MDC-700 Series User Manual

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Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

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Contents

1. Introduction

The MDC-700 series module is a Modbus Data Concentrator that has the ability to perform up to 240 Modbus/RTU commands to read/write data from/to Modbus slave devices via RS-232/485 interface and allows up to 8 Modbus/TCP masters to get the polled data via the Ethernet. The support for Modbus TCP protocol makes the MDC-700 well integrated into PC-based applications such as SCADA (Supervisor Control and Data Acquisition) and HMI (Human Machine Interface) programs.

Features

Great Capability of Shared Memory

The MDC can perform up to 240 polling definitions. And the internal shared memory has four tables to store the polled AI, AO, DI and DO data. Each table can store up to 4000 registers.
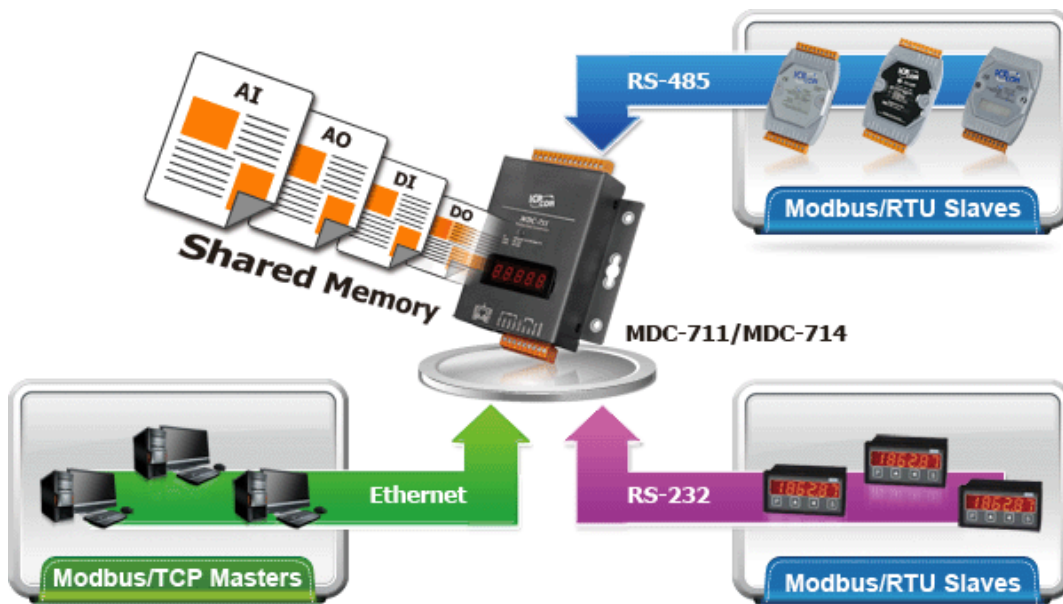
Config.CSV to Ease Hard Work of Editing a lot of Definition

The Modbus polling definition is defined in a Config.CSV file. Editing/checking a lot of polling definitions is a hard work and it may be making mistakes. A CSV format file can ease the work by using Excel. Furthermore, the built-in web server allows users to import/export the Config.CSV via a simple mouse-click action.

	A	B	C	D	E	F	G	H	I
1	#	TCPPort	ModbusID						
2	*	502	1						
3	#	ModuleInfo							
4	*	this is my data concentrator							
5	#	ComPortNo	BaudRate	DataBit	Parity	StopBit	TimeOut	PollDelay	Mode
6		1	115200	8	0	1	50	20	Master
7	*	2	115200	8	0	1	50	20	Master
8	*	3	9600	8	0	1	100	20	Master
9	*	4	9600	8	0	1	100	20	Master
10	*	5	9600	8	0	1	100	20	Master
11	#	UseComPort	SlaveModbusID	FunctionCo	RegStartAddr	RegCount			
12	*	2	1	1	0	4			
13	*	2	2	2	0	4			
14	*	2	3	3	0	4			
15	*	2	4	4	0	4			
16	*	2	4	4	4	8			

Web-based Interface to Ease the Operating and Show Clear Information

The IP address, configuration file, Config.CSV can be simply configured via the Web server. And the performed results of all Modbus polling definition are shown on the web page. It is very easy to debug which Modbus/RTU device has communication problem. And the MDC firmware will skip the abnormal Modbus polling definition for a while to smoothly perform the whole polling without distribution.

