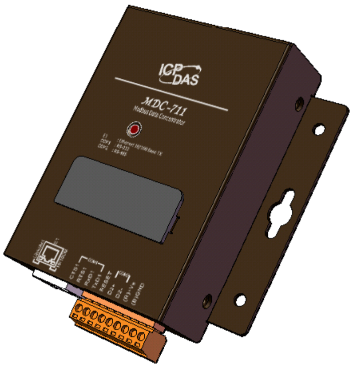

MDC-700 Series User Manual

Feb. 2018, Version 1.0.3

Written by Liam Lin

Edited by Sunny Chiu

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.

Warning

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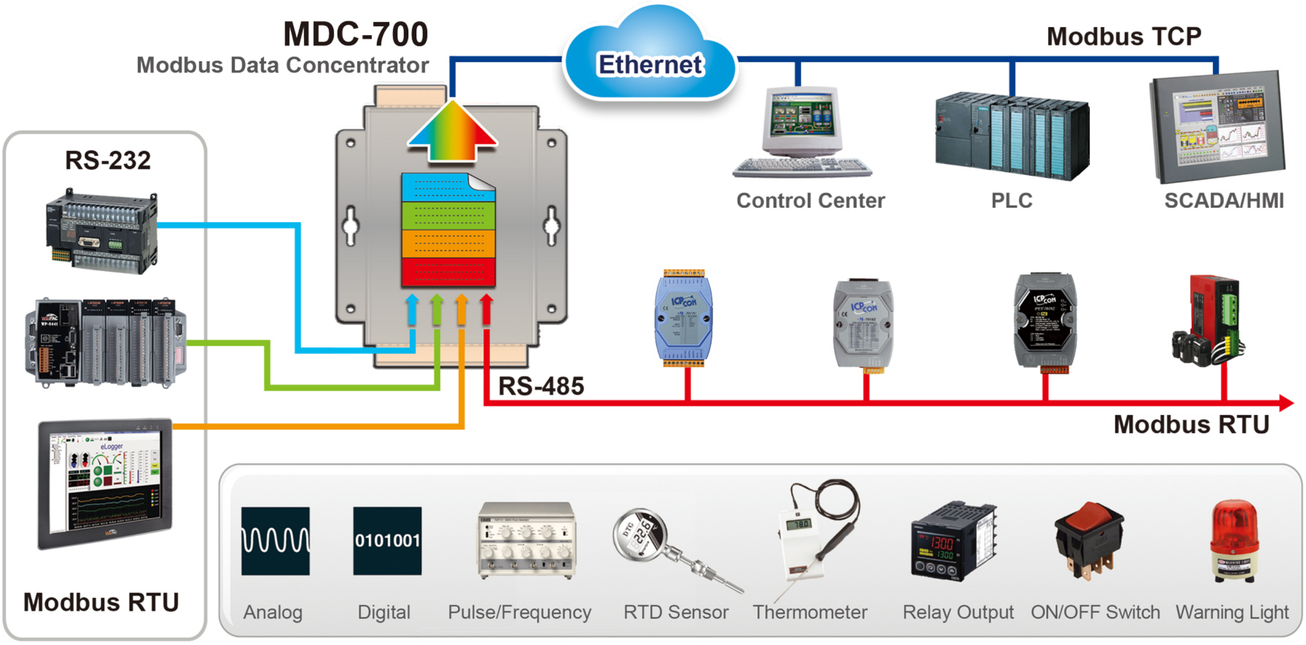
Contents

1. Introduction

The MDC-700 series module is a Modbus Data Concentrator which can concentrate data from several Modbus RTU slave devices with RS232/RS-485 interface and allows Modbus TCP masters to read/write data via Ethernet/LAN. The Modbus master can use one Modbus command to get all data on those Modbus RTU slave devices via the MDC-700 concentrator. In other words, through the help of a MDC-700 module, the Modbus RTU slave devices can be accessed over Ethernet with better read and write performance.

The MDC-700 series module has the ability to perform up to 250 Modbus RTU commands to read/write data from/to Modbus RTU slave devices and allows up to 8 Modbus TCP masters to get the polled data. 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.

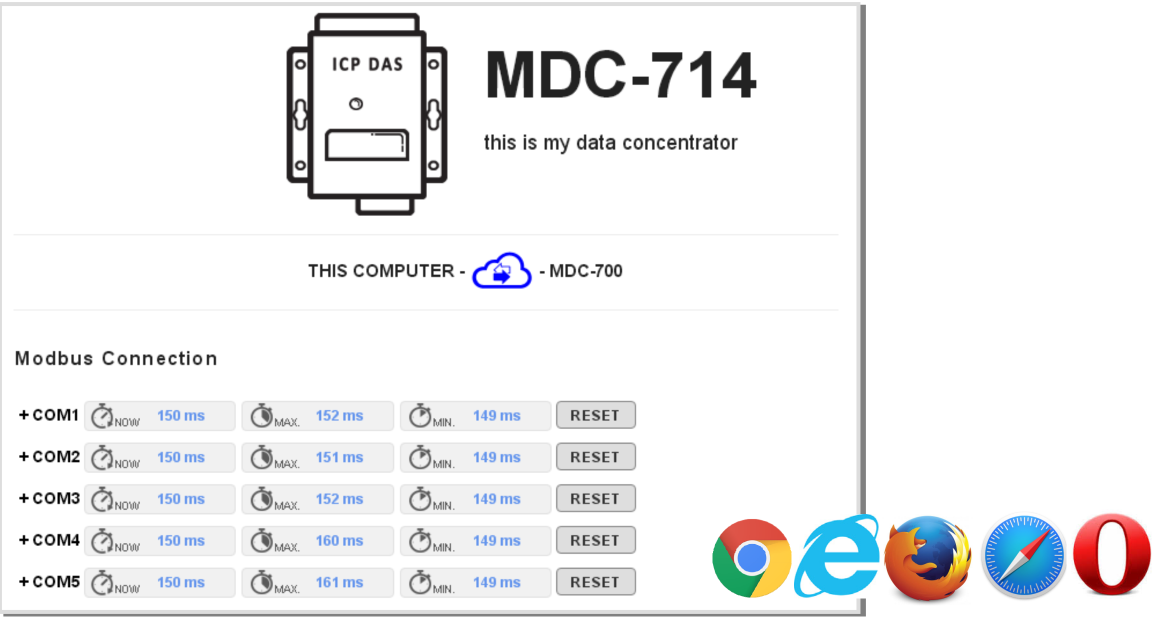


Features

HTML5 Web-based User Interface

HTML5 is the latest version of the HTML markup language. It is supported by most current browsers including Mozilla Firefox, Apple Safari, Google Chrome and so on.

For the reason, the Web-Based user interface for the MDC-700 is accessible from a wide variety of devices anywhere. Users can configure the module and monitor connection status of each polling definition through their smart phones, tablets or desktops without a line of code.



MDC-714

this is my data concentrator

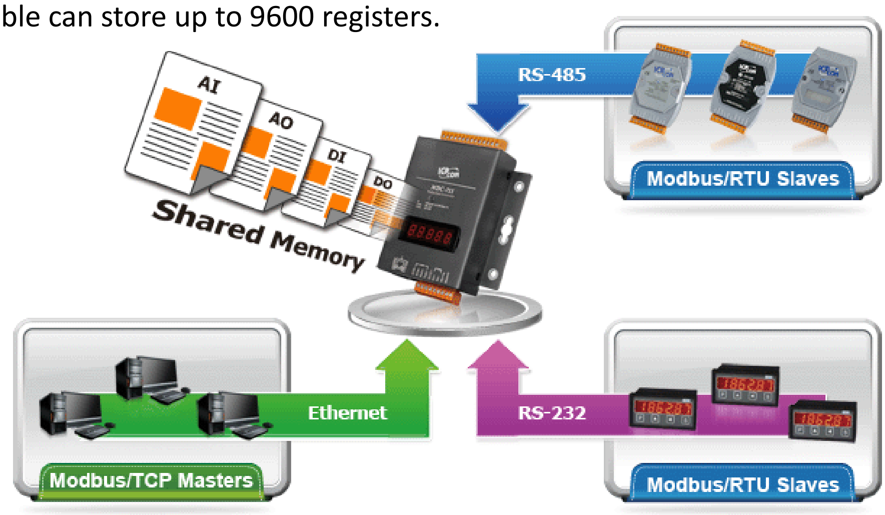
THIS COMPUTER - - MDC-700

Modbus Connection

	NOW	MAX.	MIN.	
+COM1	150 ms	152 ms	149 ms	RESET
+COM2	150 ms	151 ms	149 ms	RESET
+COM3	150 ms	152 ms	149 ms	RESET
+COM4	150 ms	160 ms	149 ms	RESET
+COM5	150 ms	161 ms	149 ms	RESET

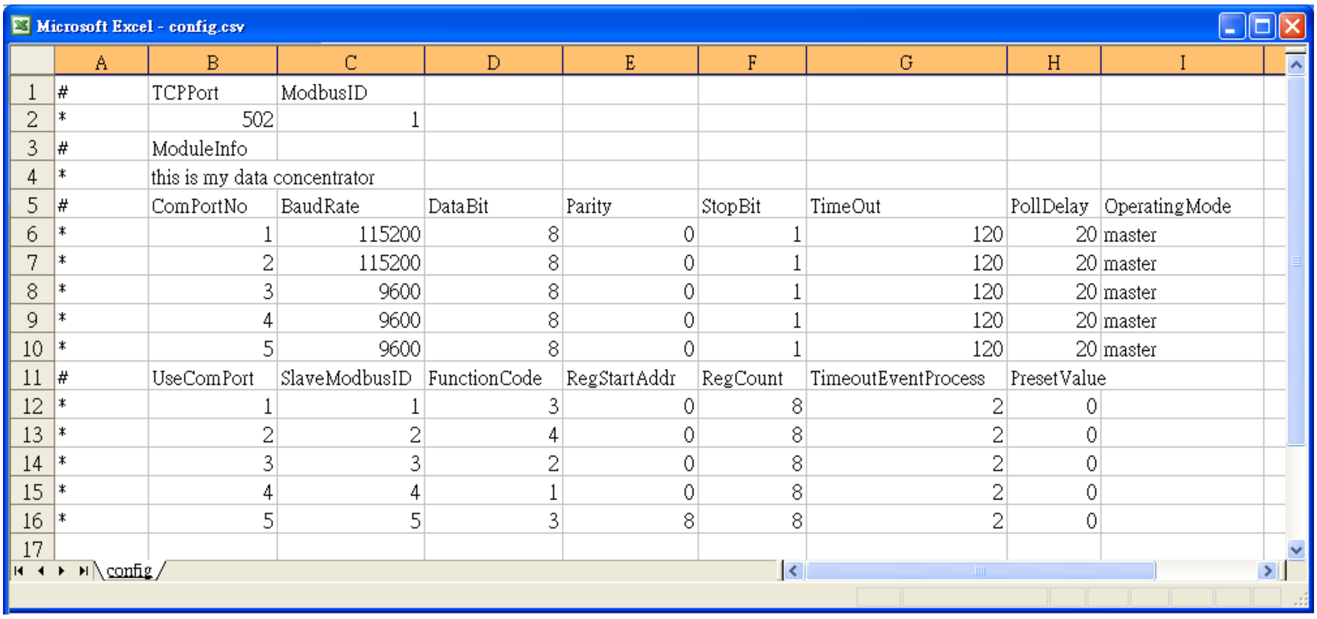
Great Capability of Shared Memory

The MDC-700 series module can perform up to 250 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 9600 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.



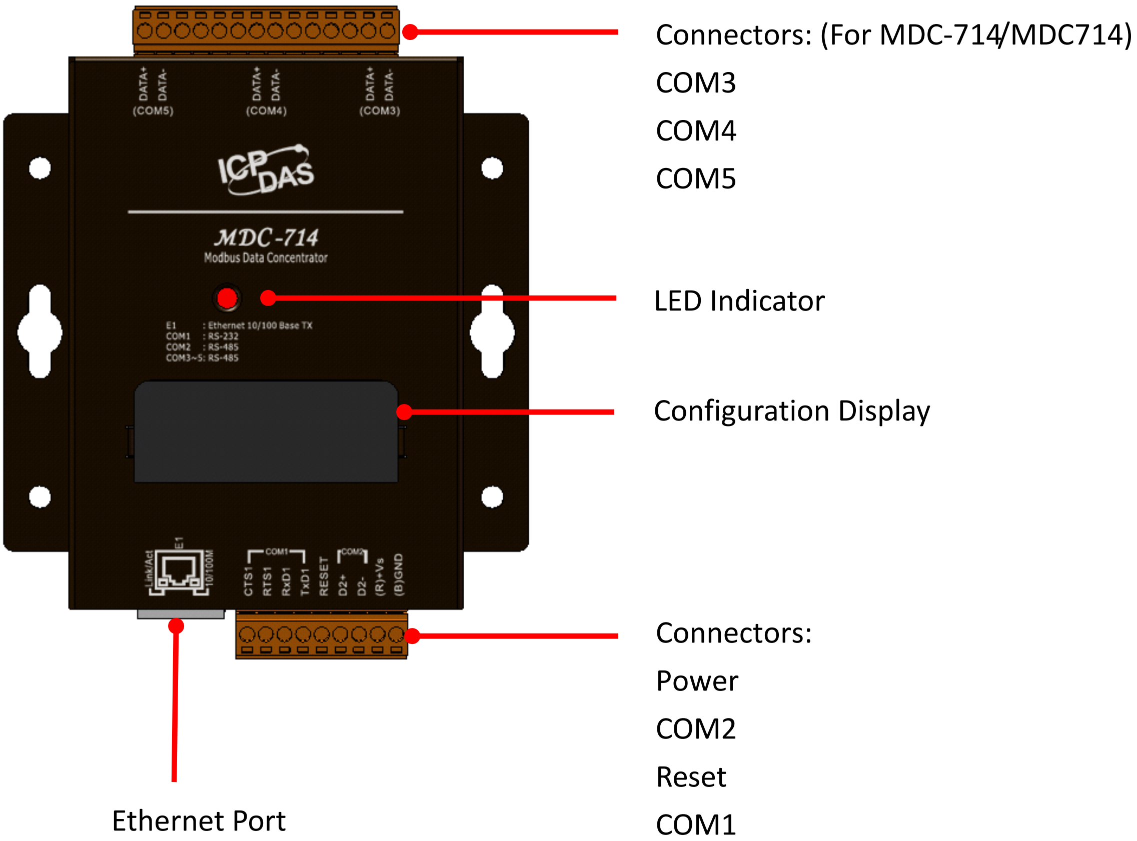
	A	B	C	D	E	F	G	H	I
1	#	TCPPort	ModbusID						
2	*	502	1						
3	#	ModuleInfo							
4	*	this is my data concentrator							
5	#	ComPortNo	BaudRate	DataBit	Parity	StopBit	TimeOut	PollDelay	OperatingMode
6	*	1	115200	8	0	1	120	20	master
7	*	2	115200	8	0	1	120	20	master
8	*	3	9600	8	0	1	120	20	master
9	*	4	9600	8	0	1	120	20	master
10	*	5	9600	8	0	1	120	20	master
11	#	UseComPort	SlaveModbusID	FunctionCode	RegStartAddr	RegCount	TimeoutEventProcess	PresetValue	
12	*	1	1	3	0	8	2	0	
13	*	2	2	4	0	8	2	0	
14	*	3	3	2	0	8	2	0	
15	*	4	4	1	0	8	2	0	
16	*	5	5	3	8	8	2	0	
17									

Support for Modbus TCP Master and Modus RTU Master

The MDC-700 can be accessed by Modbus TCP Master and Modus RTU Master. Changing the mode for a COM port from Master to Slave allows a connected Modus RTU Master to read/write data from/to the Modbus RTU slave devices on the other COM ports.

