port, use the DB9M-TERM, which will facilitate the connection of the cable's pigtail end to a computer's 9-pin serial port. The Adapter comes with the CC5MPX as an accessory (see FIGURE 9-2).

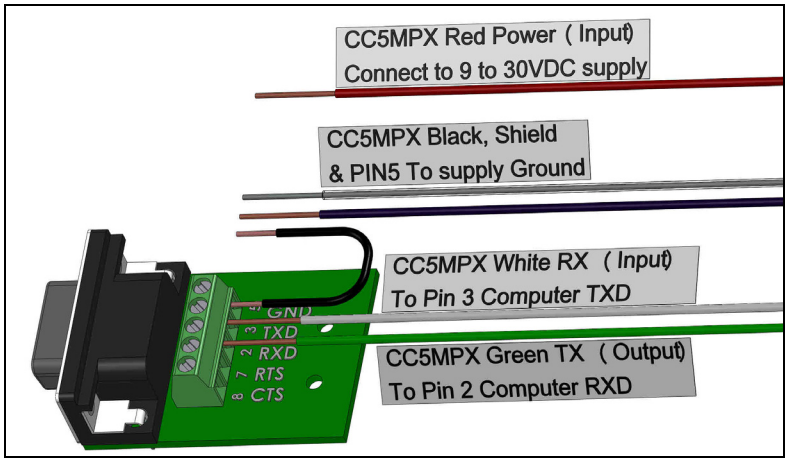


FIGURE 9-2. Connecting the CC5MPX to a 9-Pin RS-232 Port

An illustration of the required RS-232 connections to a datalogger is shown in FIGURE 9-3.

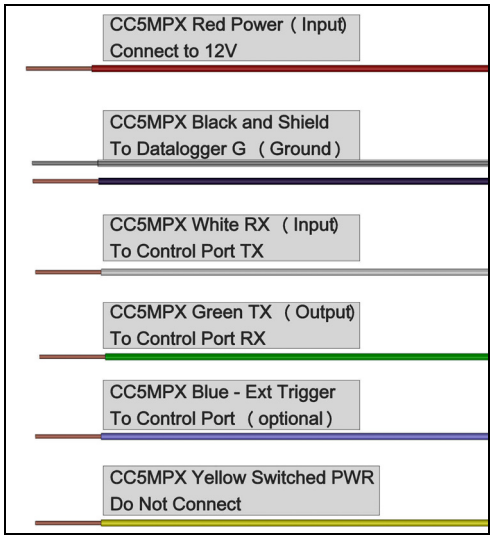


FIGURE 9-3. Datalogger Connections with RS-232

Section 10. RS-485 Communications

The optional RS-485 communication interface of the CC5MPX can be used in conjunction with the MD485 to interface a datalogger to one or more cameras. Refer to the MD485 manual for additional information.

The MD485 is useful for connecting more than one camera to a datalogger or if long cable lengths are involved. If multiple cameras are connected to an MD485, then it would be beneficial to offset the capture times of the images so that only one camera is attempting to transmit a file at any given time.

The camera can download images or video via an RS-485 port using the PakBus protocol. An MD485 is required to interface the camera to a datalogger. The following items are required for RS-485 PakBus communications and can be confirmed by either the web interface or the Device Configuration Utility:

- Confirm that the PakBus Port parameter of the Communications Settings is reading RS-485.
- Set the RS-485 BAUD rate to match the BAUD rate of the device being connected to the camera.
- Set the parameter PakBus Address of Communication Settings to a unique value in the PakBus network.
- Set the parameter PakBus Destination Address of the device that the camera needs to send images to.
- Include PakBus Security Code as required.

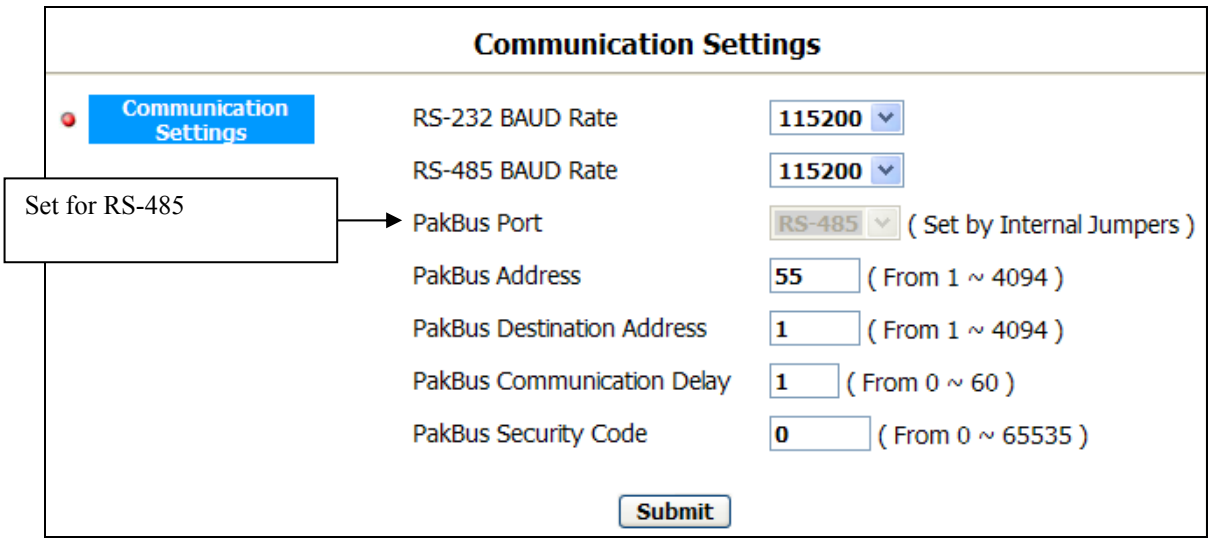


FIGURE 10-1. RS-485 Shown in PakBus Port Setting

Section 11. PakBus Communications

The camera uses the PakBus protocol to send image files from the camera to the datalogger or other PakBus compatible devices.

When an image or video file is ready to be transmitted, the camera will initiate communications and send the image or video via the selected serial interface.

The CC5MPX is capable of producing video files that exceed 30 MB in size. Trying to send such a large file to a datalogger using PakBus can be problematic. For this reason the CC5MPX is setup to not send any files using PakBus that are larger than 2 MB.

The camera is a PakBus Leaf node and is not capable of performing any routing.

11.1 Concurrent PakBus Communications

PakBus allows the camera to download images to a datalogger simultaneously with other datalogger communications. A communications task will take longer if the datalogger is communicating with multiple devices at the same time.

It may be beneficial to set up the system to avoid image transfers when other communications are scheduled.

For example, longer connect times on long distance telephone connections can be avoided by scheduling image transfers from the camera to the datalogger outside the scheduled data collection time. If a station is called on the hour to retrieve data, image acquisitions could be initiated before the scheduled call (15 minutes prior) to shorten the connect times.

Section 12. Device Configuration Utility

The Device Configuration Utility can be used to change settings in the CC5MPX. The Device Configuration Utility software can be downloaded, at no charge, from the Campbell Scientific website.

Using the Device Configuration Utility

- Connect the camera to the serial port of a PC using the DB9M-TERM as shown in Section 9, RS-232 Communications. The A200 Sensor to PC Interface can be used in lieu of the DB9M-TERM.

- Once the camera is powered up (this typically takes 90 seconds), you should observe that the LED flashes. If the LED does not flash you may have to press the Setup button to exit the camera from a low powered mode.

- Select the CC5MPX from the device list (see FIGURE 12-1) and Connect to the camera.

    - Normally the camera is set to a baud rate of 115200 bps. If the baud rate is set to something else, select the appropriate baud rate

- Once connected to the CC5MPX, use the tabs (see FIGURE 12-2) to navigate and configure the camera.