Communication status between host PC and MDC-711: GOOD

Polling Definition

- COM1
  - Def. #001 - ID [01], Register [00000:00007] ⇒ Local Register [00000:00007] GOOD
  - Def. #002 - ID [01], Register [10000:10007] ⇒ Local Register [10000:10007] GOOD
- COM2
  - Def. #003 - ID [01], Register [00000:00003] ⇒ Local Register [00008:00011] GOOD
  - Def. #004 - ID [02], Register [10000:10003] ⇒ Local Register [10008:10011] GOOD
  - Def. #005 - ID [03], Register [40000:40003] ⇒ Local Register [40000:40003] GOOD
  - Def. #006 - ID [04], Register [30000:30003] ⇒ Local Register [30000:30003] GOOD

2. Specifications

	MDC-711	MDC-714	MDC-741
Ethernet			
Port	x1, 10/100 Base-TX		
Protocol	Modbus/TCP Slave		
Max. Connection	8		
COM Port			
RS-232	x1, (TXD, RXD, RTS, CTS, GND)		x4, (TXD, RXD, RTS, CTS, GND)
RS-485	x1, (Data+, Data-)	x4, (Data+, Data-)	x1, (Data+, Data-)
Baud Rate	4800, 9600, 19200, 38400, 57600, 115200 (bps)		
Data Format	N81, E81, O81		
Protocol	Modbus/RTU Master		
Max. Node	32 nodes for each RS-485 port		
Polling Definition	200 definitions for all RS-232/485 ports		
Shared Memory	4000 registers for each of AI, AO, DI and DO data System		
System			
5-Digit 7 Segment LED Display	Yes, to display IP address		
System LED Indicator	Yes, to display hear beat		
Mechanical			
Dimension (W x H x D)	102 mm x 125 mm x 28 mm		
Installation	Wall Mount		
Power			
Required Supply Voltage	+10 VDC ~ +30 VDC (non-regulated)		
Power Consumption	2.5 W		
Environment			
Operating Temperature	-25°C ~ +75°C		
Storage Temperature	-30°C ~ +80°C		
Humidity	10 ~ 90% RH, non-condensing		

3. Configuration

This section will help you to set up your MDC-700 module and show you how to use the web interface to obtain configuration and other information related to the MDC module and associated slave devices.

Basic operating procedure

STEP 1 Assign a valid IP address to the MDC-700.

STEP 2 Edit the config.csv file. Note that before editing this file, you should confirm the parameter value for any associated Slave devices.

STEP 3 Upload the config.csv file to the MDC module.

STEP 4 Verify the status of both the connection and the configuration by browsing the web.

3.1. Assigning an IP address to MDC-700

The MDC-700 is an Ethernet device, which comes with a default IP address of 192.168.255.1; therefore, you must first assign a valid IP address of your network to the module. To access the MDC-700 by using web-based interface, you have to know the IP address setting in the module.

STEP 1 Power on the computer and the MDC module.

STEP 2 Set the IP configuration on your computer.

If the MDC module is new with using the default IP address of 192.168.255.1, you must chose an IP address for the computer in the range of 192.168.255.2 – 192.168.255.253 that is not already in use.

NOTE: Details on how to change the IP address on your computer depend upon the type architecture and operating system you are using. Use the computer Help and Support functionality to search for "IP Addressing".