2. Hardware Information

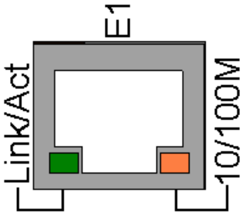
2.1. Appearance



▶ LED Indicator

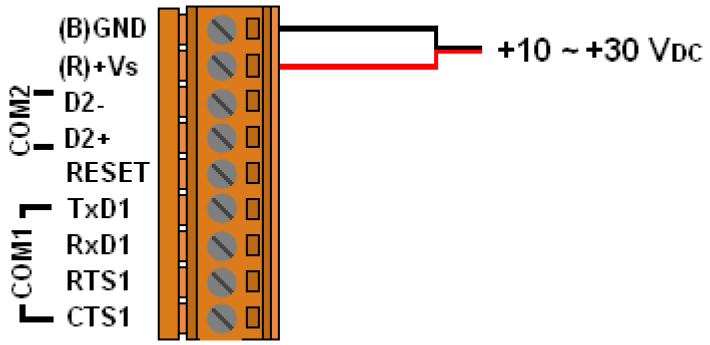
The LED is used as a heartbeat indicator and slows to approximately one flash per second.

▶ Ethernet Port



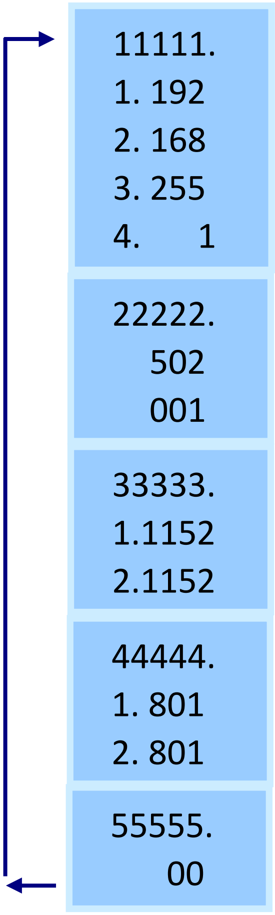
The MDC-700 is equipped with a RJ45 port for Ethernet LAN connection. When 100BASE-TX is operating, the 10/100M LED is lit orange. When 10BASE-T is operating or the machine is not connected to the network, it is turned off. When an Ethernet link is detected and an Ethernet packet is received, the Link/Act LED is lit green.

Power Connector



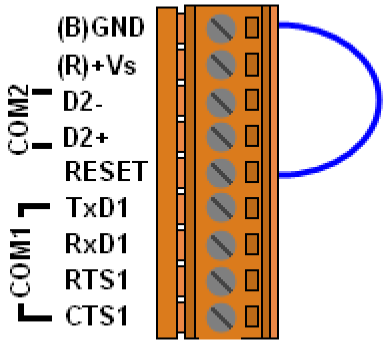
Configuration Display

MDC-700 includes a 5-digit 7-Segment LED display to indicate configuration in a module as below:



- The IP address for the MDC-700 (192.168.255.1)
- Modbus TCP communication settings
  Port: 502
  Net ID: 1
- Baud rate setting for each COM port
  COM1: 115200 bps
  COM2: 115200 bps
- Data format setting for each COM port
  COM1: 8N1
  COM2: 8N1
- The count of TCP/IP connection
  0: No TCP/IP connection

Reset



Shorting the RESET pin to GND pin over 3 seconds can reset the IP/Subnet Mask/Gateway addresses to the factory default settings.

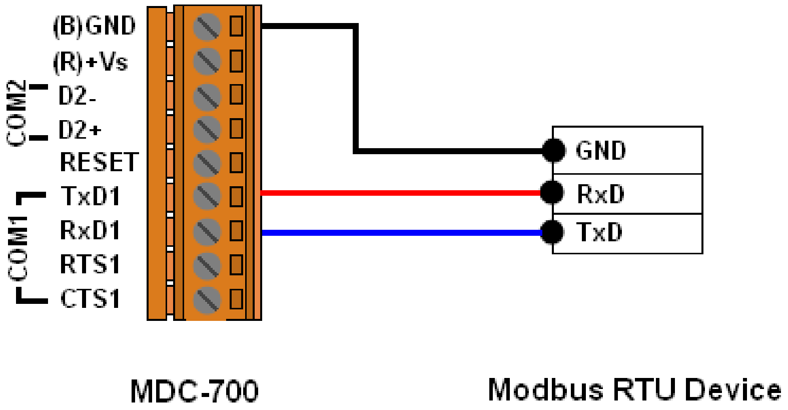
2.2. Specifications

	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	1200, 2400, 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	250 definitions for all RS-232/485 ports		
Shared Memory	9600 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 heartbeat		
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		

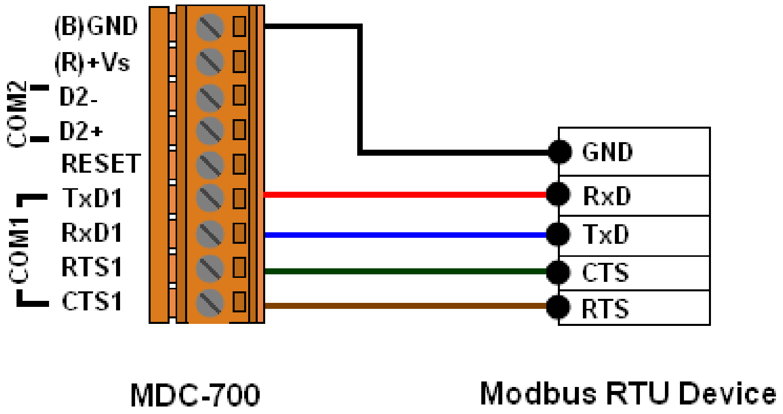
2.3. Wiring Connections

RS-232 Wiring

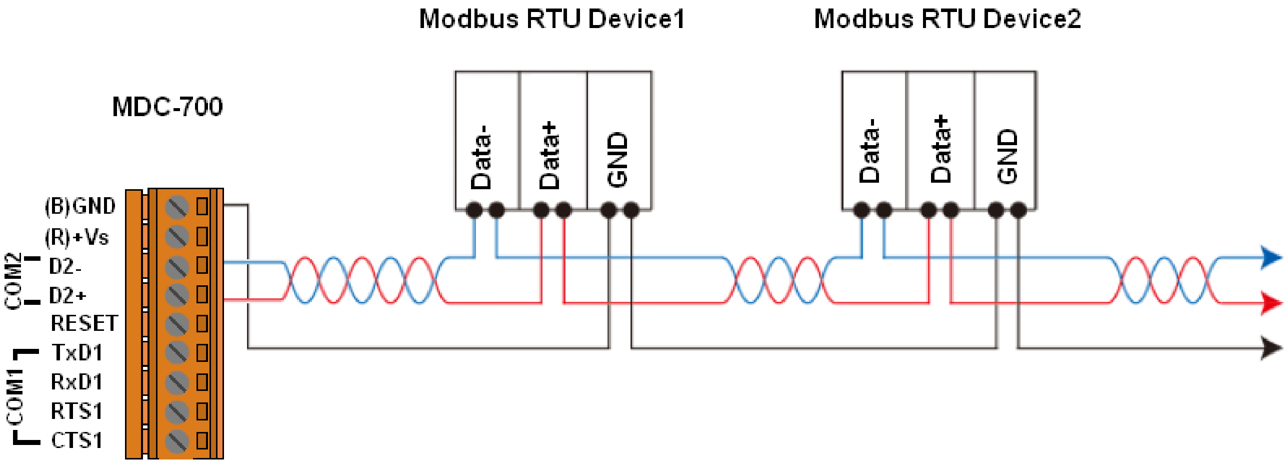
3-wire Connection Wiring



5-wire Connection Wiring

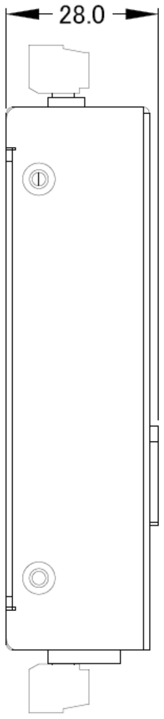


RS-485 Wiring

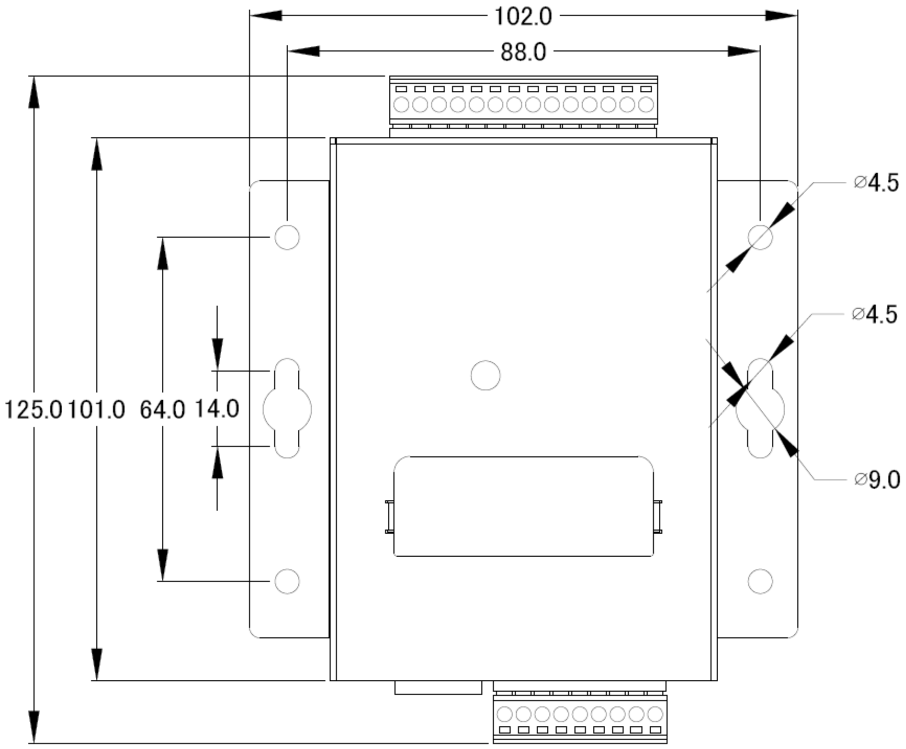


2.4. Dimensions

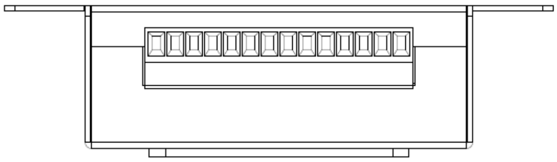
Unit: mm



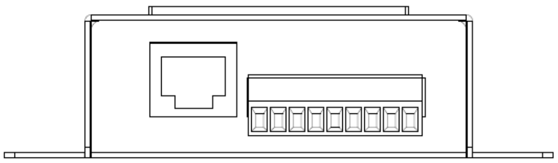
Left Side View



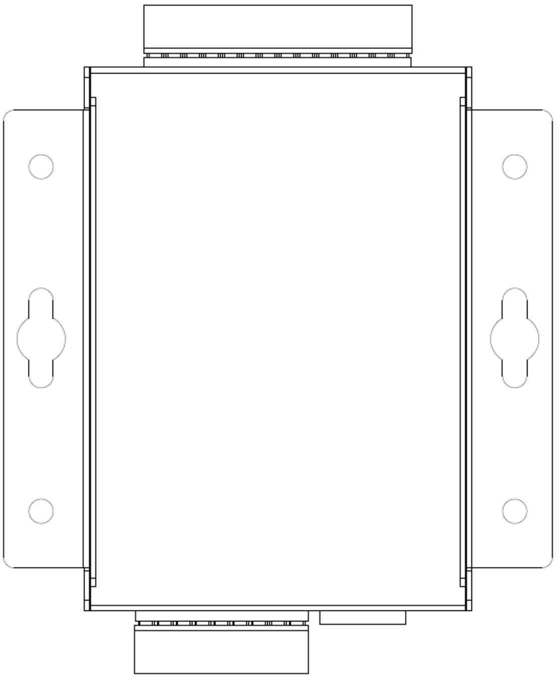
Front View



Top View



Bottom View



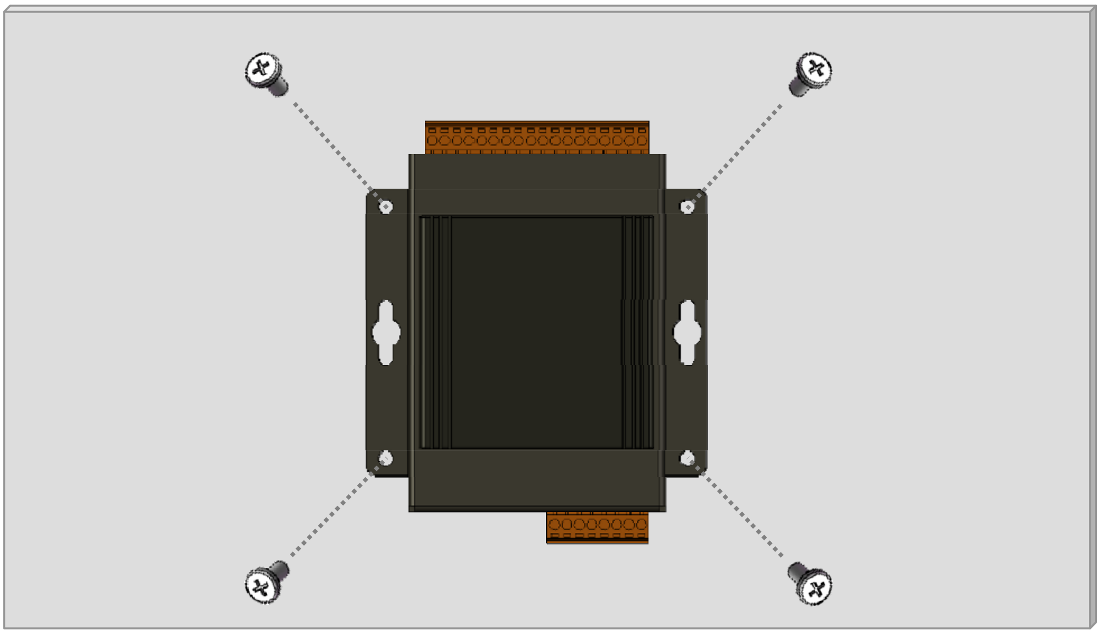
Rear View

2.5. Mounting the Hardware

Wall/Panel mounting

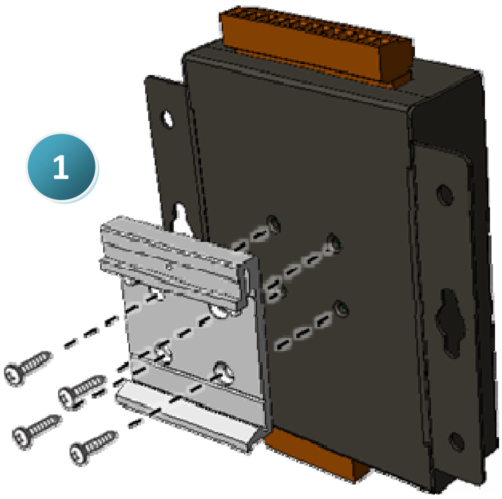
Step 1: Install the four mounting screws into the 4 keyhole mounting holes.

Step 2: Fasten the screws securely.