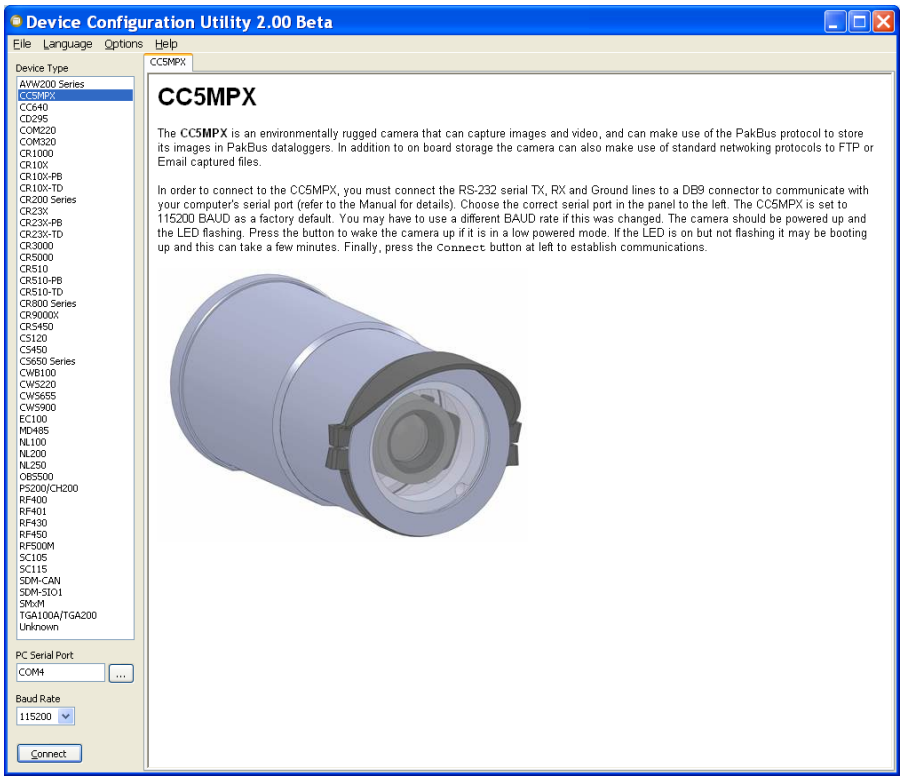


FIGURE 12-1. CC5MPX Device Configuration Option

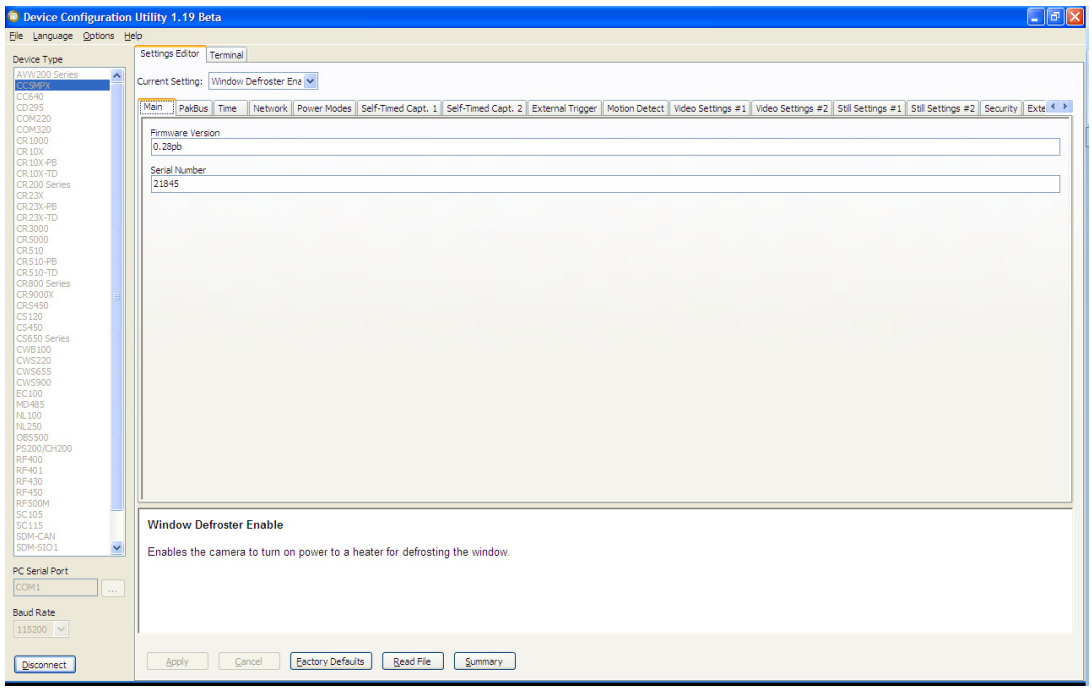


FIGURE 12-2. Device Configuration Utility Screen

Section 13. Image Quality

Lighting conditions have the greatest influence on image quality. The CC5MPX camera produces the best images under normal daylight conditions. Pictures taken in good daylight conditions produce crisper and brighter images, as the camera uses the entire image to adjust the exposure settings of a scene.

Scenes that contain small variations in light intensities will produce better images. In scenes with high variations in light intensities, such as a bright sky and a dark horizon, the image may contain portions that are under-exposed and portions that are over-exposed, as with most cameras. The CC5MPX utilizes various techniques to produce an overall good picture under most lighting conditions.

13.1 Night Time Images

In general the camera does not produce good images at night time. If lighting is present, such as street lights, then distinguishable pictures can be taken.

Section 14. Lens

The standard Lens for the CC5MPX camera contains the following features:

- C-Type Mount
- Varifocal (manual zoom)
- Manual Focus
- DC Iris

Access to the lens for adjusting the zoom and focus requires the removal of the CC5MPX lens tube (see FIGURE 14-1). The lens tube is threaded on and needs to be turned counter clockwise to be removed.

The zoom and focus adjustments are shown in FIGURE 14-2. The thumbscrews may need to be loosened prior to moving the adjustments. It is important to tighten the thumb screws once the camera focus and zoom adjustments are completed, to avoid problems from vibration.

The camera controls the iris of the lens using the cable with a 4-pin connector. This connector must always be plugged into the receptacle (on the front lens plate of the camera) for proper operation.

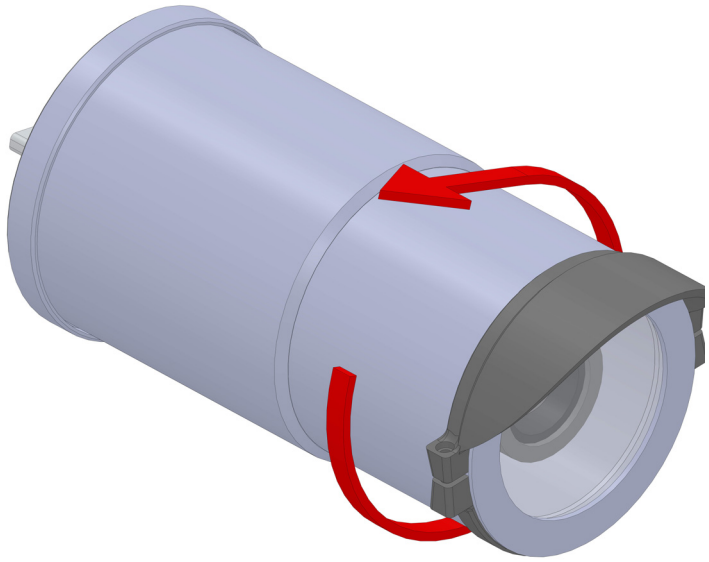


FIGURE 14-1. CC5MPX Lens Tube Removal

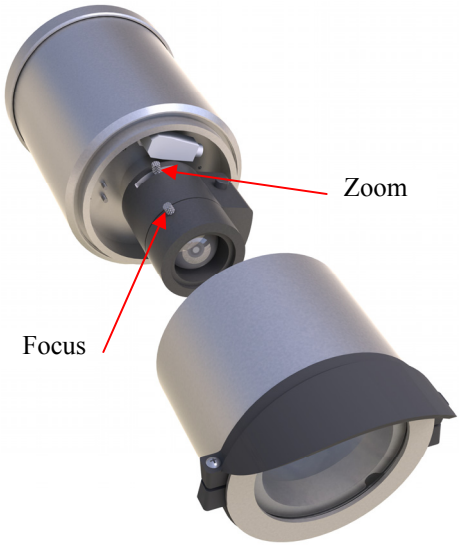


FIGURE 14-2. Focus and Zoom Adjustments

14.1 Camera Lens and Field of View

The CC5MPX camera includes a 4 to 12 mm lens, which provides an approximate 27° horizontal field of view when fully zoomed in and an 80° horizontal field of view when fully zoomed out. The CC5MPX with the special-ordered zoom lens will have a 10 to 40 mm lens, which provides an approximate 9° horizontal field of view when fully zoomed in and a 35° horizontal field of view zoomed out. See FIGURE 14-3 for a visual representation of the field of view.

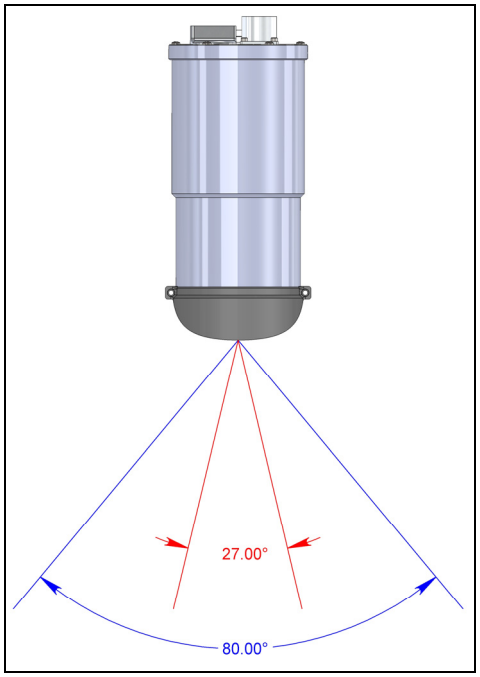


FIGURE 14-3. CC5MPX Horizontal Field of View

14.2 Focus and Zoom Adjustment

To facilitate the focus and zoom adjustments, a network connection will need to be established with the camera to view the live video on a web browser.

Refer to Sections 3 and 7 for details on accessing the camera with a web browser.

If the LED is not flashing while the camera is wired up and the power is turned on, you may need to press the setup button to wake the camera from any of its low powered modes. In some configurations, pressing the setup button may also be required to enable the Ethernet port.

Establish a connection to the camera by typing the address of the camera into the web browser (Factory default IP address is 192.168.1.90). The home page of the camera should come up once the address is entered.

To view the video select an appropriate Video Display Size. If you have a direct connection, you will get the best results by displaying the larger 1280x720 video. The smaller video display sizes are useful when working with bandwidth limited connections.

- Loosen the two thumbscrews on the adjustment rings of the lens. It is generally preferred to adjust the zoom (i.e. frame the scene), and then the focus. Once the zoom is adjusted as desired, tighten the thumbscrew so that the zoom will not inadvertently move when the focus is adjusted.

- Adjust the focus ring and then tighten its thumbscrew as well.

NOTE If the camera is targeted on an object that is far away (100 m or more), then it may be beneficial to adjust the lens before taking the camera into the field by using an object that is at a similar distance away.

14.2.1 Using the Focusing Number

The main purpose of the focusing number is to facilitate focusing the camera when using a display in outdoor sunlight. The sunlight can make it difficult to distinguish fine detail on a computer screen

The focusing number is displayed on the home page of the web interface to assist with focusing the CC5MPX camera. The focusing number is a number that generally increases as an image becomes more “in-focus”.

The lens should be adjusted so that the focusing number reads near its maximum achievable value. The numbers are relative only and are dependent on the actual scene, so a value of 9000 may be in focus for one scene and a value of 2700 may be the maximum for another scene. The numbers are most useful when the lens is near its best focus position.

The camera should be in a fixed position when using the focusing numbers. If the camera is allowed to move then movement will account for increasing or decreasing numbers.

There may be instances where the focusing numbers cannot be used to focus the CC5MPX. One such scene may be where a nearby object is desired to be in focus and the background may be out of focus. However, for most “scene” images where nearby objects and far objects are not involved, the focusing numbers work well.