STEP 3 Open a web browser and go to the website at http://192.168.255.1, where 192.168.255.1 is the IP address in your MDC module.
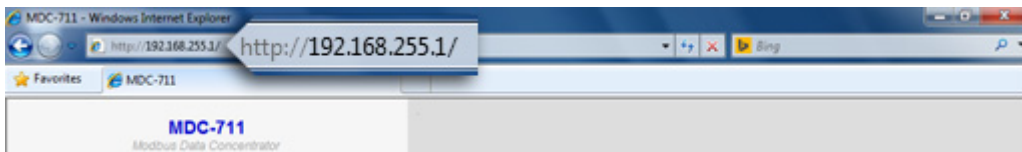

STEP 4 Open the IP address configuration interface by clicking the Ethernet Configuration.

STEP 5 Choose a valid IP address of the network for your MDC module. Make sure that the address you pick is not currently in use by another device on the network.
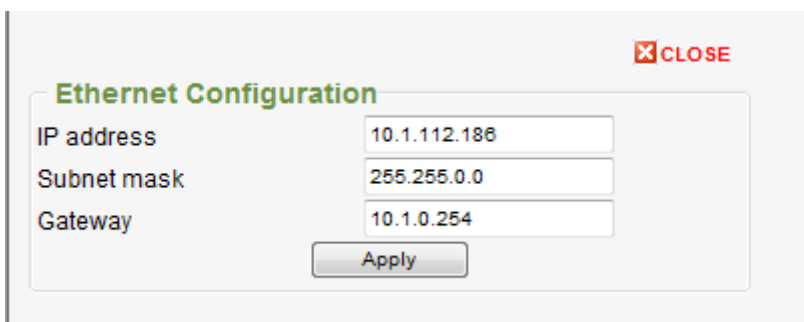
NOTE: The MDC-700 can be reset to factory defaults by shorting the RESET pin to GND pin over 3 seconds. The LED display will show "RESET" as below and the IP address set previously will be cleared and returned to the factory default.
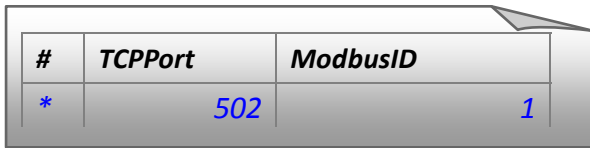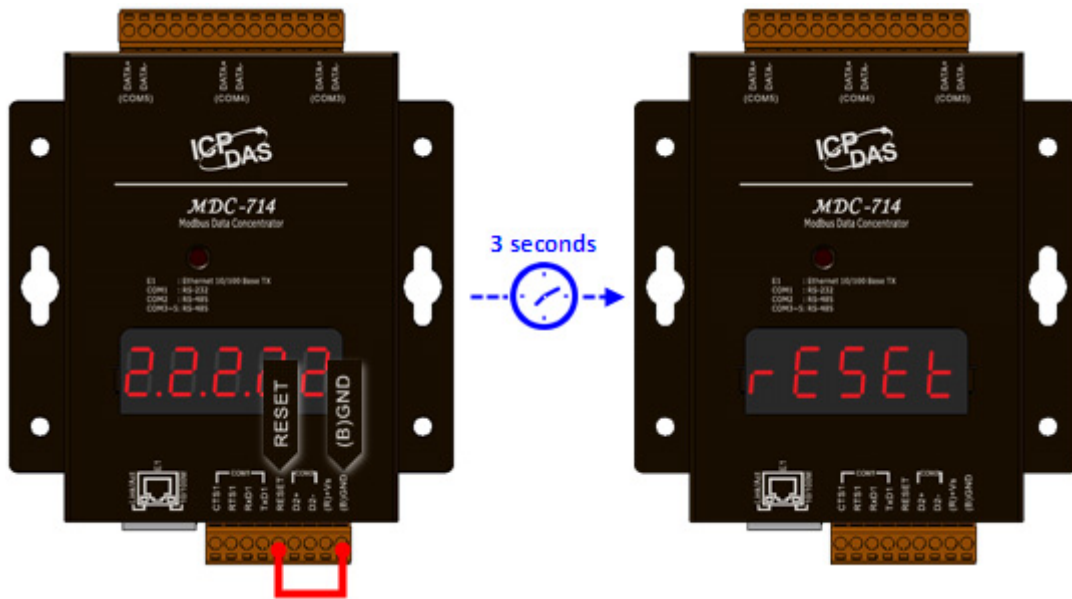
3.2. Editing the config.csv file

The MDC module is configured by the config.csv file, which can be edited to work with your RTU slave devices. The Comma Separated Values (CSV) files can be viewed and edited in spreadsheet applications like Microsoft Excel, or in any text editor. The following section describes how to edit the configuration file for your devices.