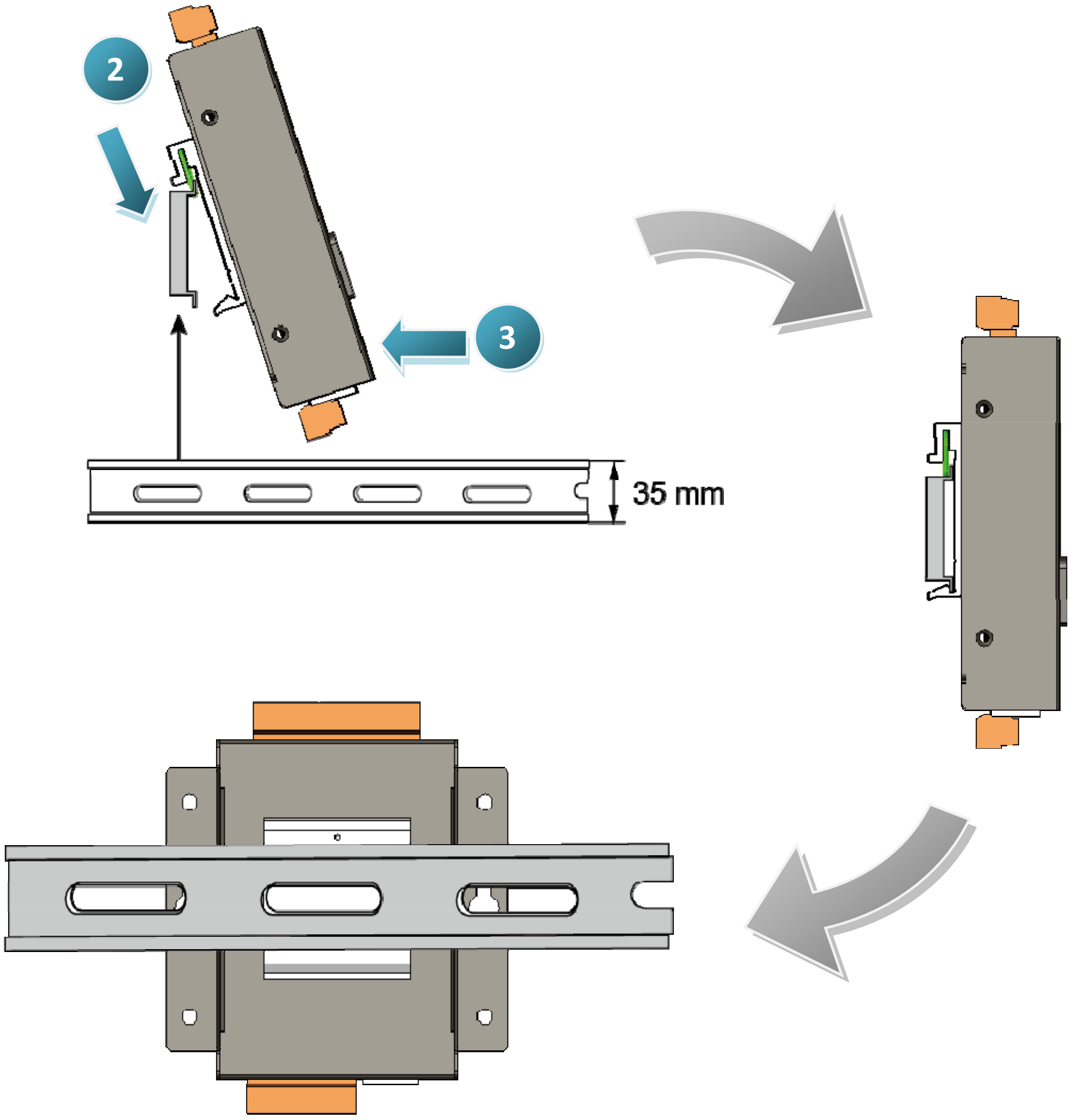
DIN Rail mounting

Step 1: Align the screw holes of the DIN-rail clip with the holes on the back side of the module, and then fasten the screws securely.



Step 2: Hook upper tab over upper flange of DIN rail.

Step 3: Tilt the module toward DIN rail until it snaps securely to DIN rail



3. Configuration

The necessary configuration for Modbus TCP communication, Modbus RTU communication and polling definition is handled by a single file named “config.csv”. Just follow the easy-to-use format defined in the config.csv file and import the new config.csv file via a simple mouse-click on the main page of the MDC-700, the data on those Modbus RTU slave devices can be accessed over an Ethernet.

Only the Function code 01/02/03/04 can be used in the config.csv file:

01: Read Coil Status (Read DO)
02: Read Input Status (Read DI)
03: Read Holding Registers (Read AO)
04: Read Input Registers (Read AI)

If you would like to write data to a digital or analog output channel on a Modbus RTU slave device, the output channel needs be mapped with a local register address in the MDC-700 by editing the polling definition with using corresponding read function code (01 or 03). Refer to Section 6. FAQ-Q4 for more detailed steps.

The following section will help you to set up your MDC-700 module. After completing the following steps, you can obtain configuration and other information related to the MDC module and associated slave devices in your browser.

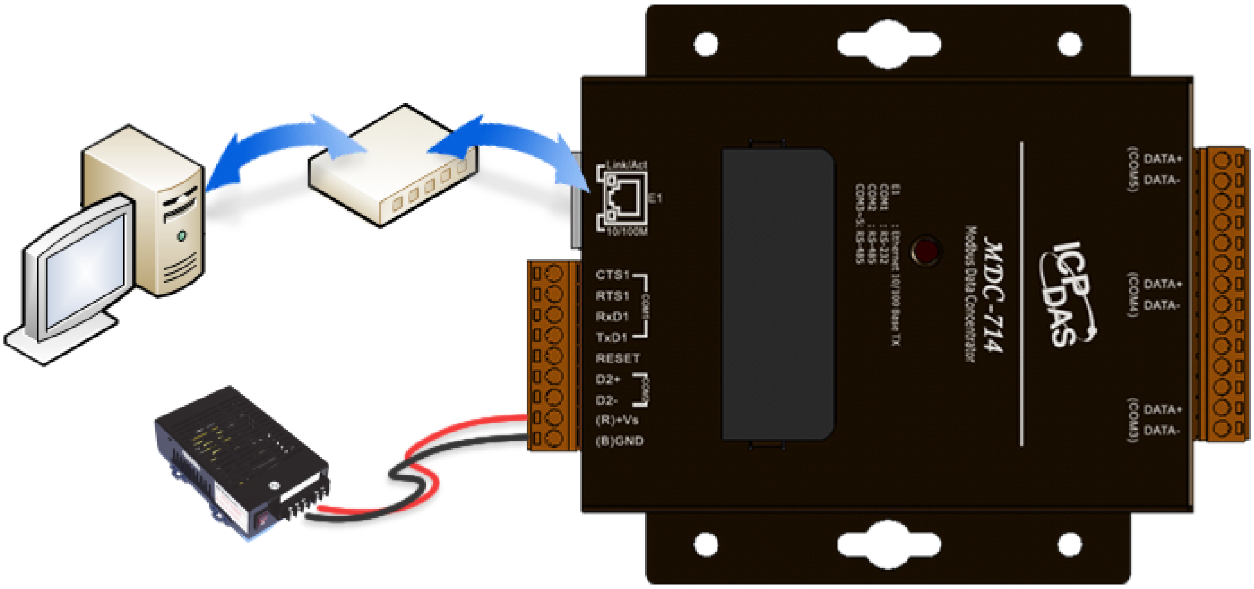
Basic operating procedure

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-700.

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: Connect the PC and MDC-700 module to an Ethernet Hub/Switch, and power on all the devices. You can also connect a MDC-700 to PC directly with an Ethernet cable.

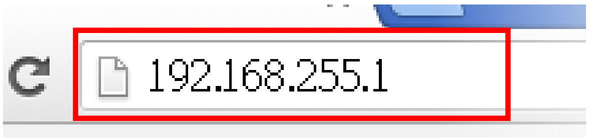


STEP 2: Set the IP configuration on your computer.

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 Help and Support functionality on your computer and 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.



192.168.255.1

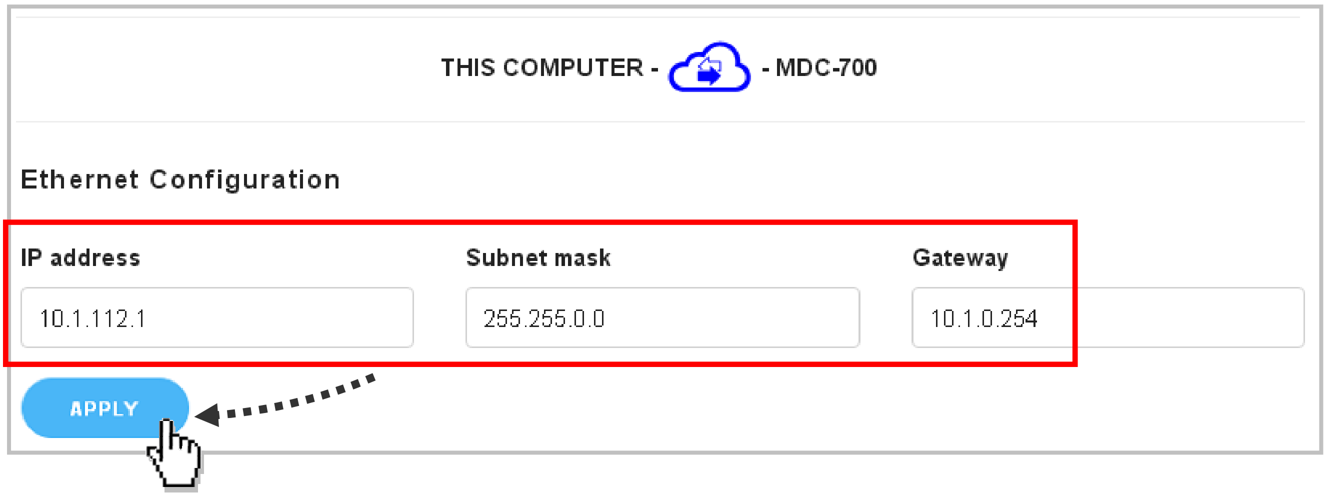
STEP 4: Confirm the connection status icon is open on the page.

☁ Denotes the connection between the computer and the MDC-module is open.

☁ Denotes the connection between the computer and the MDC-module is failed.

STEP 4: Choose a valid IP address of the network for your MDC-700 module

Scroll down to 'Ethernet Configuration' section, input the IP/Subnet mask and Gateway addresses and click on the "Apply" button. Make sure that the IP address you pick is not currently in use by another device on the network.

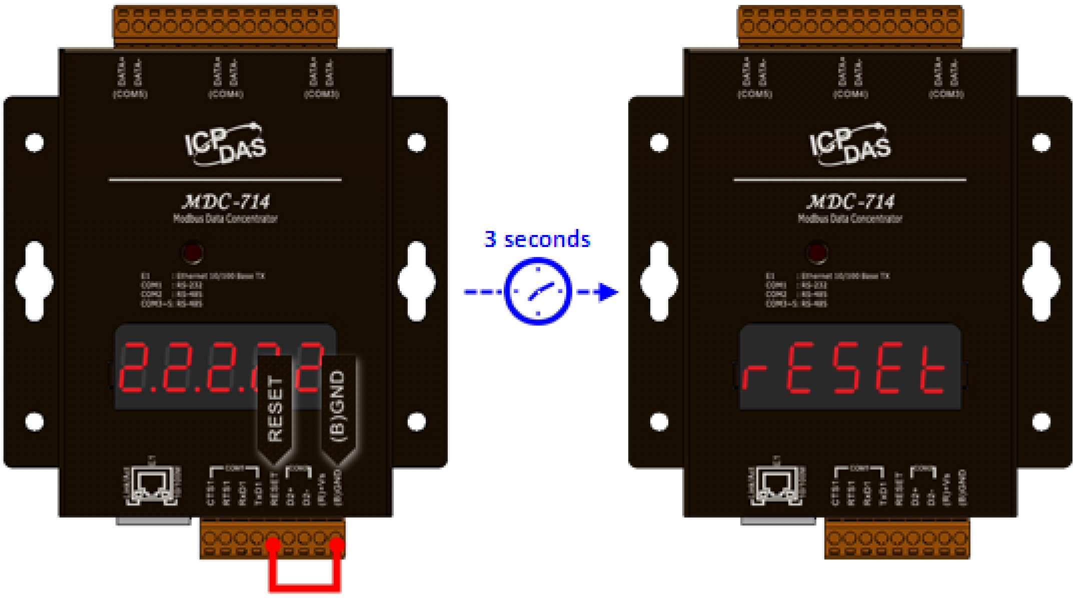


THIS COMPUTER - ☁ - MDC-700

Ethernet Configuration

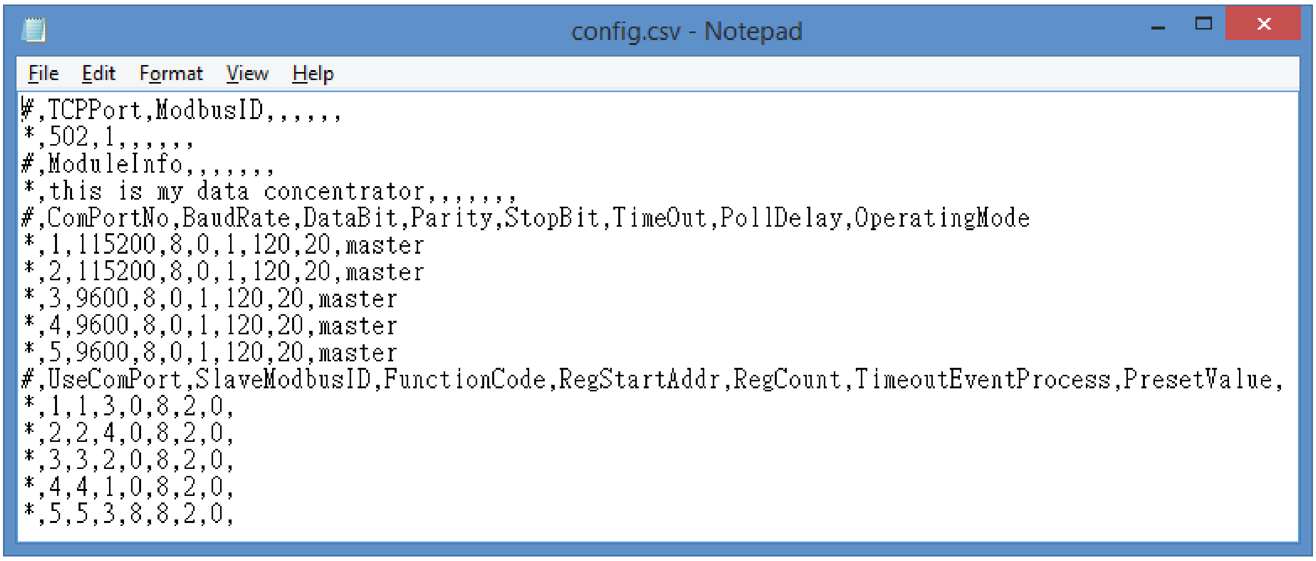
IP address	Subnet mask	Gateway
10.1.112.1	255.255.0.0	10.1.0.254

NOTE: The IP/Subnet mask/Gateway modified in a 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 a config.csv file to work with your master and 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, in which the comma character (,) typically separates each field of text. In a text editor, it looks like this:



```
#,TCPPort,ModbusID,,,,,,
*,502,1,,,,,,
#,ModuleInfo,,,,,,,
*,this is my data concentrator,,,,,,,
#,ComPortNo,BaudRate,DataBit,Parity,StopBit,TimeOut,PollDelay,OperatingMode
*,1,115200,8,0,1,120,20,master
*,2,115200,8,0,1,120,20,master
*,3,9600,8,0,1,120,20,master
*,4,9600,8,0,1,120,20,master
*,5,9600,8,0,1,120,20,master
#,UseComPort,SlaveModbusID,FunctionCode,RegStartAddr,RegCount,TimeoutEventProcess,PresetValue,
*,1,1,3,0,8,2,0,
*,2,2,4,0,8,2,0,
*,3,3,2,0,8,2,0,
*,4,4,1,0,8,2,0,
*,5,5,3,8,8,2,0,
```

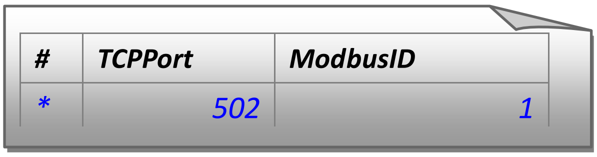
The file name "config.csv" can not be changed; it contains four main sections that need to be edited: **(1) Modbus Connection**, **(2) Module information**, **(3) COM Port Configuration** and **(4) Polling Definition.** Each section starts with a "#" character; follows are names for parameters in this section. A row starting with a "*" character is a set of settings in a section.