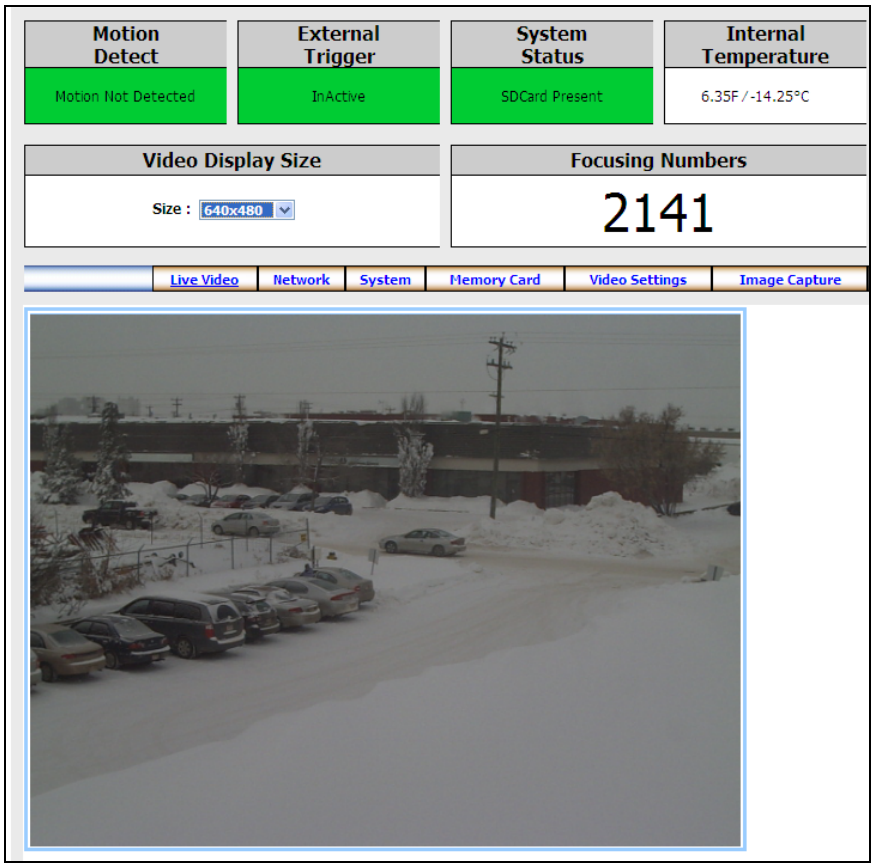


FIGURE 14-4. Homepage Video Display and Focusing Numbers

14.3 Temperature Variations and Focus

The CC5MPX can operate under extreme temperature variations. The focus of the lens can change slightly with large variations in temperature. For example, if a lens is focused at +35°C the lens may be slightly out of focus at -40°C. The change in focus will be less noticeable if the focus is adjusted closer to the cameras operating temperature.

14.4 Lens IR Cut Filter

The CC5MPX camera is internally equipped with an IR cut filter. The filter is required to filter out near-infrared light that can have an undesirable effect on the images.

Section 15. Power Calculations and Timings

The CC5MPX was specifically designed for operation in power-constrained systems such as solar powered sites. It is critical in such systems that the camera be properly configured to meet the constraints of the intended application. This section outlines the power consumption of the camera for purposes of power supply design for a system.

15.1 Standalone Operation

In standalone mode the camera operates as a self-contained image and video logger. Files will be stored onto the internal SD memory card.

The current draw of the camera is mainly dictated by the quiescent current draw of the Power mode plus the current draw when the camera enters the Fully On power mode (Active Current Draw) to acquire an image or video. TABLE 15-1. Power Consumption Table shows some total power consumption figures in Amp-Hours per day depending on the Power Mode and frequency of images.

One thing to note is that the Off State will only consume less power than the Deep Sleep State if fewer than 24 Pictures are taken per day. This is due to the boot-up time that the camera requires when exiting the OFF State. The extra boot-up time means that the camera consumes the Active Current for a longer time (120 seconds).

TABLE 15-1. Power Consumption Table (Standalone)

Power Mode	Ethernet Power Save Mode	Quiescent Current Draw Max.@12VDC	Active Current Draw Max.@12VDC Active Duration	Amp-Hr Per Day 2 JPG/Day	Amp-Hr Per Day 1 JPG/Hr	Amp-Hr Per Day 5 Min JPG
Fully On	Always On	250mA	250mA 0 Sec/JPG	6 .0	6 .0	6 .0
	Full Power Save Mode	200mA	200mA 0 Sec/JPG	4.8	4.8	4.8
Partially On	Always On	80mA	250mA 20 Sec/JPG	1.92	1.94	2.2
	Full Power Save Mode	10mA	200mA 20 Sec/JPG	0.24	0.27	0.54
Deep Sleep	Always On	6mA	250mA 25 Sec/JPG	0.15	0.18	0.63
	Full Power Save Mode	6mA	200mA 25 Sec/JPG	0.15	0.18	0.53
Off State	Always On	1mA	250mA 120 Sec/JPG	0.041	0.22	2.4
	Full Power Save Mode	1mA	200mA 120 Sec/JPG	0.037	0.18	1.93

15.2 Operation with Communications

The power calculations are more complicated when communications are involved, as the amount of time the camera is in the Fully On active state is increased by the amount of time it takes for the camera to transfer an image or video.

The transfer times are influenced by two main factors: the size of the image and the transfer speed used to send the image. The amount of time the camera is on will be increased as the size of the image becomes larger or as the communication rate slows down.

To properly determine the power consumption when using communications, the additional time the camera consumes the Fully On Active Current Draw needs to be accounted for in the power calculation. Refer to TABLE 15-2 as a guideline for determining the amount of time it takes to transfer files using RS-232 or RS-485 PakBus Communications.

TABLE 15-2. File Transfer Times Using PakBus

Communication Baud Rate (bps)	Time (Seconds) per 100 kbytes
9600	240 seconds 0.0123 A-Hrs
19200	120 seconds 0.0076 A-Hrs
38400	60 seconds 0.0052 A-Hrs
57600	40 seconds 0.0044 A-Hrs
115200	30 seconds 0.0038 A-Hrs

To estimate the power consumption of the system look up the parameters in TABLE 15-1. Power Consumption Table along with the communication times to calculate the power consumption as follows:

- Determine the total Active Time in Minutes:

  Active Minutes = Number of Pictures Per day *(Active Duration + Communication Time)/60

  For example, suppose a camera is in the Deep Sleep state. If it sends 24 100-kbyte images per day at 115200 bps, the camera is active for:

  Active Minutes = 24*(25 seconds + 30 seconds)/60 = 22 minutes/day of active time.

- Determine the total time in the Quiescent Low Powered State

  Quiescent Minutes = 1440 minutes per day - active minutes
  Quiescent Minutes = 1440 – 22 = 1418 Minutes

- Determine the power consumed by the quiescent state in Amp-hours.

  Quiescent Power = quiescent minutes * quiescent current draw/60
  Quiescent Power = 1418 minutes*6 mA/60 = 141.8 mA-hour or **0.1418 Amp-hours/day**

- Determine the power consumed by the active state in Amp-hours.

  Active Power = active minutes * active current draw/60
  Active Power = 22 minutes*250 mA/60 = 91.67 mA-hour or **0.0917 Amp-hours/day**

- Total power consumption is the sum of the active and quiescent power.

  Total Power = quiescent power + active power
  Total Power = 0.1418 Amp-hours/day + 0.0917 Amp-hours/day
  Total Power = 0.2335 Amp-hours/day

Section 16. CR1000 Interface Guide

This section contains information for interfacing the CC5MPX camera to the CR1000 datalogger. The CC5MPX can interface to the CR1000 by using RS-232 default or RS-485. The RS-232 configuration is the simplest option as it does not require an additional hardware interface. The pigtail end of the CC5MPXCBL1 Power and I/O Cable can be terminated directly to the CR1000 wiring panel control ports (COM 1 to 4). Refer to Section RS-232 Communications for wiring details.

The CC5MPX RS-485 interface can also be used, but does require the use of an MD485 interface to provide the conversion of the RS-485 signal. The MD485 can connect to the CR1000 by using the CS I/O port or the RS-232 port. Refer to the MD485 manual for additional information.

16.1 CR1000 Memory Setup

To facilitate the storage of images a CFM100 allows the use of a compact flash card on the CR1000. Memory can also be allocated from the CR1000's internal memory to create a virtual user drive "USR:" Entering a non-zero value for the parameter "USR: drive size" allocates internal memory for the drive. The amount of memory required will vary depending on each application. A good number to start with is approximately 1 048 576 bytes (1048 kbytes which is 25% of the 4 Mbytes available on a standard CR1000).

The following methods can be used to set the drive size of the USR:

- The Device Configuration Utility
- PakBus Graph
- Editing the parameter from the Status Table
- The CR1000's optional keypad and display.

NOTE The CC5MPX will not send any files using PakBus that are greater than 2 MB.

16.2 CR1000 Files Manager

The Files Manager setting on the CR1000 facilitates the management of JPEG and AVI files that are received from the camera. The Files Manager allows the user to specify a name for the files and the number of files kept in a ring memory type fashion.

The format of the Files Manager setting is as follows:

- (AAAA,DDD:NAME.EXT,NNNN)
- AAAA – Is the PakBus address of the camera

- DDD – Is the destination drive on the CR1000
    - USR for the user drive
    - CRD for the compact flash memory card
- NAME – Is any name string that will be used to name the files
- EXT – The file extension of the incoming file must match. In the case of the camera this must always be either "JPG" or "AVI".
- NNNN – The number of files kept in the ring memory. This number should be low enough so that the memory required for the files is less than what is available in the corresponding drive. However, for the internal USR drive this would normally be between 3 and 10 images and for CRD drive (memory card) this can be larger. When communications are used to retrieve images, it is suggested to limit the number of files in the ring memory to 200 in order to avoid long communication delays.

  An example of Files Manager setting is as follows:
  (55,USR:SkySouth.JPG,3)
    - Camera PakBus address is 55
    - The files will be stored in the USR: director with a name SkySouth####.JPG where #### is an incrementing number. Entering a zero for this parameter will disable the automatic numbering and produce a fixed file name.
    - The three most recent files will be kept. A new incoming file will cause the oldest to be deleted.