The config.csv file contains four main sections that need to be edited: **(1) Modbus Connection**, **(2) Module information**, **(3) COM Port Configuration** and **(4) Polling Definition** described as below:

Modbus Connection

The Modbus Connection section is used to configure the Modbus ID of the MDC module and the TCP/IP Port number for Modbus TCP communication.
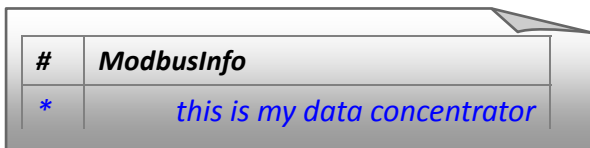
#	TCPPort	ModbusID
*	502	1

TCPPort: Define the TCP/IP Port number.
ModbusID: Define the Modbus ID of MDC module.

Module Information

The Module Information section is used to record relative information for the MDC module.

#	ModbusInfo
*	this is my data concentrator

ModuleInfo: Define the relative information for the MDC module. The string constant has a maximum length of 32 characters.

COM Port Configuration

The COM Port Configuration is used to configure the parameters for the RS-485 Modbus communication connection between the MDC module and the RTU slave devices.

#	ComPortNo	BaudRate	DataBit	Parity	StopBit	Timeout	PollDelay	OperatingMode
*	1	115200	8	0	1	100	20	Master
*	2	115200	8	0	1	100	20	Master
*	3	115200	8	0	1	100	20	Master
*	4	115200	8	0	1	100	20	Master
*	5	115200	8	0	1	100	20	Master

The connection configuration for a COM port consists of 8 parameters defined as follows.

ComPortNo: Indicates the COM number used in MDC module. The COM port number can be 1 or 2 for MDC-711, and can be 1, 2, 3, 4 or 5 for MDC-714 and MDC-741.

BaudRate: Defines the transmission speed between the MDC module and the RTU slave devices. The baud rate can be set to 4800 bps, 9600 bps, 19200 bps, 34800 bps, 57600 bps or 115200 bps depending on the RTU slave device being used.

DataBit: Defines the number of data bits in each character. Either7 or 8 can be selected. Be sure this setting is the same as the setting for the RTU slave device.

Parity: Defines the Parity bit. The parity bit can be set to 0 (none), 1 (even) or 2 (odd).

StopBit: Defines the Stop bits. Either 1 or 2 can be selected.

Timeout: Defines the period of time that the MDC module will wait for a response from the RTU slave device.

PollDelay: Defines the Poll Delay between each scan for Modbus RTU communication. The units are milliseconds (ms).

OperatingMode: This parameter can be ignored for now.

Polling Definition

Before attempting to configure the parameters for the Polling Definition, be sure to check the settings for Com port, the slave address, the function code and the quantity of registers.

#	UseComPort	SlaveModbusID	FunctionCode	RegStartAddr	RegCount
*	1	1	1	0	8
*	1	1	2	0	8
*	2	2	1	0	4
*	3	3	2	0	4
*	4	4	3	0	4
*	5	5	4	0	4

Each Polling Definition consists of 5 parameters. The definitions of the parameters are as follows.

UseComPort: Defines the COM port number which is used to connect the slave device on a MDC module. The COM port number can be 1 or 2 for MDC-711, and can be 1, 2, 3, 4 or 5 for MDC-714 and MDC-741.

SlaveModbusID: Defines the identification of the remote slave. The valid range is from 1 to 255.

FunctionCode: Defines the request function code. A valid code can be 1 (Read DO), 2 (Read DI), 3 (Read AO) or 4 (Read AI) depending on the I/O features of the slave device.