NOTE:

- The name for each parameter can not be changed.
- You can make a copy of the config.csv file in three ways and modify it to meet your requirements:
  1. Export the config.csv file in your MDC-700. (See 3.3. Importing/exporting the config.csv file)
  2. Download the file from http://ftp.icpdas.com/pub/cd/8000cd/napdos/modbus/mdc700/firmware/.

Modbus Connection

The Modbus Connection section is used to configure the Modbus ID of the MDC-700 and the TCP port number for Modbus TCP communication.



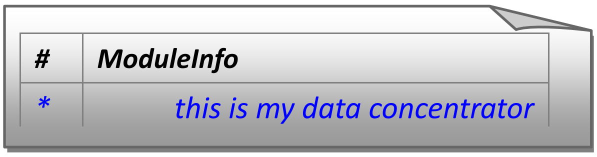
#	TCPPort	ModbusID
*	502	1

TCPPort: Defines the TCP/IP Port number, in the example set to 502. (Default value)

ModbusID: Defines the Modbus ID of the MDC-700, in the example set to 1. (Default value)

Module Information

The Module Information section is used to record auxiliary description for the MDC-700. It will be displayed on the main page of the MDC-700, and can be used to identify one MDC-700 from the others.



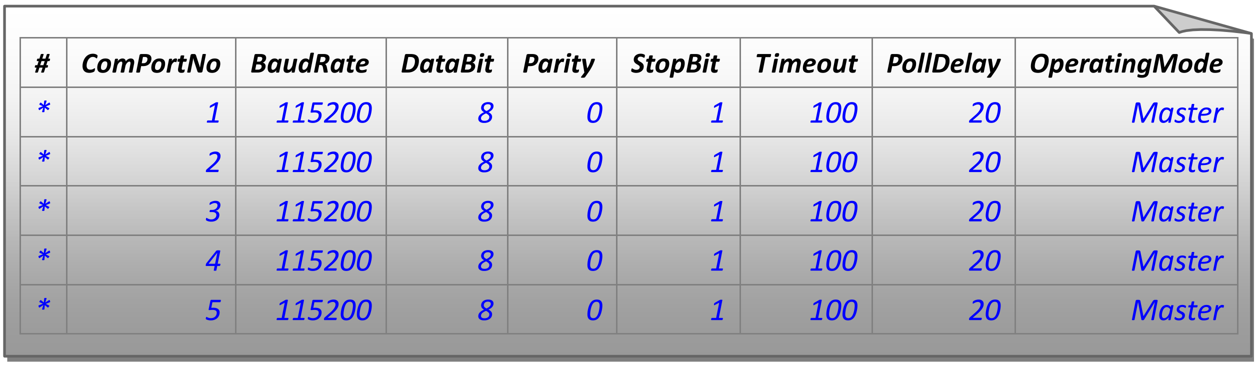
#	ModuleInfo
*	this is my data concentrator

ModuleInfo: Defines the auxiliary description 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-700 and the RTU slave devices.

NOTE: Only one set of configuration settings is allowed for each COM port.



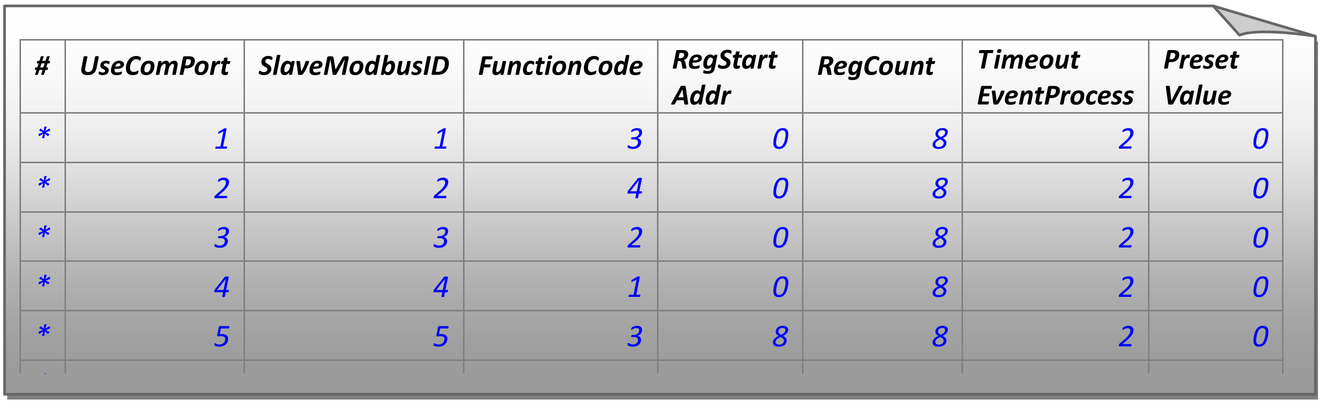
#	ComPortNo	BaudRate	DataBit	Parity	StopBit	Timeout	PollDelay	OperatingMode
*	1	115200	8	0	1	100	20	Master
*	2	115200	8	0	1	100	20	Master
*	3	115200	8	0	1	100	20	Master
*	4	115200	8	0	1	100	20	Master
*	5	115200	8	0	1	100	20	Master

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

ComPortNo	Specifies the COM port number 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 BaudRate can be set to 1200/ 2400/ 4800/ 9600/ 19200/ 34800/ 57600/ 115200 (bps) depending on the RTU slave device being used.
DataBit	Defines the number of data bits in each character. It is fixed to 8 and the RTU slave devices need be set to 8-bit data, too.
Parity	Defines the Parity bit. The parity bit can be set to 0 (none), 1 (even) or 2 (odd).
StopBit	Defines the Stop bits. It is fixed to 1, one stop bit.
Timeout	Defines the period of time that the MDC module will wait for a response from the RTU slave device. The available range is from 50 to 6000 (ms).
PollDelay	Defines the Poll Delay between each scan for Modbus RTU communication. The available range is from 20 to 6000 (ms).
OperatingMode	Defines the operating mode. - Master: the com port is used to connect Modbus RTU slave devices. The MDC-700 is acting as a master to send requests to slave devices. - Slave: the com port is used to connect Modbus RTU master devices. The master devices can read/write data from/to the MDC-700.

Polling Definition

The Polling Definition is used to define Modbus commands to read data from the slave devices. Before attempting to configure the parameters for the Polling Definition, be sure to check the COM port number that the target device is connected to, the Modbus ID setting for the target device, and the function code, start address, and the quantity for reading data.



#	UseComPort	SlaveModbusID	FunctionCode	RegStart Addr	RegCount	Timeout EventProcess	Preset Value
*	1	1	3	0	8	2	0
*	2	2	4	0	8	2	0
*	3	3	2	0	8	2	0
*	4	4	1	0	8	2	0
*	5	5	3	8	8	2	0

Each Polling Definition consists of 8 parameters listed as below:

#	Defines the type for a polling definition. In the MDC-700, it provides three types: "*": Asterisk symbol means that this is a valid polling definition. The MDC-700 will assign local register for data defined in the definition and save the polled data to the mapping local register. "-": Minus sign means that this is a disabled polling definition. The MDC-700 will assign local register for data defined in the definition but will not poll data. "": Empty means that this is a null polling definition. The MDC-700 will neither assign local register for data defined in the definition nor poll data.
UseComPort	Defines the COM port number to which the slave device is connected. 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 available range is from 0 to 65535.
RegCount	Defines the quantity of registers to be read. The available range is from 1 to 125.
Timeout EventProcess	Defines which data will be read while a timeout error is occurred: 0: the exception code 1: the latest data before the timeout error occurred 2: a preset value
PresetValue	Defines the preset value applied when the ***TimeoutEventProces***s is set to 2.

NOTE:

- The maximum number of all the polling definitions is 250.
- The MDC-700 provides 9600 internal Modbus registers each table (DI/DO/AI/AO) to hold data collected from the RTU slave devices.
- The Modbus ID for the MDC-700 is defined in Modbus Connection section.
- By setting different types for a polling definition to retain register space mapped for specific devices, or to release those space mapped but reserve the definition, the main program on the Modbus master device can be applied in different applications where users would like to change or stop some devices without modification or with minimum level of modification.
- The ***TimeoutEventProcess*** and the ***PresetValue*** parameters are only available to firmware version 1.08 and later. If a config.csv file for firmware version 1.06 or prior is imported to a MDC-700 with firmware version 1.08 or later, the ***TimeoutEventProcess*** parameter is auto set to 2, and the ***PresetValue*** parameter is set to 0.

3.3. Importing/exporting the config.csv file

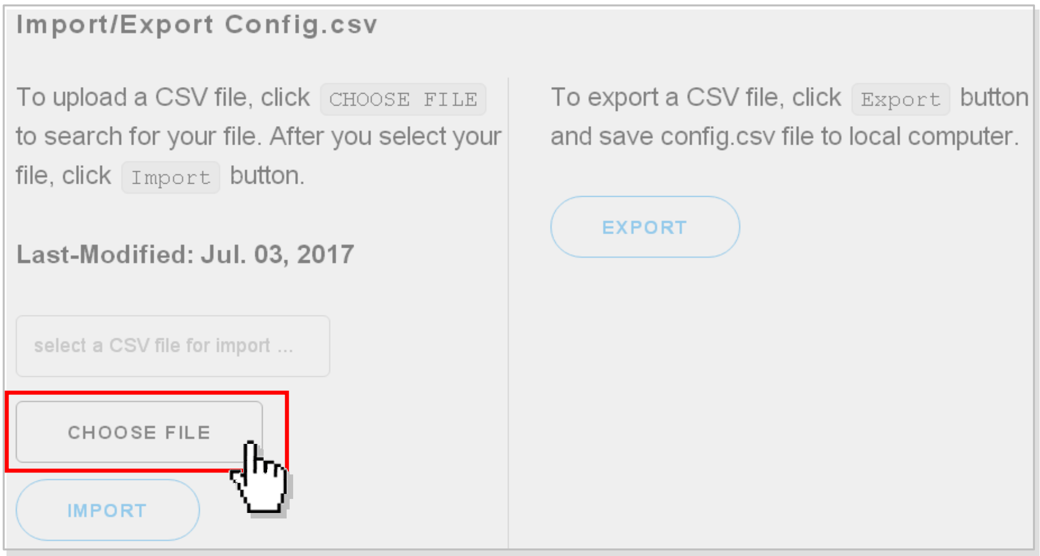
Go to the web interface at http://xxx.xxx.xxx.xxx, where xxx.xxx.xxx.xxx is the IP address set in your MDC module. Any standard browser such as Mozilla Firefox, Internet Explorer or Google Chrome can be used to interface the module.

NOTE:

- If you haven't changed the default IP address in the MDC-700, refer to "3.1. Assigning an IP address to MDC-700" to configure it.
- After the import process is finished, the MDC-700 will reboot in 5 seconds.

Importing a CSV file to MDC-700

STEP 1: Scroll down to the **Import/Export Config.csv** section of the page, click the **CHOOSE FILE** button, and then select your config.csv file.



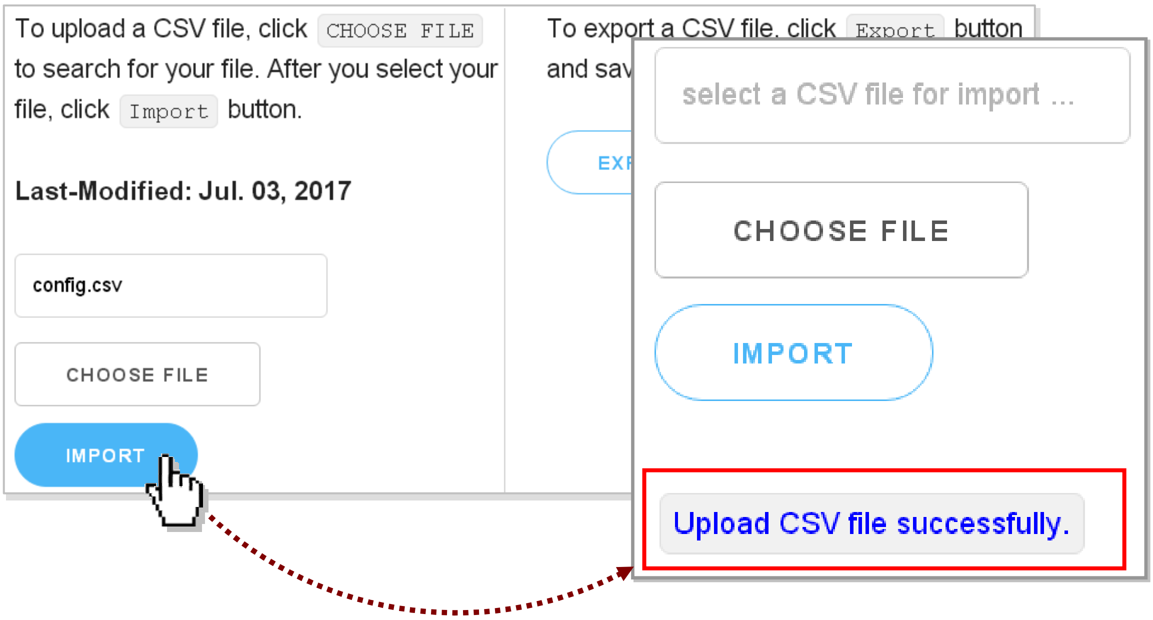
Import/Export Config.csv

To upload a CSV file, click CHOOSE FILE to search for your file. After you select your file, click Import button.

Last-Modified: Jul. 03, 2017

To export a CSV file, click Export button and save config.csv file to local computer.

STEP 2: Click on the **Import** button to import the config.csv file to the MDC-700.



To upload a CSV file, click CHOOSE FILE to search for your file. After you select your file, click Import button.

Last-Modified: Jul. 03, 2017

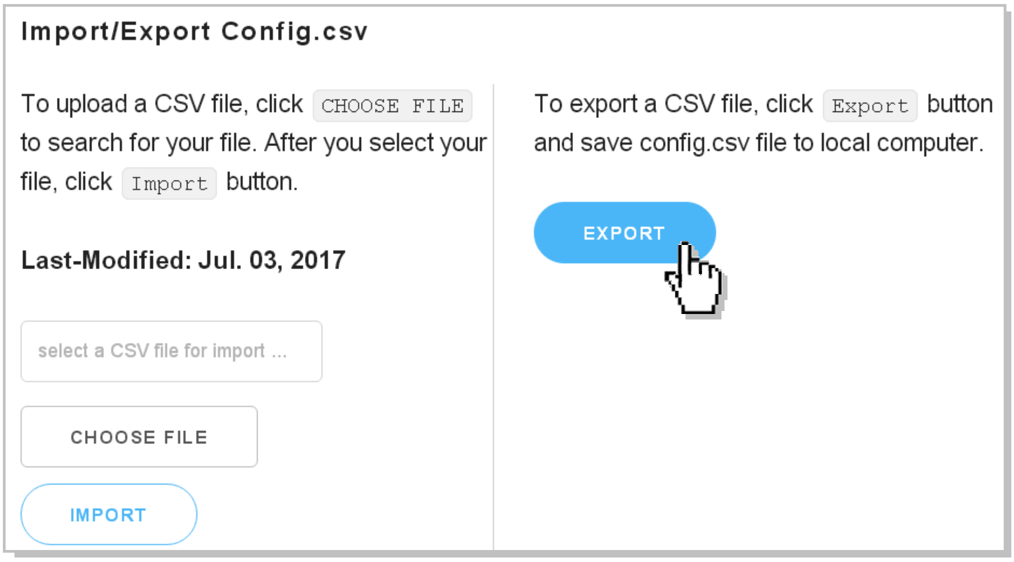
config.csv

To export a CSV file, click Export button and sav

Upload CSV file successfully.