16.3 CR1000 COM Port (Control Port) Communications

On the CR1000 the control ports can be configured to function as RS-232 communication ports. Any of these four COM ports can be configured as PakBus ports and used to communicate with the camera.

The COM ports can be activated as PakBus ports using the Device Configuration utility or by using the SerialOpen instruction in the CR1000 program.

The following SerialOpen instruction configures COM port 2.

- BAUD rate - 115200
- PakBus Port – 4
- Transmit delay - 0,
- Buffer size - 1000.

SerialOpen (Com2,115200,4,0,1000)

Section 17. Remote Image Retrieval

Once the camera has transferred an image or video to a datalogger, existing LoggerNet communications can be used to retrieve images and video remotely from the datalogger memory.

17.1 LoggerNet File Retrieval

LoggerNet (Version 4.0 or newer) includes the File Retrieval setup that facilitates the image and video file retrieval from PakBus dataloggers (CR800 series, CR1000, and CR3000). The File Retrieval tab is located in the Setup Screen as part of the datalogger configuration. Once configured, the file retrieval software is used to retrieve images and video from a datalogger.

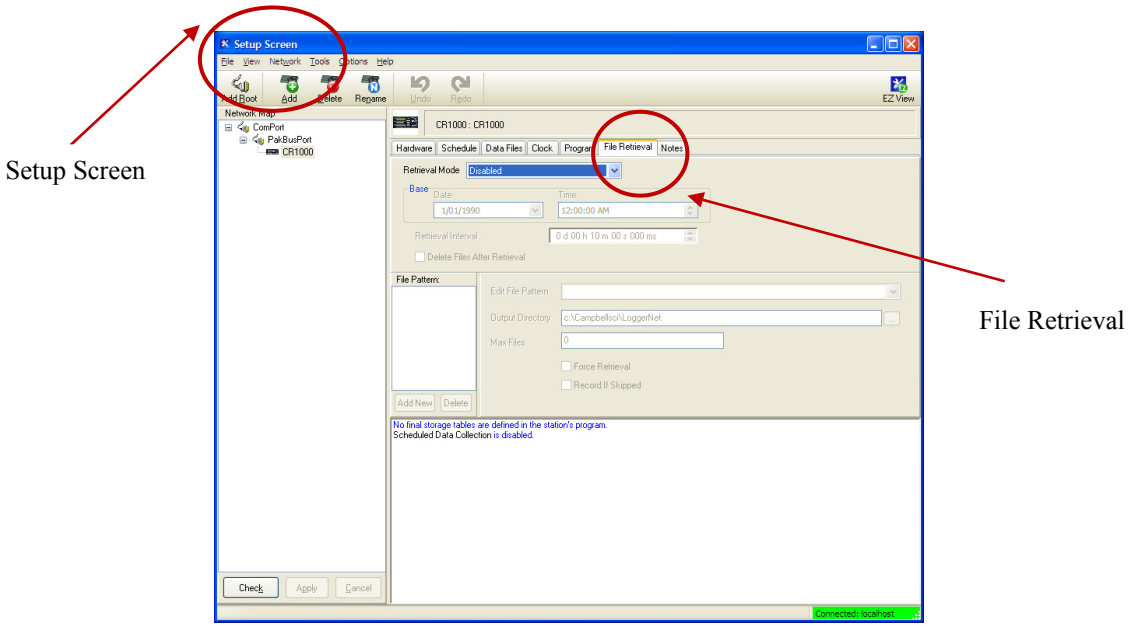


FIGURE 17-1. File Retrieval Setup Screen

Select the required Retrieval Mode for the application. The use of the "Follow Scheduled Data Collection" option will use the scheduled configured in the Schedule tab. If the "New Schedule" option is selected you will need to configure the Base Date and Time, and the Retrieval Interval parameters.

It is possible to configure File Retrieval to delete files once retrieved from the datalogger. If datalogger memory capacity is a concern, it is recommended to use this feature.

To add a file retrieval process, start by clicking "Add New" under File Pattern. Once added the Edit File Pattern, Output Directory, and Max Files parameter become available to fill out. Each File Pattern added will need to be individually configured.

Under the Edit File Pattern parameter you must select from the directory location options, in order to specify the image or video to be retrieved. By

default the .jpg and .avi names are a wild card (*), which means all .jpg or .avi files in the specified directory will be retrieved. If you have used specific filenames in the camera configuration you are able to specify these names in the Edit File Pattern parameter. It is possible to configure multiple File Patterns to collect images or video on different schedules or from multiple directories.

NOTE If your version of LoggerNet File Retrieval does not list the avi file as an option under Edit File Pattern you are able to force the filename and format.

The default Output Directory is C:\Campbellsci\LoggerNet. If required you are able to change this by browsing to the preferred location. The Max Files parameter specifies the maximum number of files that can be retrieved during each scheduled event. The newest files will be retrieved.

When the Force Retrieval box is selected, a file that matches the file pattern will be retrieved regardless of the file's timestamp or whether the file has already been retrieved. When the Record If Skipped box is selected, the names and dates of any files that are not retrieved because of the Max Files parameter will be recorded and they will not be retrieved later. If this box is not selected, the skipped files can be retrieved in a later attempt.

17.2 Using LoggerNet File Control

Images or video that are in the dataloggers memory can be viewed or collected on demand by using the File Control feature that is available from the Connection Screen menu (FIGURE 17-2). The use of File Control requires a communications connection to the datalogger. Using the File Control can also be useful for debugging purposes.

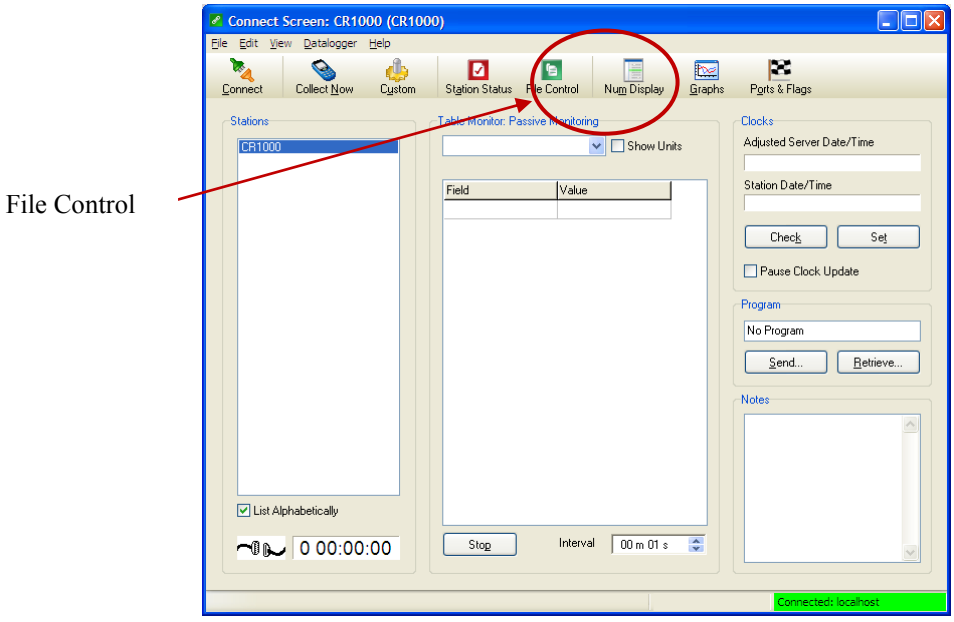


FIGURE 17-2. LoggerNet Connection Screen

In dataloggers such as the CR1000, the Device Map can include the CPU, USR and the CRD (compact flash module). The devices show up in the left hand side of the File Control panel. To view files of a certain device, simply click on the desired device listed in the panel (FIGURE 17-3). Use the "Retrieve" button to download the image from the datalogger.

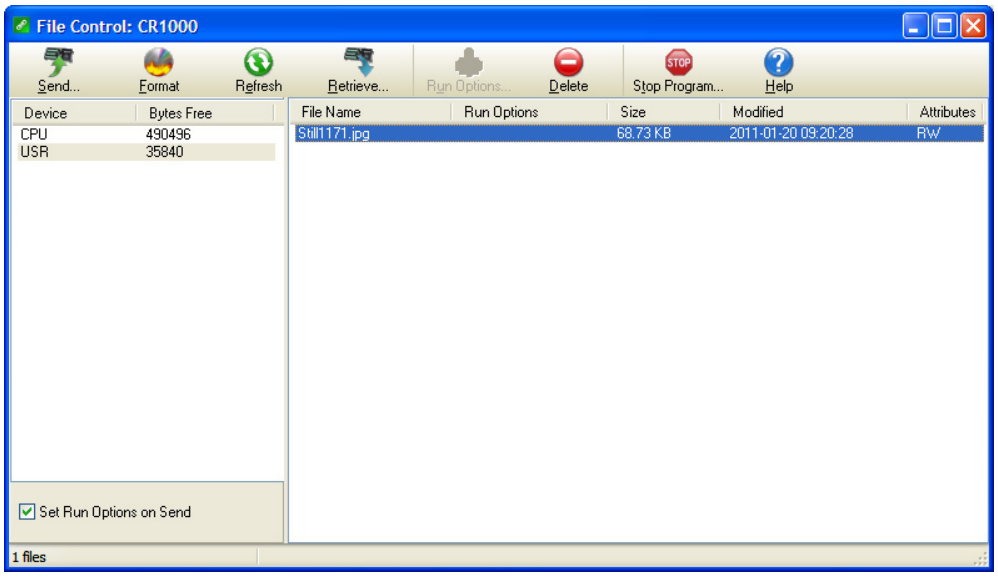


FIGURE 17-3. USR Drive View in File Control

Section 18. Installation

The camera enclosure is designed to be environmentally sealed for outdoor installations. The enclosure provides protection from moisture or high humidity. It is not intended for operation under water. All that is required for use is an appropriate mounting fixture.

FIGURE 18-1. CC5MPX Mounting Kit

The camera is equipped with a set of three ¼-20 threaded mounting holes (see FIGURE 18-2). These mounting holes are centered along the bottom of the camera and are spaced 1.0 in. (25.4 mm) apart from one another. At least two of the ¼-20 threaded holes are required for mounting the camera.