RegStartAddr: Defines the starting address, i.e. the address of the first register specified. The valid is ranged from 0 to 8192.

RegCount: Define the quantity of registers to be read. The valid value is from 1 to 64.

NOTE:
- The maximum number of all the polling definitions is 240.
- The MDC module provides a total of 4127 internal Modbus registers, 4000 of them are used to hold data collected from the RTU slave devices. In other words, the total number of registers that can be used for accessing slave devices is 4000.
- The Modbus address for the MDC module is defined in Modbus Connection section.
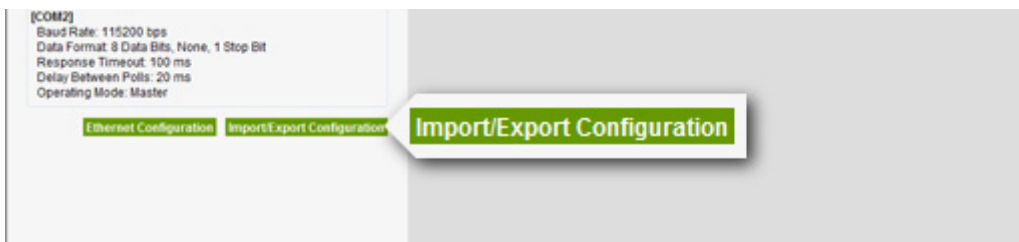
3.3. Importing/exporting the config.csv file

Go to the web interface at http://xxx.xxx.xxx.xxx, where xxx.xxx.xxx.xxx is the IP address set in your MDC module. Any standard browser such as Mozilla Firefox, Internet Explorer or Google Chrome can be used to interface the module.
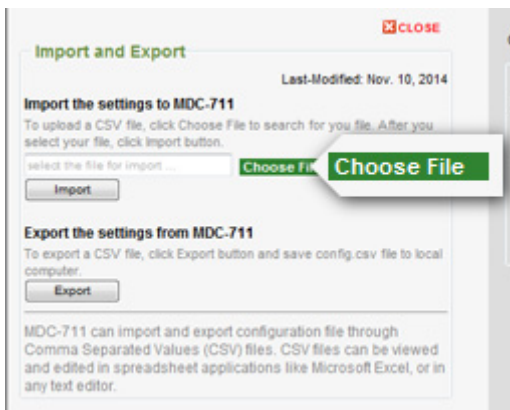
NOTE: If you haven't changed the default IP address in the MDC module, please refer to "Assigning an IP address to MDC-700" to configure it.
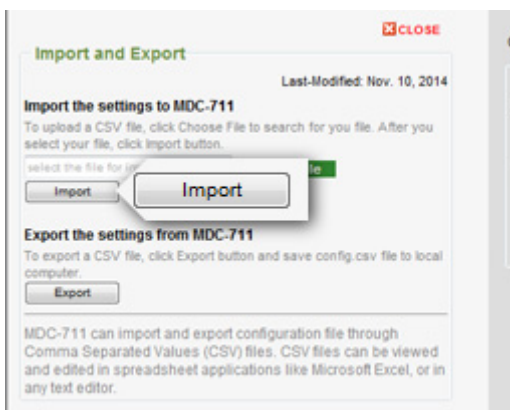
Importing a CSV file to MDC

STEP 1 Open the Import and Export interface by clicking the **Import/Export Configuration** button.

STEP 2 Choose a CSV file from your computer by clicking the **Choose File** button.

**STEP 3** Click the **Import** button to import the config.csv file to the MDC.

NOTE: After the import process is finished, the MDC module will reboot in 5 seconds.

Exporting a CSV file from MDC

STEP 1 Open the Import and Export interface by clicking the **Import/Export Configuration** button.