Exporting a CSV file from MDC-700

STEP 1: Click on the **Export** button to export the config.csv file from the MDC-700. The config.csv file will be exported to the download directory configured in the web browser.



Import/Export Config.csv

To upload a CSV file, click CHOOSE FILE to search for your file. After you select your file, click Import button.

Last-Modified: Jul. 03, 2017

To export a CSV file, click Export button and save config.csv file to local computer.

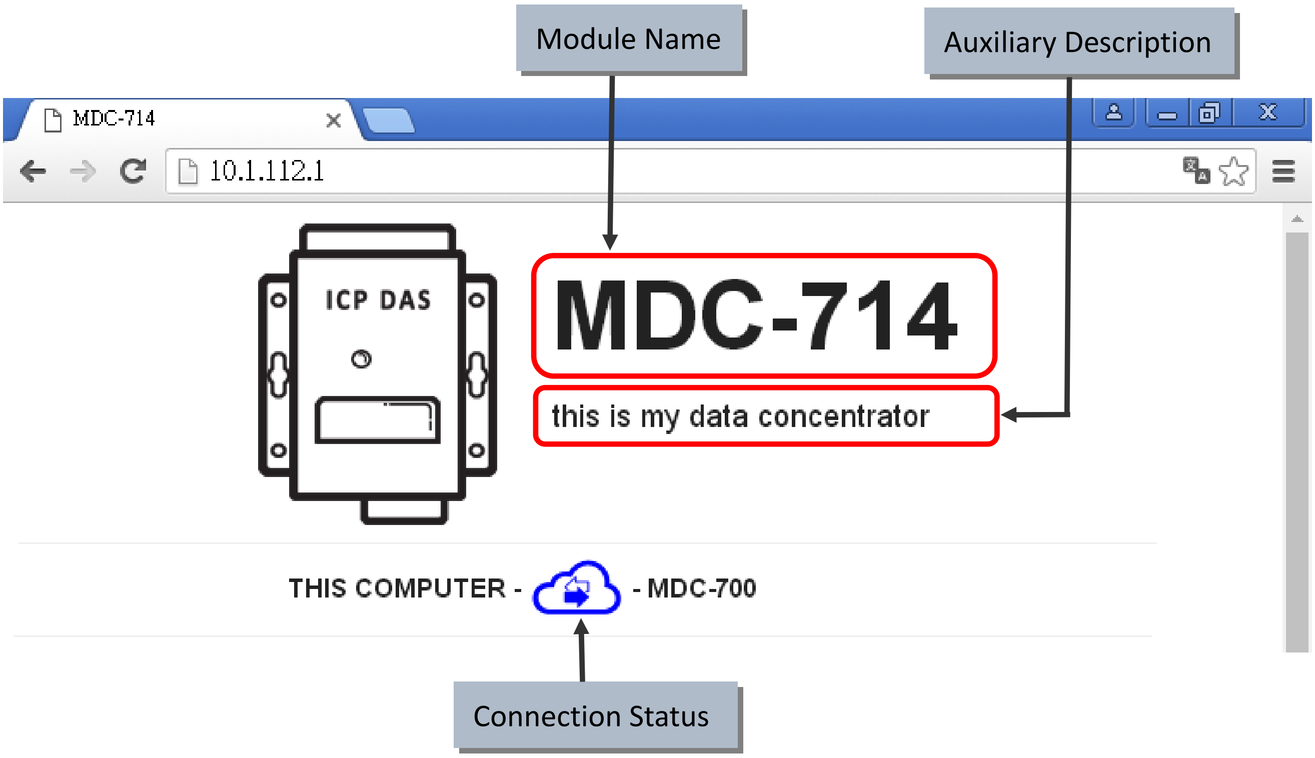
4. MDC-700 Web Interface

Go to the web interface at http://xxx.xxx.xxx.xxx, where xxx.xxx.xxx.xxx is the IP address in your MDC-700. Any standard browser such as Mozilla Firefox, Internet Explorer or Google Chrome can be used to interface the MDC-700.

The MDC-700 web page includes the following sections:

1. The connection status between the user device and the MDC-700
2. The connection information for each polling definition
3. The communication configuration information on the MDC-700
4. Ethernet configuration
5. Importing/exporting the config.csv file
6. OS version, firmware version and MAC address information

Connection status between your device and the MDC-700

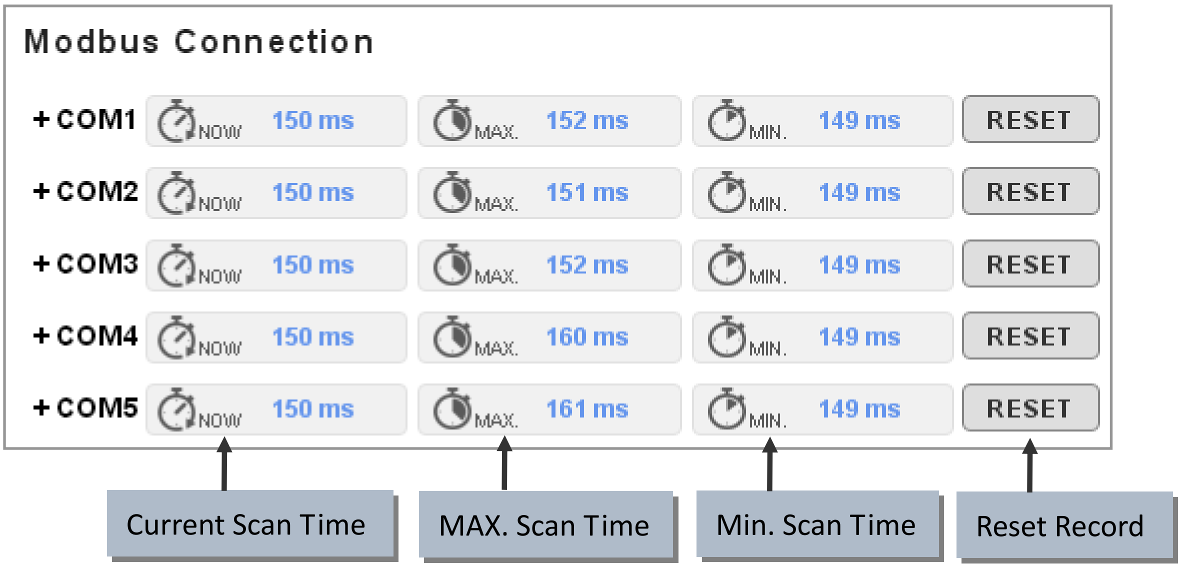


Denotes the connection is successfully established

Denotes the connection is failed

Modbus Connection

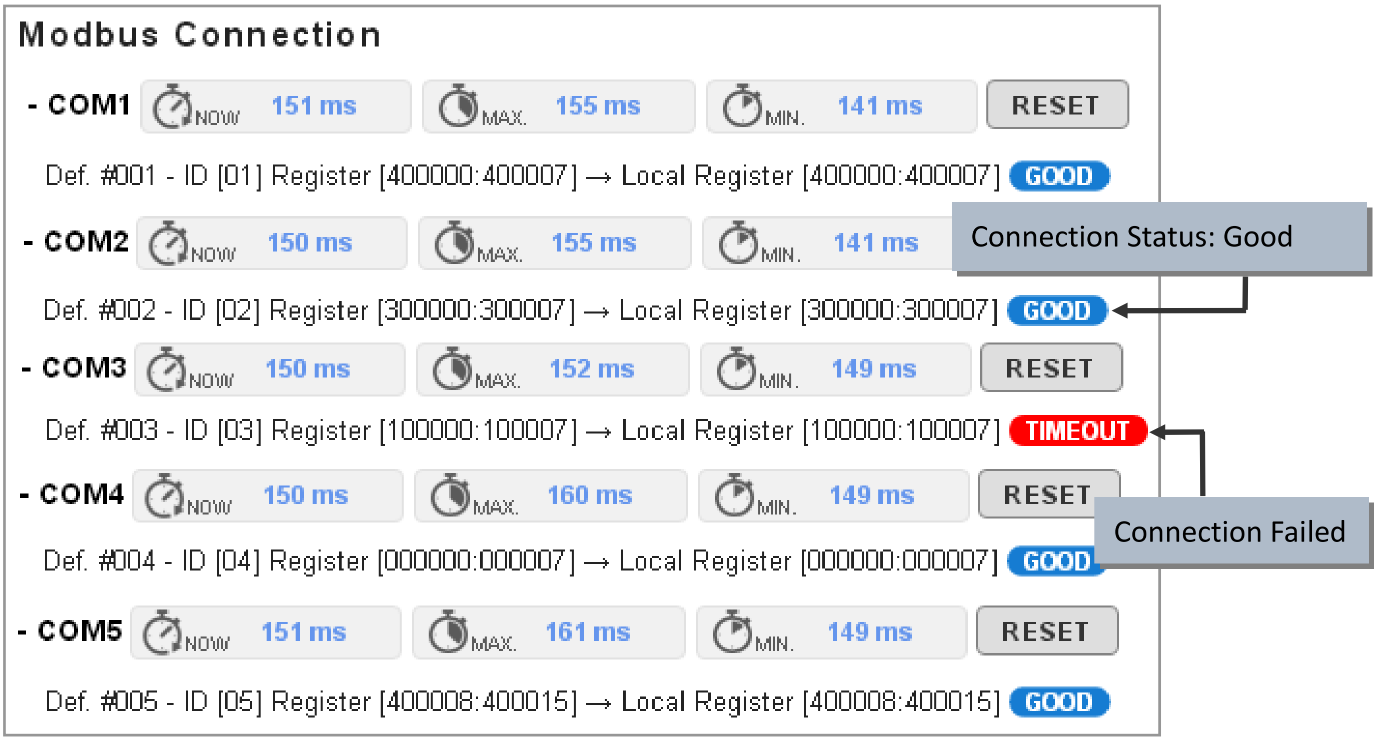
In the Modbus Conncetion section (on the MDC-700 with firmware version 1.08 and later), it provides the scan time information for each COM port. The Master device can refer to the scan time to extend or shorten the time interval for each requesting data command.



Modbus Connection

+COM1	NOW 150 ms	MAX. 152 ms	MIN. 149 ms	RESET
+COM2	NOW 150 ms	MAX. 151 ms	MIN. 149 ms	RESET
+COM3	NOW 150 ms	MAX. 152 ms	MIN. 149 ms	RESET
+COM4	NOW 150 ms	MAX. 160 ms	MIN. 149 ms	RESET
+COM5	NOW 150 ms	MAX. 161 ms	MIN. 149 ms	RESET

Expand the polling definitions by clicking on the [+COMn], information including the polling definition number, SlaveModbusID, Starting Address of Register and Count of Register on both slave client and MDC-700, and the connection status are provided.



Modbus Connection

- COM1 NOW 151 ms MAX. 155 ms MIN. 141 ms RESET

Def. #001 - ID [01] Register [400000:400007] → Local Register [400000:400007] GOOD

- COM2 NOW 150 ms MAX. 155 ms MIN. 141 ms

Def. #002 - ID [02] Register [300000:300007] → Local Register [300000:300007] GOOD

- COM3 NOW 150 ms MAX. 152 ms MIN. 149 ms RESET

Def. #003 - ID [03] Register [100000:100007] → Local Register [100000:100007] TIMEOUT

- COM4 NOW 150 ms MAX. 160 ms MIN. 149 ms RESET

Def. #004 - ID [04] Register [000000:000007] → Local Register [000000:000007] GOOD

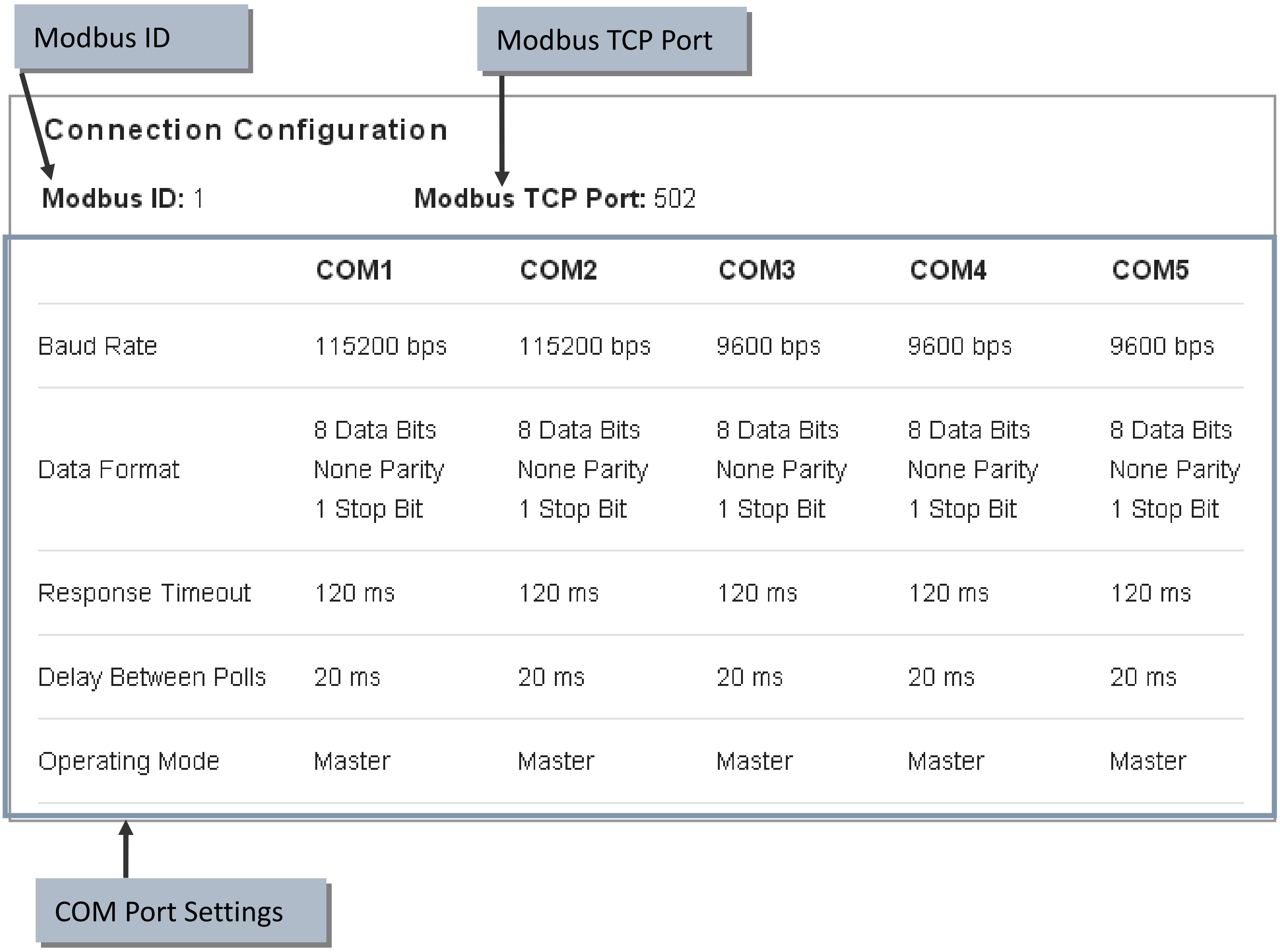
- COM5 NOW 151 ms MAX. 161 ms MIN. 149 ms RESET

Def. #005 - ID [05] Register [400008:400015] → Local Register [400008:400015] GOOD

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

Connection Configuration

The **Connection Configuration** section provides the configuration information including Modbus ID, Modbus TCP port on the MDC-700, and Baud Rate. Data Format, Response Timeout, Delay Between Polls, Operation Mode settings for each COM port.