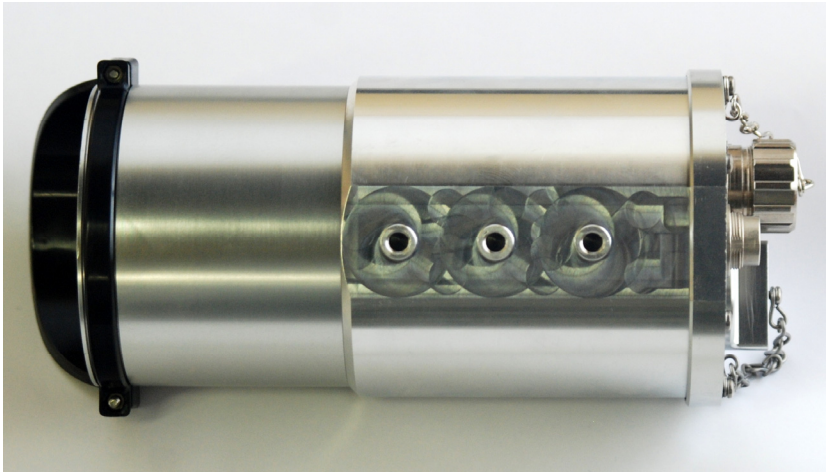


FIGURE 18-2. CC5MPX Mounting Holes

The 18549 Mounting Kit is available for mounting the camera to a crossarm, tripod, or pole. When using this mounting kit, align the outer holes of the CC5MPX with the center hole and the 180° slot of the mount. Loosely secure the two together with the two ¼-20 x 0.5 in. Hex bolts included with the kit. It is now possible to mount the CC5MPX to either a crossarm or other mounting surface with the included u-bolt.

With the hardware loose, the camera and the 18549 mount can be pivoted to allow a full range of motion when aiming the camera. The hardware should be secured once the camera is properly aimed at the intended target.

The focus of the camera should be checked and adjusted as required. Refer to Section 14.2, Focus and Zoom Adjustment for details. Be sure that the lens tube is fully seated, the sun shroud is properly orientated after the camera is aimed, and any protective caps are properly secured.

The sun shroud can be adjusted by loosening the Philips screws and turning the shroud. When tightening the screws back up do not over tighten the screws as the shroud may crack.

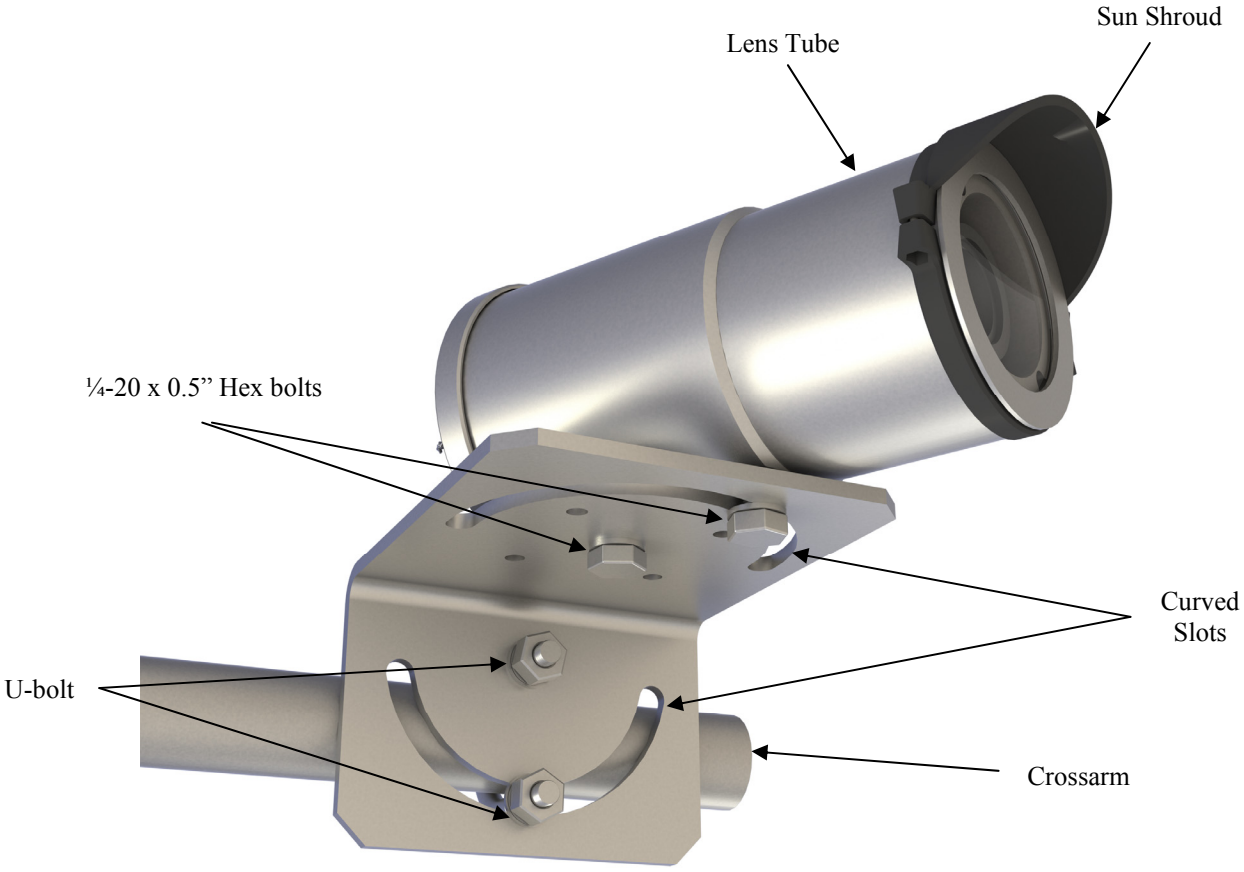


FIGURE 18-3. CC5MPX Mounted to Crossarm

Section 19. Maintenance

The CC5MPX requires little maintenance and no calibrations. Keeping the camera clean is important for the longevity of the camera and image and video quality.

19.1 Lithium Battery

The camera is equipped with a lithium-thionyl-chloride battery. The battery maintains the clock functionality for periods when power is not connected to the camera. The expected battery life is 10 years. It is recommended that the battery be replaced by a certified repair facility.

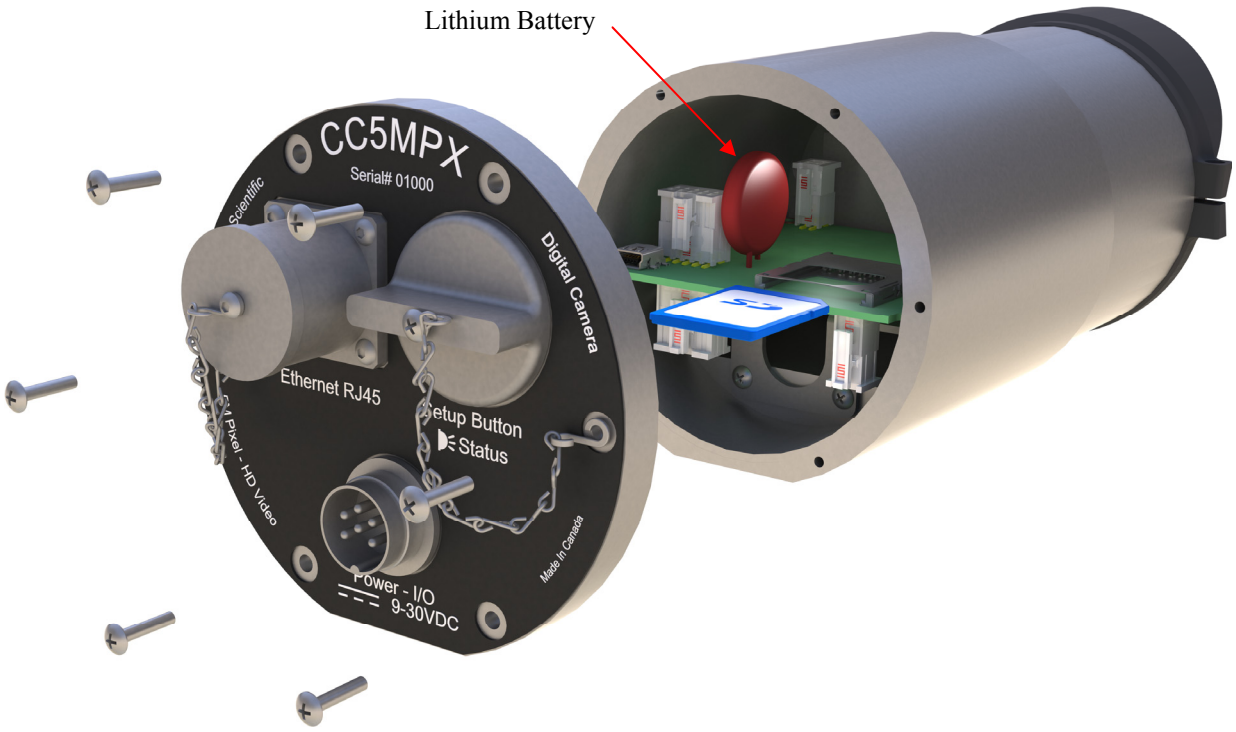


FIGURE 19-1. Lithium Battery Replacement (wires not shown)

19.2 Window and Lens Cleaning

If the enclosure window or lens requires cleaning, it is very important that only a proper lens cloth or lens tissue be used. The use of inappropriate materials to clean the lens or window can permanently damage the surface and reduce the clarity.

19.3 CC5MPX O-Rings

There are three O-rings that should be inspected on the camera. If any of the O-rings look cracked or damaged, then they will require replacement. The locations of the three O-rings are shown in FIGURE 19-2 through FIGURE 19-4.