STEP 2 Click the **Export** button to export the config.csv file from the MDC module. When you click the Export button, you will get a popup box to download the file.
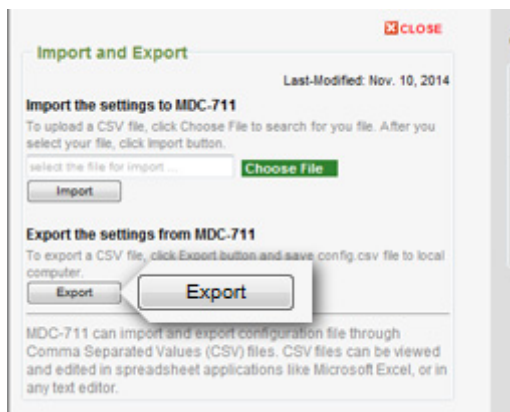
3.4. Connecting to the Web HMI

Go to the web interface at http://xxx.xxx.xxx.xxx, where xxx.xxx.xxx.xxx is the IP address in your MDC module. Any standard browser such as Mozilla Firefox, Internet Explorer or Google Chrome can be used to interface the MDC.
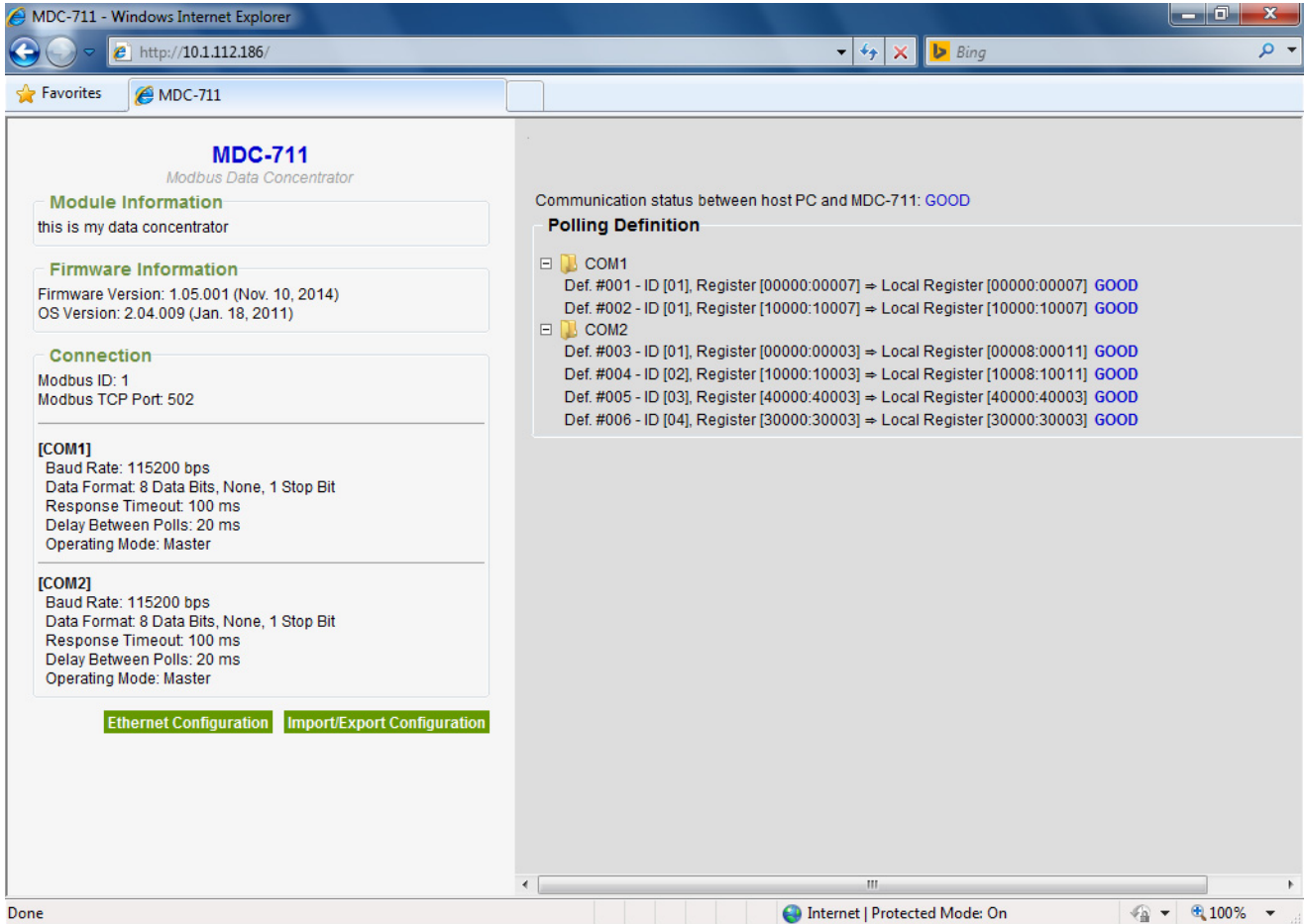