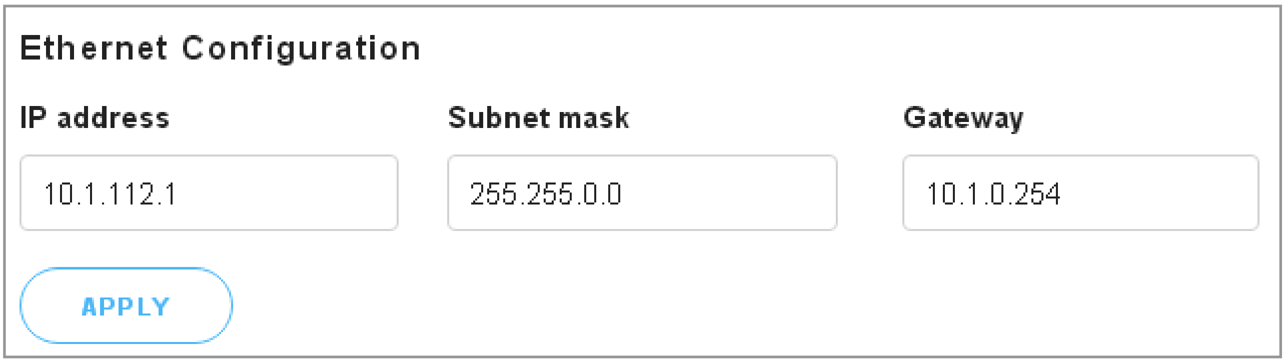
Connection Configuration

Modbus ID: 1 **Modbus TCP Port:** 502

	COM1	COM2	COM3	COM4	COM5
Baud Rate	115200 bps	115200 bps	9600 bps	9600 bps	9600 bps
Data Format	8 Data Bits None Parity 1 Stop Bit	8 Data Bits None Parity 1 Stop Bit	8 Data Bits None Parity 1 Stop Bit	8 Data Bits None Parity 1 Stop Bit	8 Data Bits None Parity 1 Stop Bit
Response Timeout	120 ms	120 ms	120 ms	120 ms	120 ms
Delay Between Polls	20 ms	20 ms	20 ms	20 ms	20 ms
Operating Mode	Master	Master	Master	Master	Master

Ethernet Configuration

In this section you can obtain or set the Ethernet Configuration. To change the Ethernet parameters, you just need to input the valid IP, Subnet mask and Gateway addresses and then click **APPLY**.

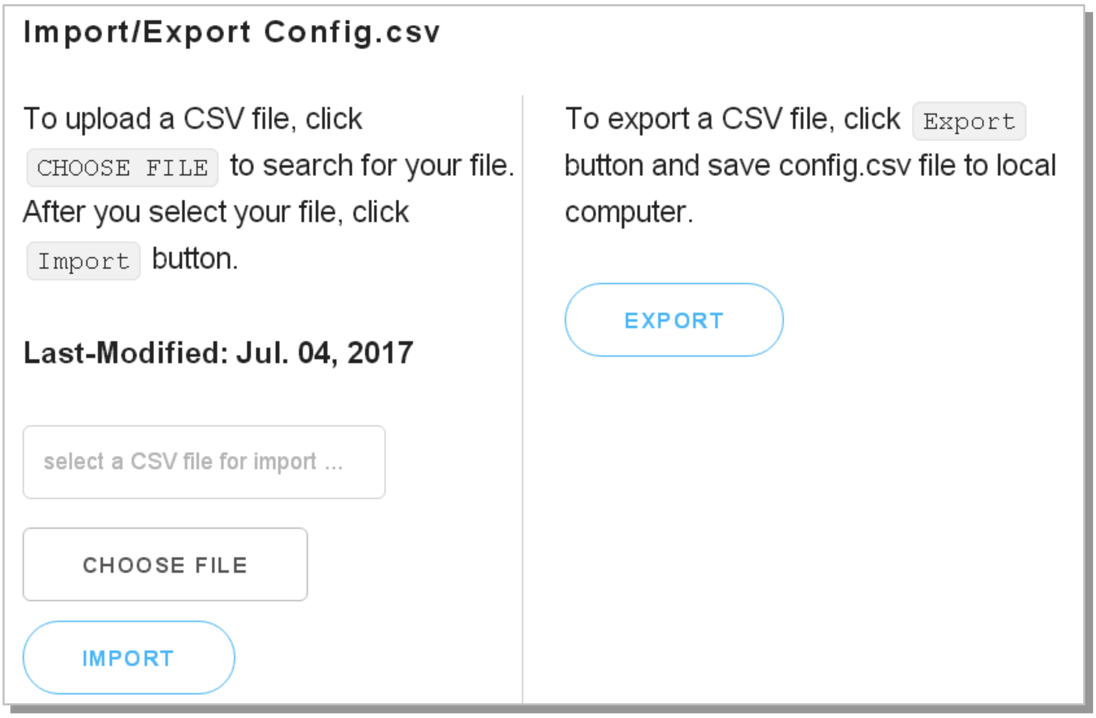


Ethernet Configuration

IP address	Subnet mask	Gateway
10.1.112.1	255.255.0.0	10.1.0.254

Import/Export Config.csv

You can import/export the config.csv file in this section. Refer to Section 3.3 for the detailed steps.



Import/Export Config.csv

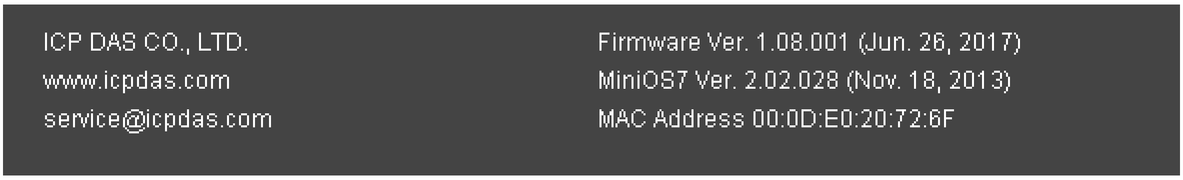
To upload a CSV file, click CHOOSE FILE to search for your file. After you select your file, click Import button.

Last-Modified: Jul. 04, 2017

To export a CSV file, click Export button and save config.csv file to local computer.

Fimware Version/OS Version and MAC Address

The Firmware version, OS version and MAC address for the MDC-700 are commented at the bottom of the page.



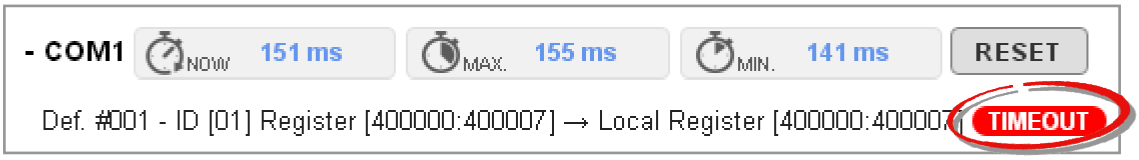
ICP DAS CO., LTD.
www.icpdas.com
service@icpdas.com

Firmware Ver. 1.08.001 (Jun. 26, 2017)
MiniOS7 Ver. 2.02.028 (Nov. 18, 2013)
MAC Address 00:0D:E0:20:72:6F

5. Troubleshooting

In this chapter, we will explain how to troubleshoot the communication problems.

Possible causes of TIMEOUT



- COM1 NOW 151 ms MAX. 155 ms MIN. 141 ms RESET

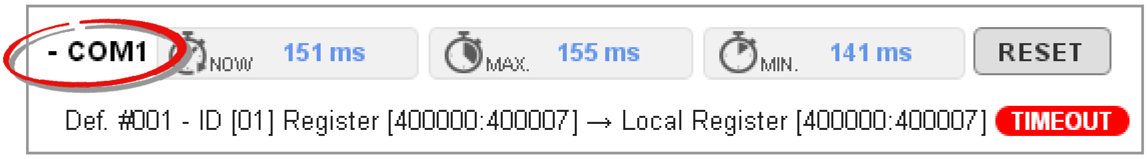
Def. #001 - ID [01] Register [400000:400007] → Local Register [400000:400007] TIMEOUT

Situation #1: The slave device is not active or the transfer function of the slave site may fail.

Solution: Check the slave device is powered up and the communication function is enabled.

Situation #2: The COM port number to which the slave device is connected is not the same with the UseComPort setting in the polling definition.

Solution: Connect the slave device to the COM port number that is defined in the polling definition, or fix the ***UseComPort*** parameter to the virtual COM port number that the slave device is connected to.



- COM1 NOW 151 ms MAX. 155 ms MIN. 141 ms RESET

Def. #001 - ID [01] Register [400000:400007] → Local Register [400000:400007] TIMEOUT

Situation #3: The wiring for communication is wrong.

Solution: Exchange the D+ and D- wiring of RS-485 connection, or exchange the Rx and Tx wiring of RS-232 connection, and check the GND pin on the slave device is properly connected to the MDC-700.

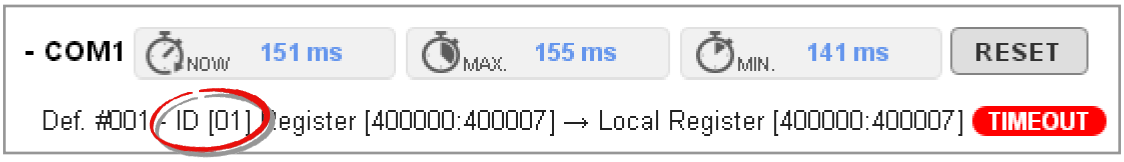
Situation #4: An incorrect Baud Rate or/and Data Format setting is being specified.

Solution: Check and fix the difference of the Baud Rate and Data Format settings between the polling definition and the slave device.

ComPortNo	*BaudRate*	*DataBit*	*Parity*	*StopBit*	*Timeout*	*PollDelay*	*Operating Mode*
1	9600	8	0	1	120	100	Master
2	9600	8	0	1	3000	1000	Master
3	9600	8	0	1	3000	1000	Master
4	9600	8	0	1	120	100	Master
5	9600	8	0	1	120	100	Master

Situation #5: An incorrect ID of the Modbus slave device is being specified.

Solution: Check and fix the difference of ID number between the polling definition and the slave device.

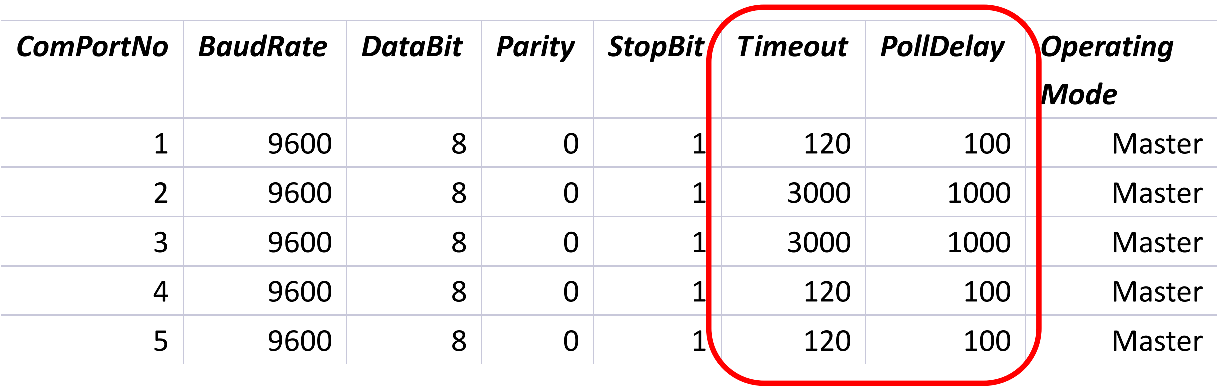


- COM1 NOW 151 ms MAX. 155 ms MIN. 141 ms RESET

Def. #001 - ID [01] Register [400000:400007] → Local Register [400000:400007] TIMEOUT

Situation #6: The Timeout or PollDelay setting is not long enough.

Solution: Lengthen the Timeout or PollDelay setting until it is suitable for communication with the slave device.



ComPortNo	*BaudRate*	*DataBit*	*Parity*	*StopBit*	*Timeout*	*PollDelay*	*Operating Mode*
1	9600	8	0	1	120	100	Master
2	9600	8	0	1	3000	1000	Master
3	9600	8	0	1	3000	1000	Master
4	9600	8	0	1	120	100	Master
5	9600	8	0	1	120	100	Master

6. FAQ

Q1: What are the maximum numbers of polling definition and local register?

A1: The maximum number of polling definition in a MDC-700 is 250, each definition can access up to 125 registers. Each of the four tables (DI/DO/AI/DO) can store up to 9600 registers for polled data.

Q2: What is the maximum number of registers can be accessed in one Modbus command from a Modbus master device?

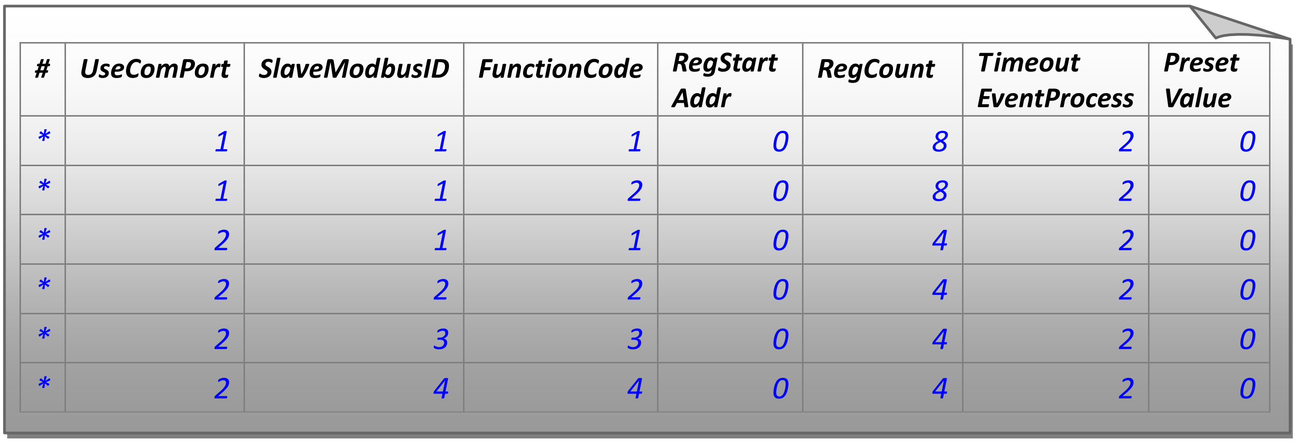
A2: By following the Modbus protocol, the maximum amount of registers that one command can access is 255 of function code 01 and 02, and 126 of function code 03 and 04.

Q3: How are the local registers mapped to the polled data in a MDC-700?

A3: Only the function code 01/02/03/04 can be used in the polling definition section in config.csv file.