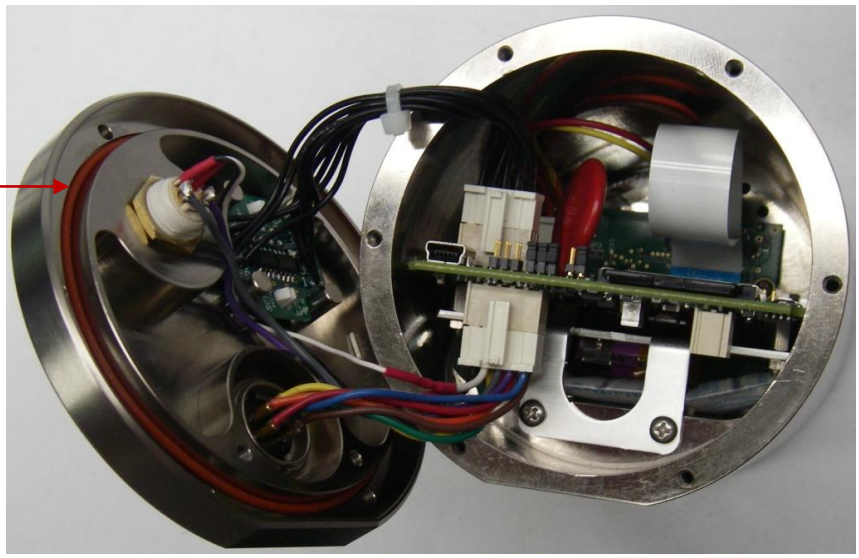


FIGURE 19-2. Backplate O-ring

FIGURE 19-3. Button Cap O-ring

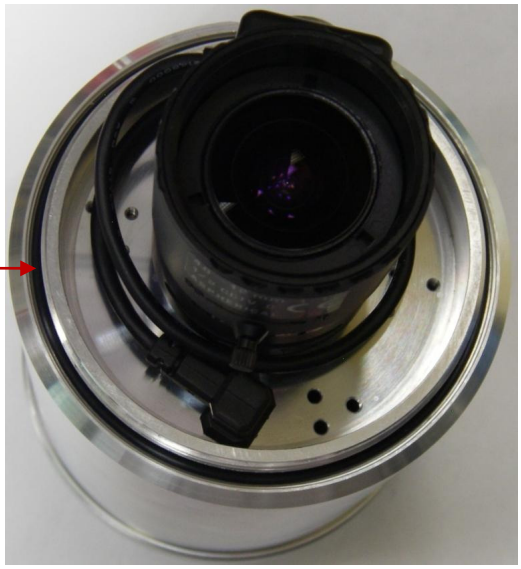


FIGURE 19-4. Front Main Body O-ring

It is recommended that the O-rings be inspected whenever opened or at a minimum of every two years (with desiccant replacement) to ensure that the seal integrity is maintained. Contact Campbell Scientific for details on replacement parts.

It is important to note that the button cap O-ring and the front main body O-ring are both glued into place to prevent the O-rings from inadvertently falling out. Do not attempt to remove these O-rings unless they are being replaced.

19.4 CC5MPX Desiccant

The CC5MPX contains three small desiccant packs inside of the camera. If the camera is frequently opened (i.e. backplate or lens tube removed), then the desiccant packs of the camera should be replaced yearly. Otherwise the desiccant packs should be replaced every 2 years as preventative maintenance.

The desiccant that is supplied with the camera is an indicating type of desiccant. There is a small viewing window on the pack that shows the color of the desiccant. If the desiccant is blue, then it is still good. If the desiccant is pink, then it is saturated with moisture.

The desiccant packs are located under the PCB on the bottom of the camera (see FIGURE 19-5). Needle nose pliers will be useful in helping to remove and reinsert the three desiccant packs.

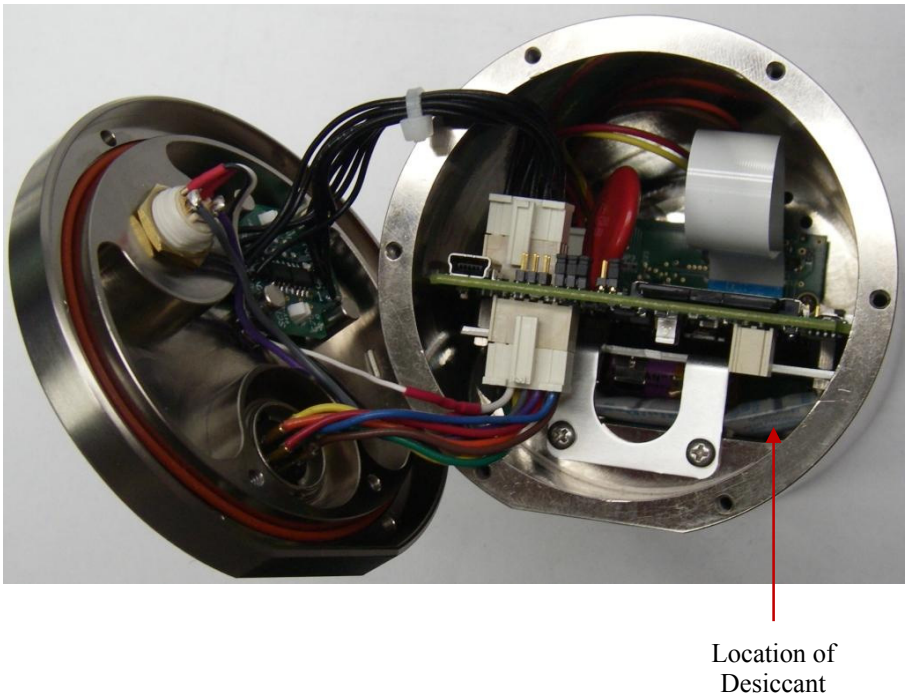


FIGURE 19-5. Desiccant Location

Section 20. Backplate Removal Procedures

It will be necessary to remove the backplate for the following reasons:

- Access to the SD memory card
- Change Internal Jumper Positions
- Replace Desiccant
- Inspect O-rings

If the camera is powered up and operating (LED is flashing), properly shutdown the camera by holding down the setup button for more than 10 seconds continuously. Alternatively the Shutdown button can be used from the Live Video Home page of the camera. Once the camera LED stops flashing, remove the CC5MPX from any power supply and disconnect any attached cabling.

To remove the backplate, first remove the six Philips screws located along the perimeter of the cameras backplate (see FIGURE 20-1). Note that there are two washers that are included with the protective cover chains of the button cap and the RJ45 cap.

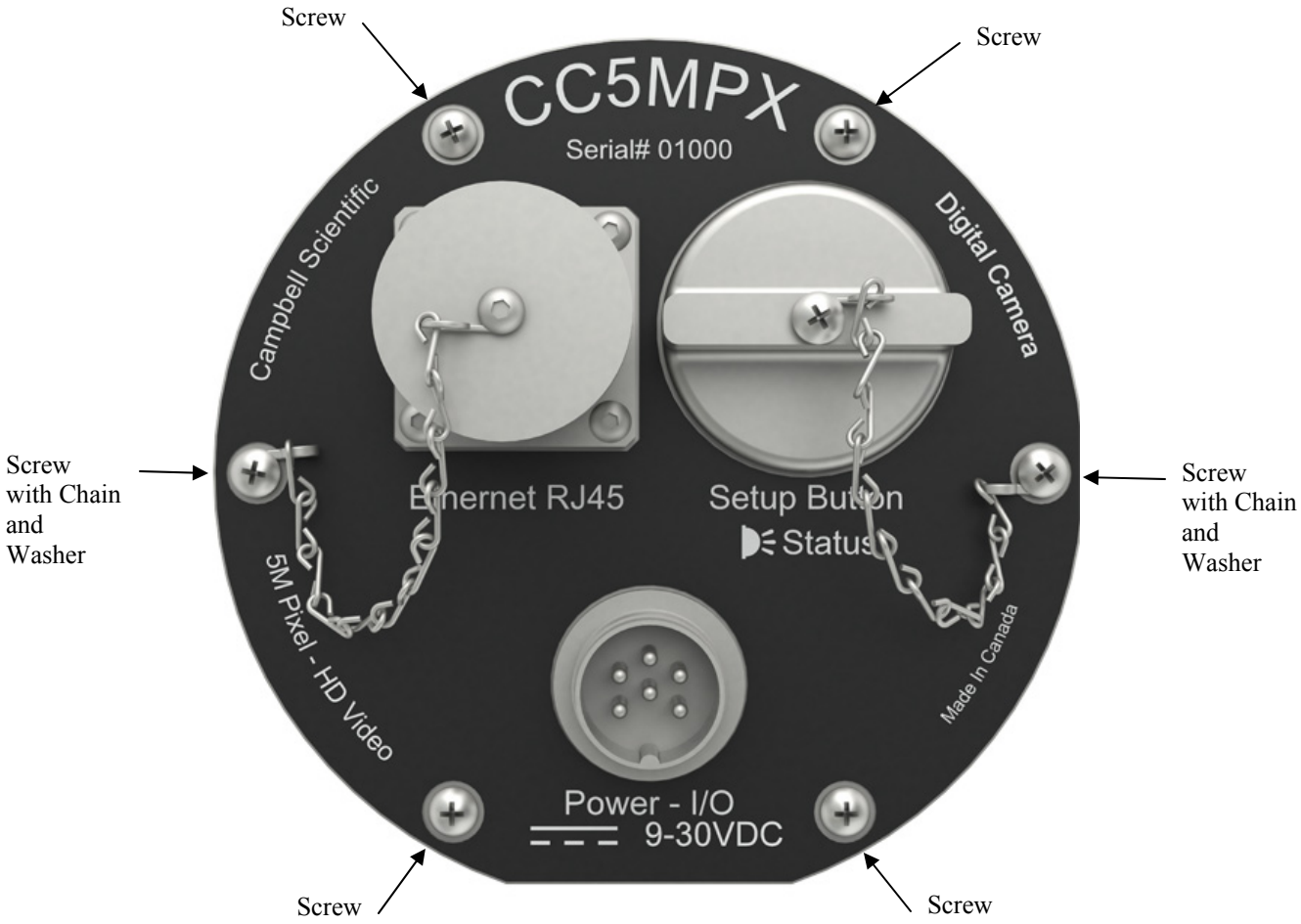


FIGURE 20-1. Backplate View

After the screws are removed, gently pull the backplate out (see FIGURE 20-2). The backplate will still be attached to the camera with the wires (see FIGURE 20-3). Do not remove the wires. Pivot the backplate to the left side of the camera. You will now have access to the inside of the camera.