NOTE: The contents of the section may be different depending on the settings contained in the config.csv file.

NOTE: The Web HMI requires the Adobe Flash Player to be installed. The latest version of the Adobe Flash Player can be downloaded by accessing the Adobe Systems Incorporated website. The following instructions will help you to install the Adobe Flash Player in your web browser.

STEP 1 Go to the Adobe Flash Player Download Center
The address for Adobe Flash Player Download Center is http://get.adobe.com/flashplayer/

> **NOTE:** The Adobe Flash Player is subject to change without notice; refer to http://www.adobe.com/support/flashplayer/downloads.html for the latest version of this software.
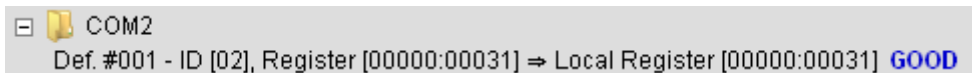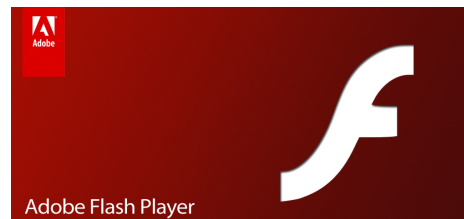
STEP 2 Follow the instructions to download the installation file and install it on your PC.

Introduction to the Web HMI

After connecting to the website, the following sections will be displayed.
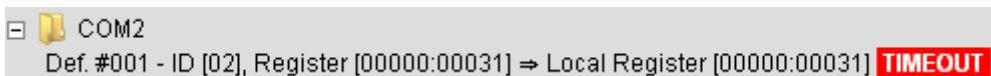
- **Module Information**

  The Module Information section of the page provides the module information about the MDC module.

- **Firmware Information**

  In the Firmware Information section of the page, information about the Firmware Version and the OS Version is displayed

- **Connection**

  In the Connection section of the page, information about the current Connection configuration is displayed, including the TCP Port, Modbus ID of MDC, Baud Rate, Data Bit, Parity, Stop Bit, Timeout, Delay Polls and Operating Mode details.

- **Polling Definition**

  In the Polling Definition section of the page, information about the current configuration for the Polling Definition is displayed, including the Com Port, SlaveModbusID, Function Code, Starting Address of Register and Count of Register details.

The State of the Connection

When the state is shown as **GOOD**, it indicates that the connection was successfully established and the parameter settings are valid.

When the state is shown as **TIMEOUT**, it indicates that the attempted connection has failed. To resolve this issue, check whether the parameters listed below match the settings of the RTU slave device.

- Baud Rate
- Slave Address
- Data Format (Data Bit, Parity and Stop Bit)

When the state is shown as **ERROR: ILLEGAL FUNCTION**, it indicates that the connection was successfully established, but the parameter is invalid. To resolve this issue, check whether the Function Code listed in the Polling Definition match the settings of the Modbus RTU slave device.

When the state is shown as ERROR: ILLEGAL DATA VALUE, it indicates that the connection was successfully established, but one or more of the parameters are invalid. To resolve this issue, check whether the Start Address of Register and Count of Register listed in the Polling Definition match the settings of the Modbus RTU slave device.

Revision History

Revision	Date	Description
1.0.0	2014/11	First released
1.0.1	2015/07	Added description for MDC-741.