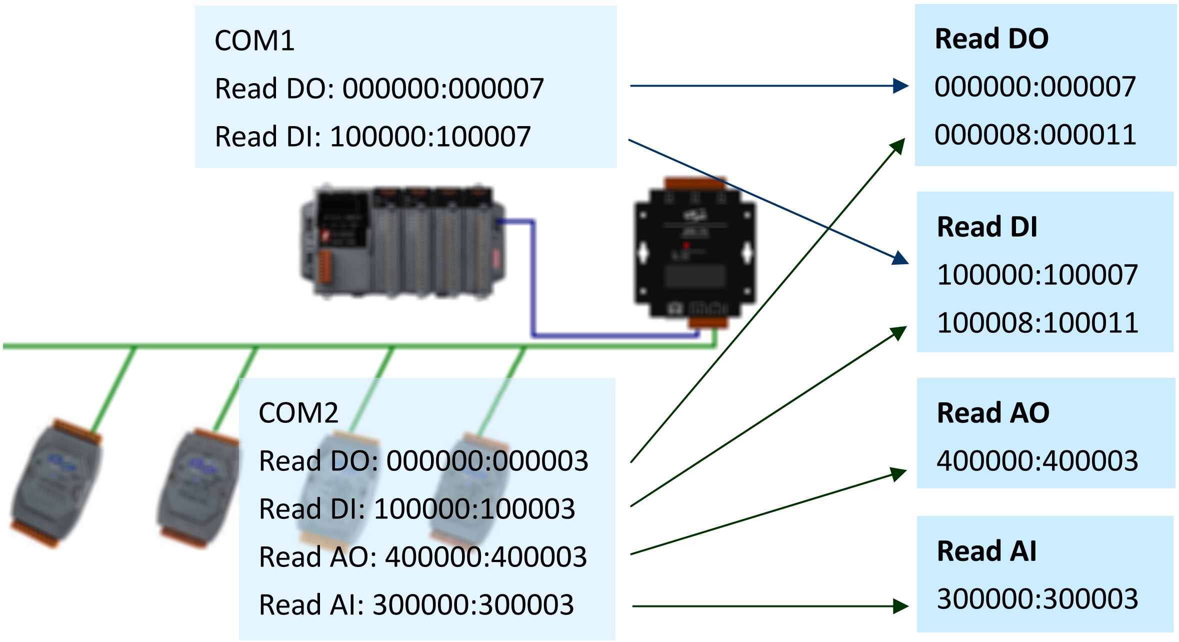
01: Read Coil Status (Read DO)
02: Read Input Status (Read DI)
03: Read Holding Registers (Read AO)
04: Read Input Registers (Read AI)

Refer to the example below,



#	UseComPort	SlaveModbusID	FunctionCode	RegStart Addr	RegCount	Timeout EventProcess	Preset Value
*	1	1	1	0	8	2	0
*	1	1	2	0	8	2	0
*	2	1	1	0	4	2	0
*	2	2	2	0	4	2	0
*	2	3	3	0	4	2	0
*	2	4	4	0	4	2	0

The MDC-700 will sort the order of polling data by COM port number and the sequence of polling definition; and then map the local registers corresponding to the data type (DI/DO/AI/AO) by the order of polling data. So the data comes from different slave devices with the same type will be saved in continuous registers, and a Modbus mater device and read the data on a variety of slave devices with one Modbus command.



COM1
Read DO: 000000:000007
Read DI: 100000:100007

COM2
Read DO: 000000:000003
Read DI: 100000:100003
Read AO: 400000:400003
Read AI: 300000:300003

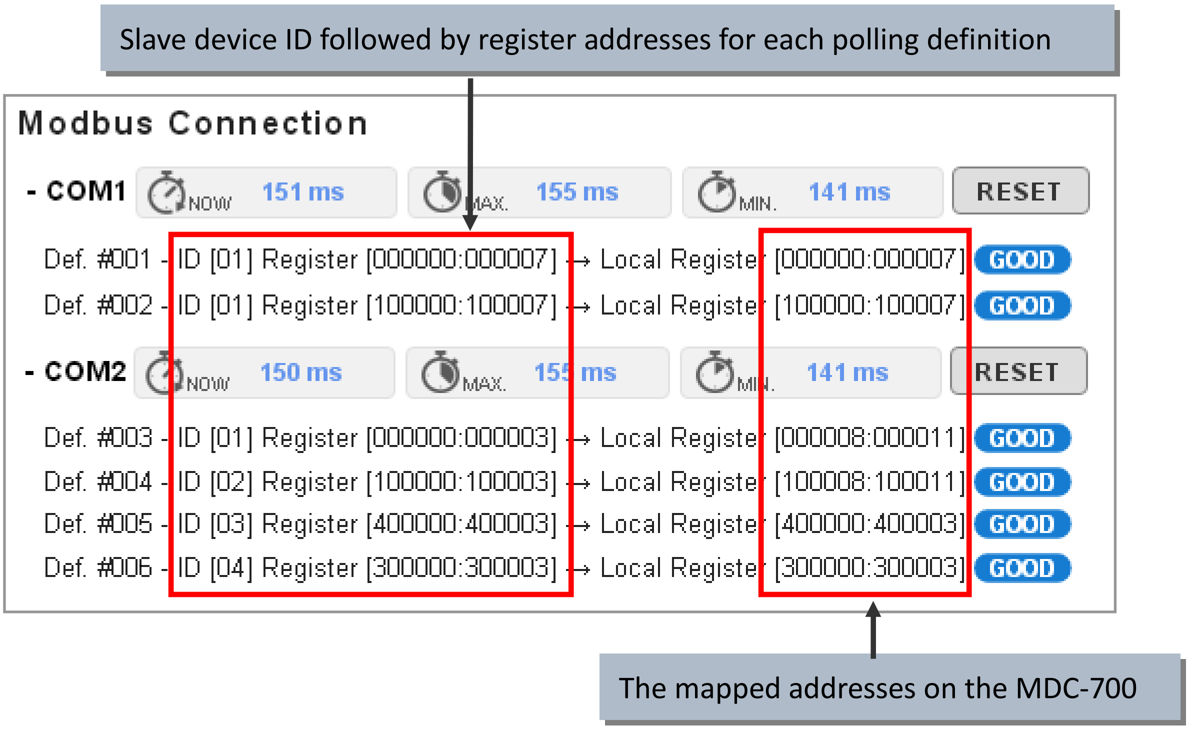
Read DO
000000:000007
000008:000011

Read DI
100000:100007
100008:100011

Read AO
400000:400003

Read AI
300000:300003

The local registers mapping is listed on the main page of the MDC-700 module.



Slave device ID followed by register addresses for each polling definition

Modbus Connection

- COM1 NOW 151 ms MAX. 155 ms MIN. 141 ms RESET

Def. #001 - ID [01] Register [000000:000007] → Local Register [000000:000007] GOOD

Def. #002 - ID [01] Register [100000:100007] → Local Register [100000:100007] GOOD

- COM2 NOW 150 ms MAX. 155 ms MIN. 141 ms RESET

Def. #003 - ID [01] Register [000000:000003] → Local Register [000008:000011] GOOD

Def. #004 - ID [02] Register [100000:100003] → Local Register [100008:100011] GOOD

Def. #005 - ID [03] Register [400000:400003] → Local Register [400000:400003] GOOD

Def. #006 - ID [04] Register [300000:300003] → Local Register [300000:300003] GOOD

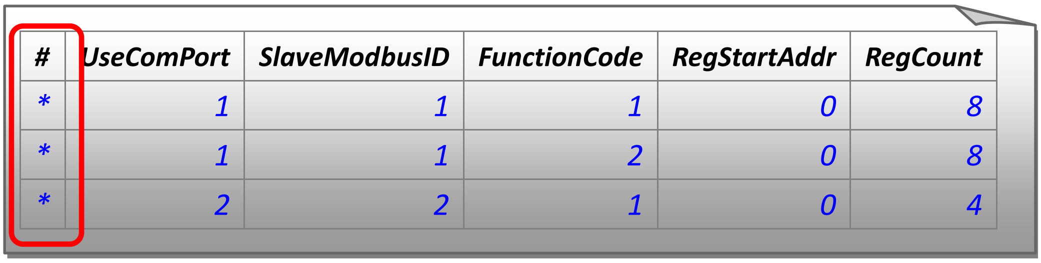
The mapped addresses on the MDC-700

The MDC-700 allows users to enable/disable a polling definition by changing the first field of the polling definition section in the config.csv file. There are three types that users can use:

"*": Asterisk symbol means that this is a valid polling definition. The MDC-700 will assign local register for data defined in the definition and save the polled data to the mapping local register.

"-": Minus sign means that this is a disabled polling definition. The MDC-700 will assign local register for data defined in the definition but will not poll the data.

"": Empty means that this is a null polling definition. The MDC-700 will neither assign local register for data defined in the definition nor poll data.



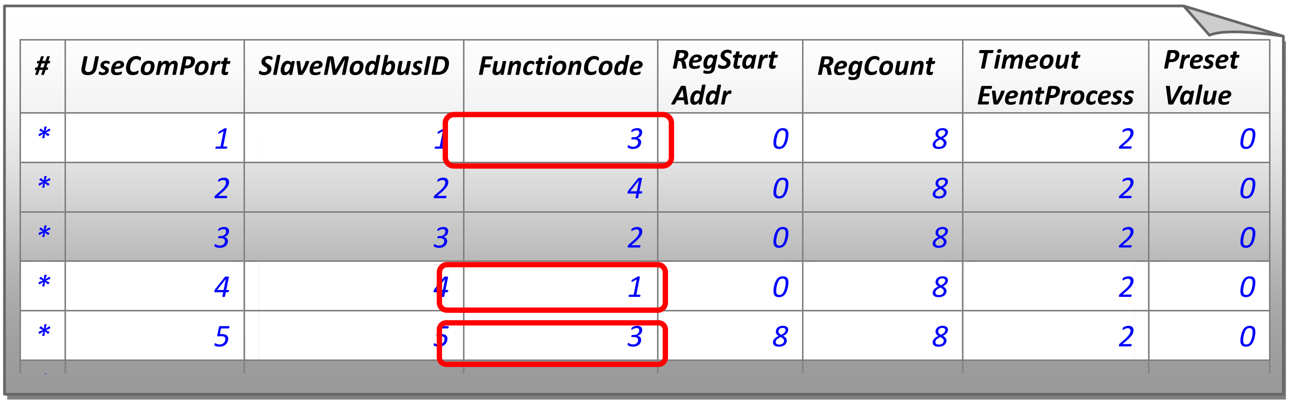
#	UseComPort	SlaveModbusID	FunctionCode	RegStartAddr	RegCount
*	1	1	1	0	8
*	1	1	2	0	8
*	2	2	1	0	4

With the function of retaining register space mapped for specific devices, or releasing those spaces mapped but reserving the definition, the main program on the Modbus master device can be applied in similar applications where users would like to change or stop some devices without modification or with minimum level of modification.

Q4: How to write data to output channels on a Modbus RTU slave device?

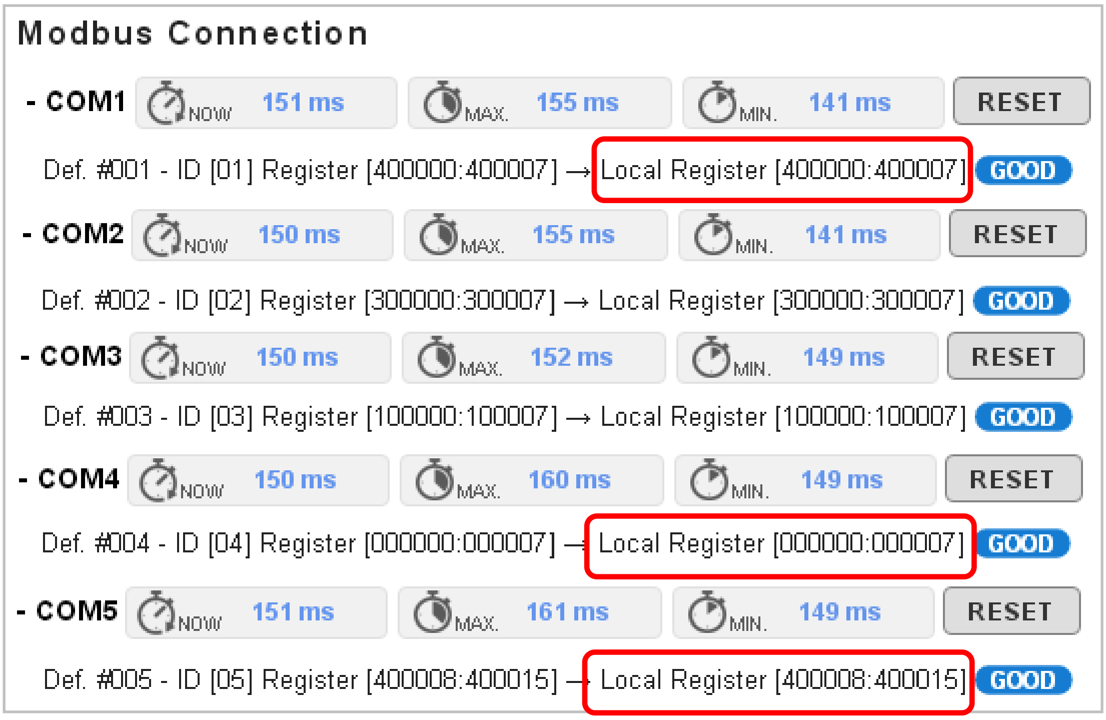
A4:

Step 1: Edit the polling definition for the output channels with read function code in the config.csv file. (For example, use 01 to read DO channels, 03 to read AO channels)



#	UseComPort	SlaveModbusID	FunctionCode	RegStart Addr	RegCount	Timeout EventProcess	Preset Value
*	1	1	3	0	8	2	0
*	2	2	4	0	8	2	0
*	3	3	2	0	8	2	0
*	4	4	1	0	8	2	0
*	5	5	3	8	8	2	0

Step 2: Import the config.csv file into the MDC-700, wait the MDC-700 reboot in 5 seconds, and then check the addresses for the local registers mapped to the output channels.



Modbus Connection

- COM1 NOW 151 ms MAX. 155 ms MIN. 141 ms RESET

Def. #001 - ID [01] Register [400000:400007] → Local Register [400000:400007] GOOD

- COM2 NOW 150 ms MAX. 155 ms MIN. 141 ms RESET

Def. #002 - ID [02] Register [300000:300007] → Local Register [300000:300007] GOOD

- COM3 NOW 150 ms MAX. 152 ms MIN. 149 ms RESET

Def. #003 - ID [03] Register [100000:100007] → Local Register [100000:100007] GOOD

- COM4 NOW 150 ms MAX. 160 ms MIN. 149 ms RESET

Def. #004 - ID [04] Register [000000:000007] → Local Register [000000:000007] GOOD

- COM5 NOW 151 ms MAX. 161 ms MIN. 149 ms RESET

Def. #005 - ID [05] Register [400008:400015] → Local Register [400008:400015] GOOD

Step 3: Write data with corresponding function code (05/06/15/16) on your Modbus master device to the local registers mapped for the output channels, the MDC-700 will process writing operations to the slave devices.

Q5: How to read the status of each connection?

A5: The status for each connection is saved in the sequence of polling definition from local register address 39600. The maximum number of polling definition in the config.csv file is 250, so the available address for the connection status is from 39600 to 39849. A Modbus master use function code 04 to read the status, up to 126 register of status can be read in one command. For example, the status of the graph shown above is presented as the third column in the following table.

Def. number	Address	Status	Status display on web page
Def.#001	39600	0	GOOD
Def.#002	39601	0	GOOD
Def.#003	39602	0xFFFF	TIMEOUT
Def.#004	39603	0x8201	ERROR: ILLEGAL FUNCTION
Def.#005	39604	0	GOOD
Def.#006	39605	0x8402	ERROR: ILLEGAL DATA ADDRESS

The value of status:

0: Good

0xFFFF: Timeout

0x8XYY: Exception Rresponse. **X** - Modbus Function Code. **YY** - Exception Code.