When replacing the backplate, ensure that the O-ring is still seated properly on the backplate (see FIGURE 19-2). This is very important as the O-ring is required to properly seal the camera.

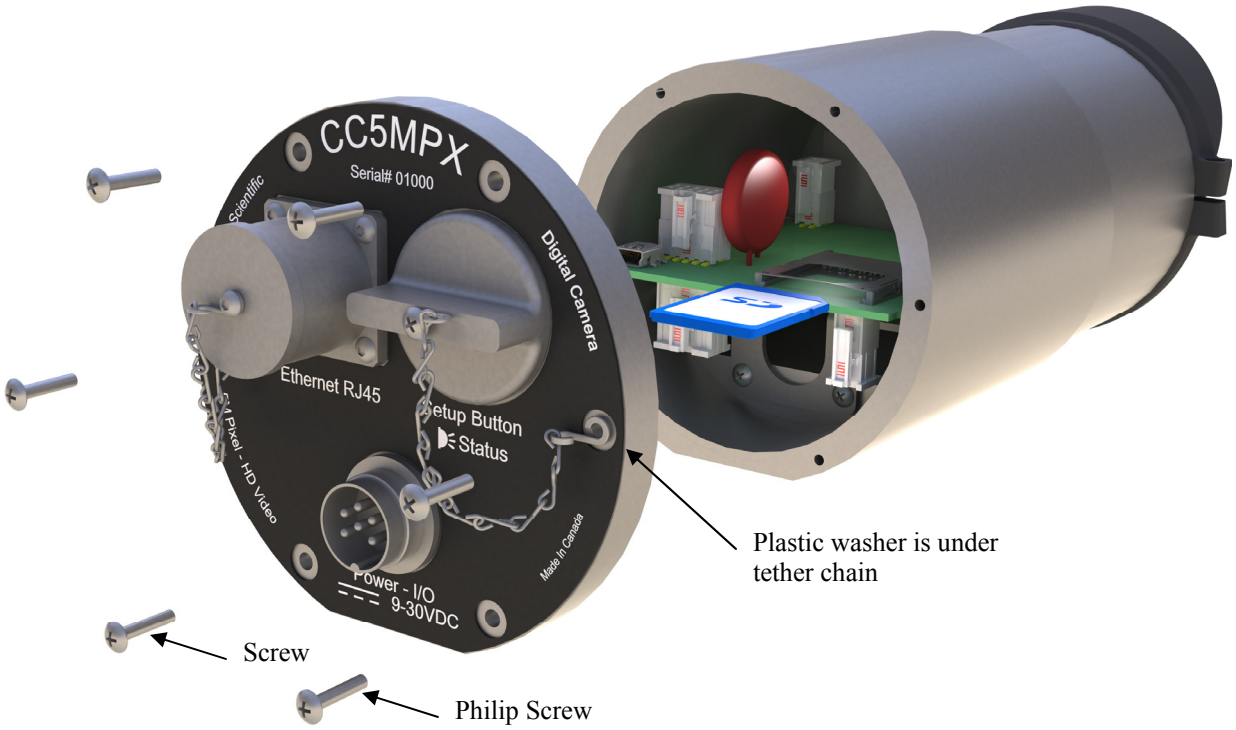


FIGURE 20-2. Removing Backplate Screws (wires not shown)

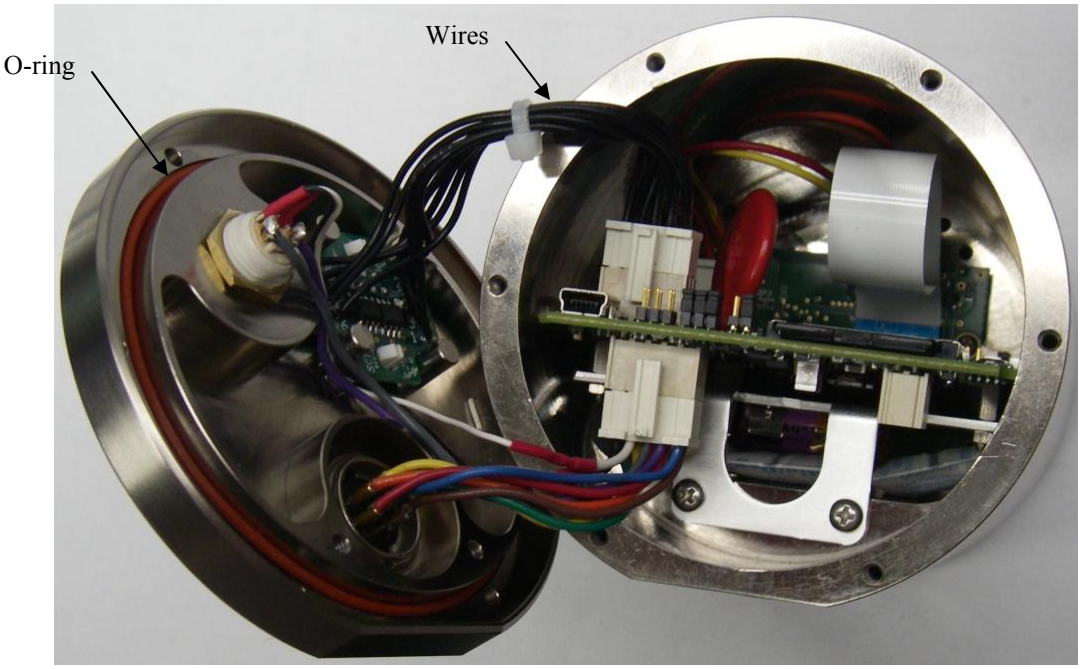


FIGURE 20-3. Inside of Camera with Wires Attached

The backplate can only be seated in the orientation that aligns the flat surfaces of the backplate and the bottom of the camera body. This will also help align the screw holes. The six screws can now be threaded and hand tightened. Be sure the two plastic washers are located between the tether chains and the backplate.

Section 21. System Limitations

This section outlines some system limitations that exist in the CC5MPX camera

21.1 High resolution 5 Megapixel Images

The capturing of 5 MP pictures will result in longer capture times than other image resolutions. When a 5 MP image is captured the continuous video stream is paused, the image sensor is reconfigured and then the 5 MP image is captured. This longer delay time would be noticeable when capturing images from the external trigger. 5 MP images would take several seconds from the external trigger signal being asserted. All other still image captures are less than 1 second.

21.2 Simultaneous processes

The CC5MPX cannot capture two events simultaneously. For example the CC5MPX cannot capture a still image while video is being recorded.

Also other processes such as downloading files from the memory card can add additional delays to the capture process.

Section 22. Internal USB Function

The internal USB port in the camera currently only has one function. It provides a backdoor for setting up the Network interface on the camera. When first connected to a PC the following window will pop up:

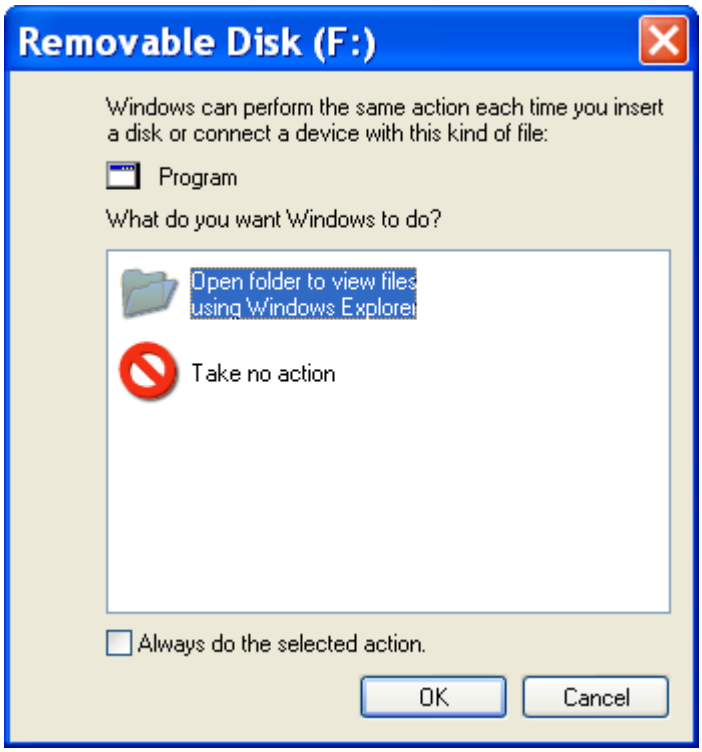


FIGURE 22-1. USB Network Interface

Select the option ***Open folder to view files.***

The following will be the viewable files:

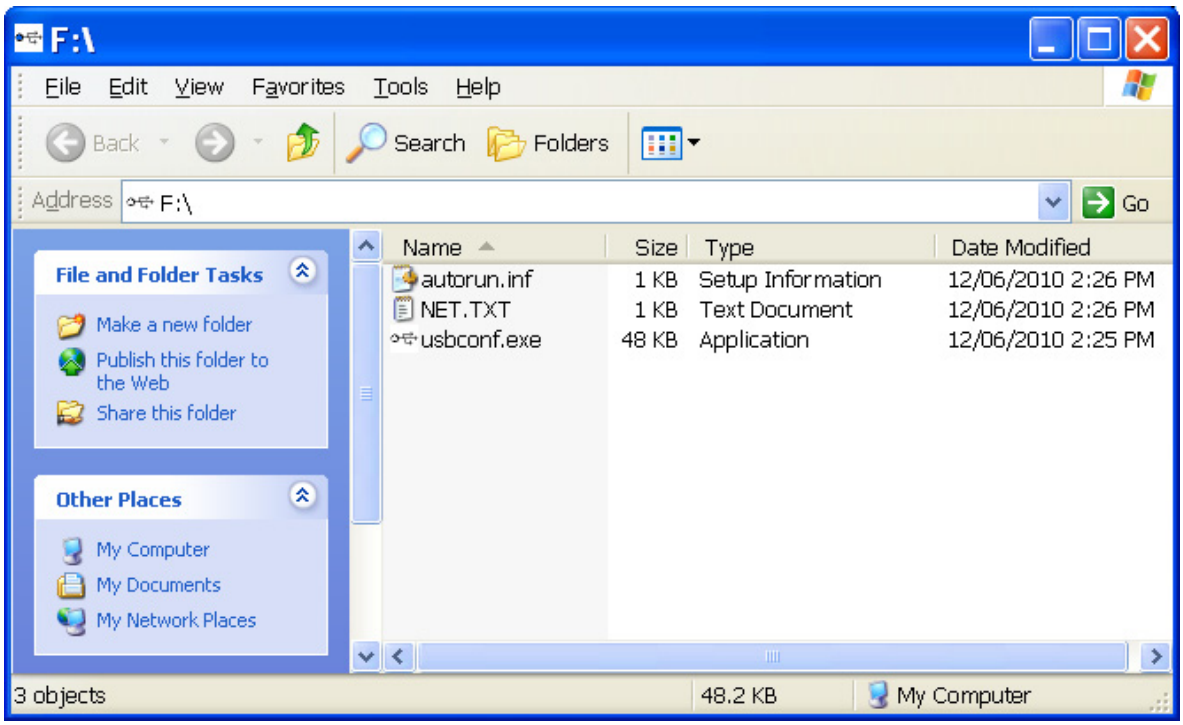


FIGURE 22-2. CC5MPX USB Directory

Run the executable file usbconf.exe.

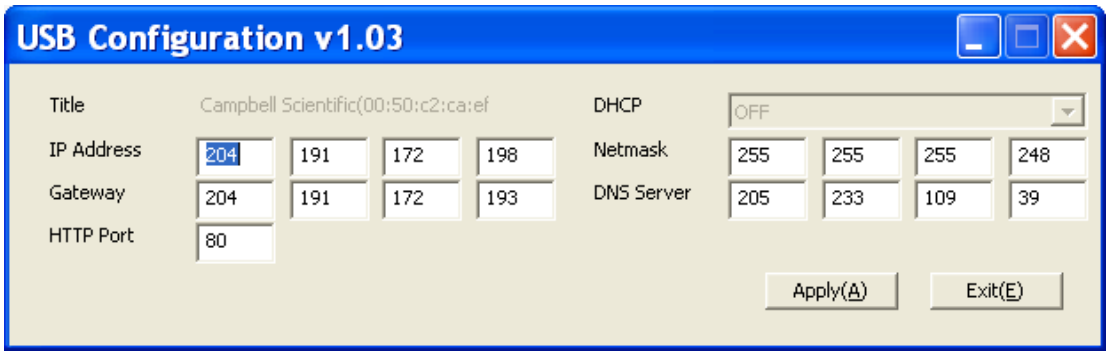


FIGURE 22-3. Network Configuration

At this point you can confirm or edit the IP address settings. If changes are made, the apply button must be selected followed by Exit. **Do not unplug the USB cable or shut down the camera at this point**. The USB device must be safely removed before unplugging the cable or shutting down the camera otherwise the changes will be lost.

Section 23. Quick Notes

23.1 CC5MPX General

- The LED will Flash or be on when the camera is in an Active Power State.
- When the LED is steadily on the camera is booting up. Avoid interrupting this process.
- Briefly pressing the setup button will always cause the camera to exit from any low powered quiescent states and enable the Ethernet interface for communications. The camera will remain in this state for 5 minutes.
- An active session to the camera with a web browser will prevent the camera from entering a low powered state.
- Avoid removing power from the camera when it is in an active state. If the camera is in an active state (LED is flashing), properly shut down the camera to avoid any memory card corruption before removing power. The camera can be shut down by pressing the setup button continuously for more than 10 seconds or by using the Shutdown button on the web interface.
- The SD memory card must be formatted to FAT32.
- Verify that the lens cable is properly seated, as the connector may inadvertently become unplugged during handling or installation.
- Always ensure that all cable connectors, covers and the lens tube are securely in place.
- Record any changes to the IP settings of the camera. This information is important to gain access to the camera for focusing, or reconfiguration.
- Check the Campbell Scientific Website for Firmware updates that may apply.

23.2 Campbell Datalogger Users

- If interfacing to a datalogger, ensure that your datalogger has the appropriate PakBus operating system.
- Use either the CC5MPX built in web interface or the Device Configuration Utility to change settings in the camera.
- Use the Device Configuration Utility to change settings in MD485 or other PakBus devices.
- The Device Configuration Utility can also be used to set the Dataloggers memory and PakBus parameters.
- Files must be less than 2 Mbytes for PakBus transmissions.

23.3 Configuration Process

1. Determine what will trigger the capture of an image or video. Options are:

   a. Time
   Enable and configure Self Timed Capture 1, Self Timed Capture 2 or both.

   b. External Signal
   Enable and configure the External Trigger Capture.

   c. Motion Detect
   Enable and configure Motion Detect Capture.

2. Select the Power Mode that best suits your requirements (see TABLE 23-1). Options are:

   a. Fully On
   Used if no power constraints exist or if high performance is required.

   b. Partially On
   Provides substantial reduction in power (especially with the Ethernet Power Mode set to Full Power Save).

   c. Deep Sleep
   Provides very good power savings. The camera does not need to reboot when activated by a trigger. Recommended to use if more than 24 triggers are expected per day.

   d. Off Mode
   Offers the best power savings mode. Useful if less than 24 images or video captures are required per day. It takes about 90 seconds for the camera to wake up to start acquiring a picture.

TABLE 23-1. Power Mode Summary				
Power Mode	**Ethernet Power Save Mode**	**Quiescent Current Draw Max.@12VDC**	**Time (Seconds) From wakeup to start of capture**	**Time (Seconds) In Fully On Mode (Active Current Draw)**
Fully On	Always On	250mA	< 1 Second	0 – Always Active
	Full Power Save Mode	200mA	< 1 Second	0 – Always Active
Partially On	Always On	80mA	10 Seconds	20 Seconds
	Full Power Save Mode	10mA	10 Seconds	20 Seconds
Deep Sleep	Always On	6mA	15 Seconds	25 Seconds
	Full Power Save Mode	6mA	15 Seconds	25 Seconds
Off State	Always On	1mA	90 Seconds	120 Seconds
	Full Power Save Mode	1mA	90 Seconds	120 Seconds

3. Set the details of the still image or video

   a. Set the Still Image Settings

   b. Set the Video Settings

4. Set other details related to Communications and I/O
   These other parameters are located under

   a. Network

   b. System

   c. Communications

Appendix A. Camera Parts and Accessories

Power and I/O Cable

Details:

24-AWG 3 pair (6 conductor) Individually Shielded Cable with Santoprene jacket
6-Pin Environmental Connector
Maximum Length 100 ft (30 m)

Ordering Part Number:

CC5MPXCBL1-L (-L is length in feet)

Environmental Ethernet Cable

Details:

26-AWG 4 pair (8 conductor) Shielded CAT5E Cable with polyurethane jacket
RJ45 Environmental Connector on one end and regular RJ45 connector on the other end
Maximum Length 230 ft (70 m)

Ordering Part Number:

CC5MPXCBL2-L (-L is length in feet)

18549 Mounting Kit

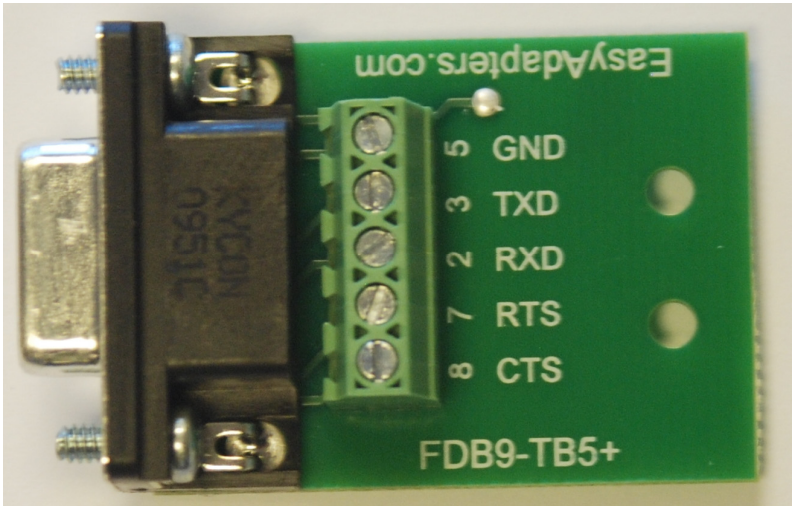
Details:
Mounting kit with U-bolt and fasteners

Ordering Part number :
18549

DB9M-TERM

Details:
Adapter 9-pin female RS-232 to screw terminal block

Ordering Part Number:
C2469



Desiccant

Details:
Silica gel indicating desiccant 2-g MiniPax
Three per camera

Ordering Part Number:
4091

1-Position Terminal Connector

Details:
Terminal strip for connecting unused wires
Three shipped with CC5MPXCBL1 Cable
Ordering Part Number: 27749

Appendix B. CC5MPXWD Window Defroster Description

The window defroster consists of an aluminum ring with a resistive type heating element (see Figure B-1 CC5MPXWD Window Defroster). The camera can be programmed to turn on the power to the heater based on the internal temperature reading of the camera. The on duration can also be set on the camera.

The heating element is nominally 18 Ohms in resistance. The current draw will vary with the allowable input voltage range of 9 to 16 VDC. The current draw from the camera and heater combined is 1.2 A maximum at 16 Vdc and is typically 1.0 A on a nominal 12 Vdc system.

CAUTION Operating the CC5MPXWD at voltages greater than 16 Vdc may damage the camera.

The window defroster is useful in preventing and removing light frost and icing from the camera window. With extreme icing or riming conditions and low temperatures the window defroster may not be able to clear the window due to the power constraints of the defroster.

Springs are used to press the window defroster against the window. It is normal for the window defroster to leave marks on the window. These marks are outside of the camera's viewing angle (see Figure B-2 Window Defroster with Lens Tube).

FIGURE B-1. CC5MPXWD Window Defroster

FIGURE B-2. CC5MPXWD Window Defroster with Lens Tube Installed

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