Exception Code	Name	Meaning
01	Illegal Function	The function code received is not an allowable action.
02	Illegal Data Address	The data address received in the query is not an allowable address.
03	Illegal Data Value	A value contained in the query data field is not an allowable value.
04	Illegal response length	The request would generate a response with size bigger than that available for MODBUS protocol.

Q6: How to update firmware?

A6: The upgrade procedure of the firmware consists of the following main steps:

- Install the MiniOS7 Utility on your computer
- Upload the latest firmware to MDC-700 through the MiniOS7 Utility
- Check the firmware version and the configuration settings via web interface

Here we will introduce how to update firmware of the MDC-700 step-by-step.

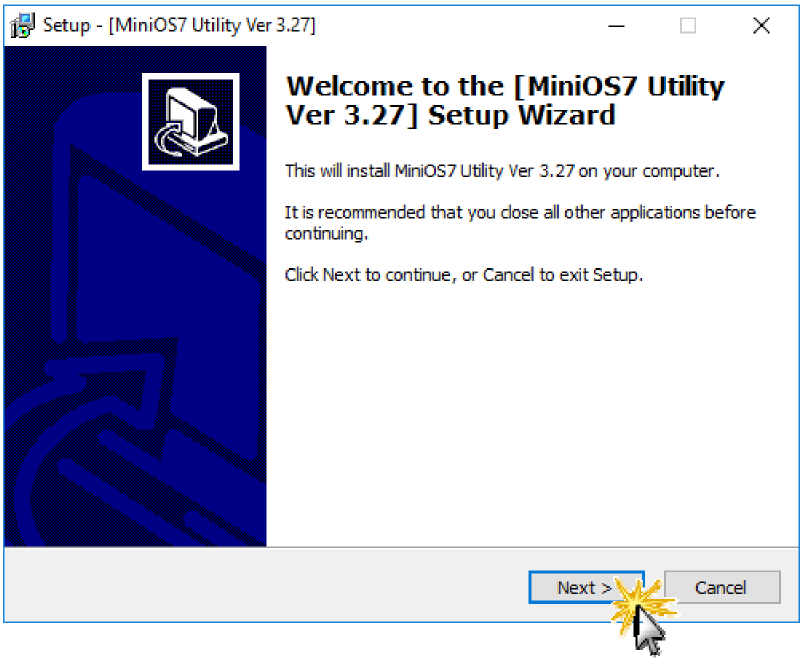
1. Install MiniOS7 Utility

STEP 1: Download the installation file of the MiniOS7 Utility to your computer

The installation file can be obtained from:

http://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/utility/minios7_utility/old/

Step 2: Run the downloaded file to start the installation process. It will lead you through the installation step by step



Welcome to the [MiniOS7 Utility Ver 3.27] Setup Wizard

This will install MiniOS7 Utility Ver 3.27 on your computer.

It is recommended that you close all other applications before continuing.

Click Next to continue, or Cancel to exit Setup.

Step 3: After the installation is finished, the icon named “MiniOS7 Utility Ver 3.27” will appear on the desktop and the Program sub-menu “ICPDAS” of the start menu

2. Upgrade Firmware using the MiniOS7

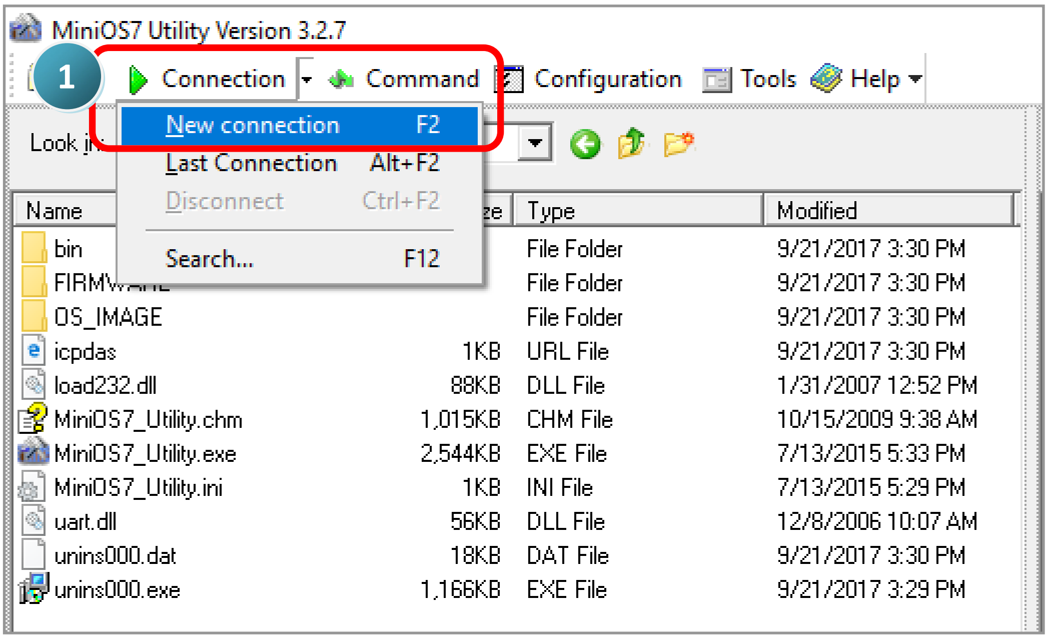
The firmware update requires a TCP/IP connection. Connect the MDC-700 to a network whenever possible.

Step 1: Use an Ethernet cable to connect the MDC-700 to the computer

After plugging the Ethernet cable, the Link/Act and 10/100 indicator LEDs come on or start flashing to indicate a connection was made.

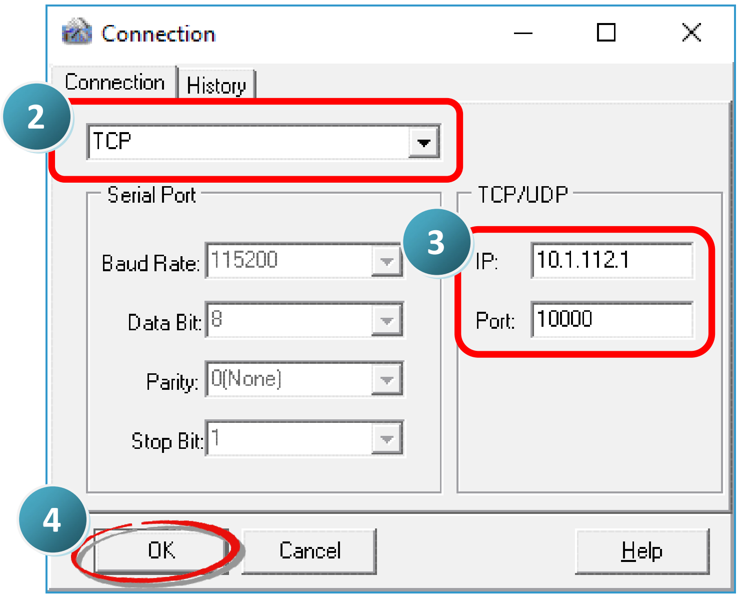
Step 2: Establishing a connection between the MiniOS7 Utility and the MDC-700

Launch the MiniOS7 Utility and then select **New Connection** on the Connection menu.



Name	ze	Type	Modified
bin		File Folder	9/21/2017 3:30 PM
FIRMWARE		File Folder	9/21/2017 3:30 PM
OS_IMAGE		File Folder	9/21/2017 3:30 PM
icpdas	1KB	URL File	9/21/2017 3:30 PM
load232.dll	88KB	DLL File	1/31/2007 12:52 PM
MiniOS7_Utility.chm	1,015KB	CHM File	10/15/2009 9:38 AM
MiniOS7_Utility.exe	2,544KB	EXE File	7/13/2015 5:33 PM
MiniOS7_Utility.ini	1KB	INI File	7/13/2015 5:29 PM
uart.dll	56KB	DLL File	12/8/2006 10:07 AM
unins000.dat	18KB	DAT File	9/21/2017 3:30 PM
unins000.exe	1,166KB	EXE File	9/21/2017 3:29 PM

On the "**Connection**" tab of the "Connection" dialog, select "**TCP**" from the dropdown list, type the IP address of MDC-700, and then click OK button.



TCP

Serial Port

Baud Rate: 115200

Data Bit: 8

Parity: 0(None)

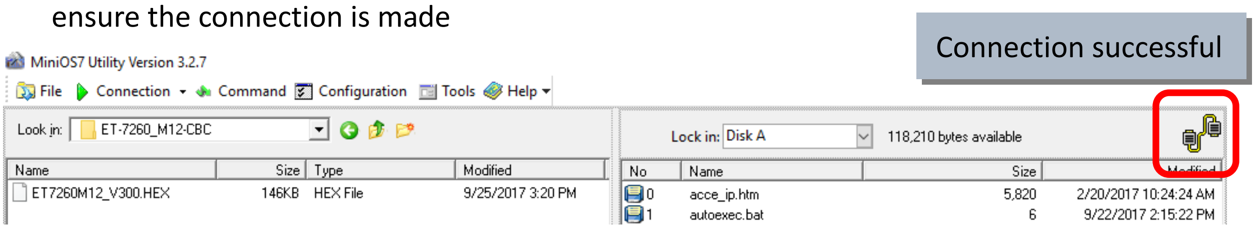
Stop Bit: 1

TCP/UDP

IP: 10.1.112.1

Port: 10000

Step 3: Look for the connector symbol at the upper right-hand corner of the MiniOS7 Utility to ensure the connection is made



Look in: ET-7260_M12-CBC

Name	Size	Type	Modified
ET7260M12_V300.HEX	146KB	HEX File	9/25/2017 3:20 PM

Lock in: Disk A 118,210 bytes available

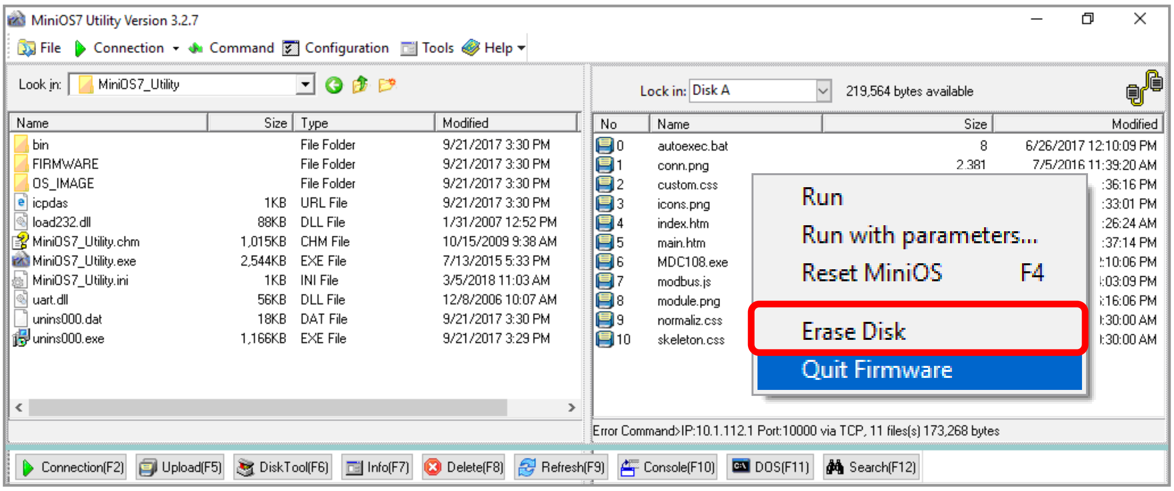
No	Name	Size	Modified
0	acce_ip.htm	5,820	2/20/2017 10:24:24 AM
1	autoexec.bat	6	9/22/2017 2:15:22 PM

If the connection fails, make sure that:

- An Ethernet cable is connected securely to both the MDC-700 and your computer
- The MDC-700 is active (powered on)
- The IP address of MDC-700 is correct
- No firewall is blocking the connection

Step 4: Delete the original files from the MDC-700

After establishing a connection, select “Erase Disk” from Command menu (or right-click on the right of window) to delete all files existed on the MDC-700.



Look in: MiniOS7_Utility

Name	Size	Type	Modified
bin		File Folder	9/21/2017 3:30 PM
FIRMWARE		File Folder	9/21/2017 3:30 PM
OS_IMAGE		File Folder	9/21/2017 3:30 PM
icpdas	1KB	URL File	9/21/2017 3:30 PM
load232.dll	88KB	DLL File	1/31/2007 12:52 PM
MiniOS7_Utility.chm	1,015KB	CHM File	10/15/2009 9:38 AM
MiniOS7_Utility.exe	2,544KB	EXE File	7/13/2015 5:33 PM
MiniOS7_Utility.ini	1KB	INI File	3/5/2018 11:03 AM
uart.dll	56KB	DLL File	12/8/2006 10:07 AM
unins000.dat	18KB	DAT File	9/21/2017 3:30 PM
unins000.exe	1,166KB	EXE File	9/21/2017 3:29 PM

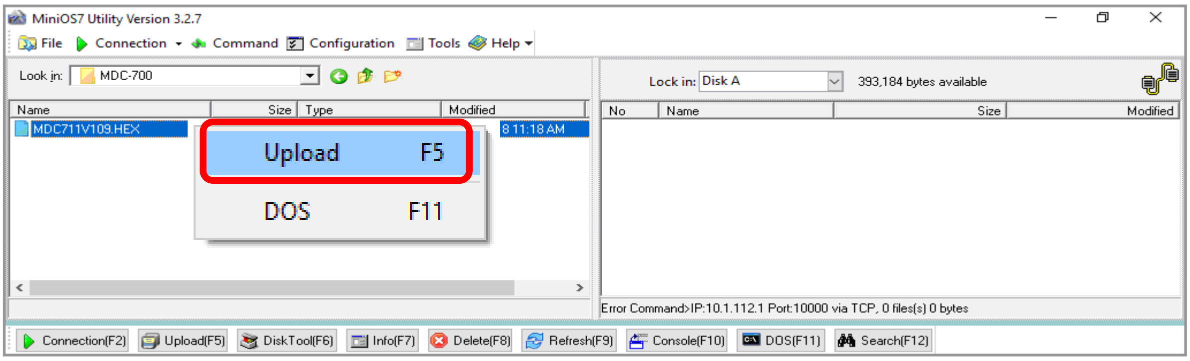
Lock in: Disk A 219,564 bytes available

No	Name	Size	Modified
0	autoexec.bat	8	6/26/2017 12:10:09 PM
1	conn.png	2,381	7/5/2016 11:39:20 AM
2	custom.css		:36:16 PM
3	icons.png		:33:01 PM
4	index.htm		:26:24 AM
5	main.htm		:37:14 PM
6	MDC108.exe		:10:06 PM
7	modbus.js		:03:09 PM
8	module.png		:16:06 PM
9	normaliz.css		:30:00 AM
10	skeleton.css		:30:00 AM

Error Command>IP:10.1.112.1 Port:10000 via TCP, 11 file(s) 173,268 bytes

Step 5: Upload the firmware file to MDC-700

Right-click on the MDC7XXV109.HEX file and select Upload from the menu.



Look in: MDC-700

Name	Size	Type	Modified
MDC711V109.HEX			8 11:18 AM

Lock in: Disk A 393,184 bytes available

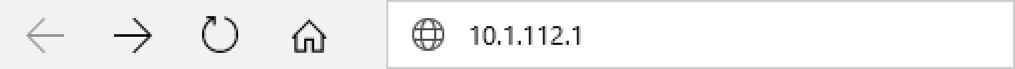
No	Name	Size	Modified

Error Command>IP:10.1.112.1 Port:10000 via TCP, 0 file(s) 0 bytes

Step 6: Wait until the firmware update is finished, and then power cycle the MDC-700.

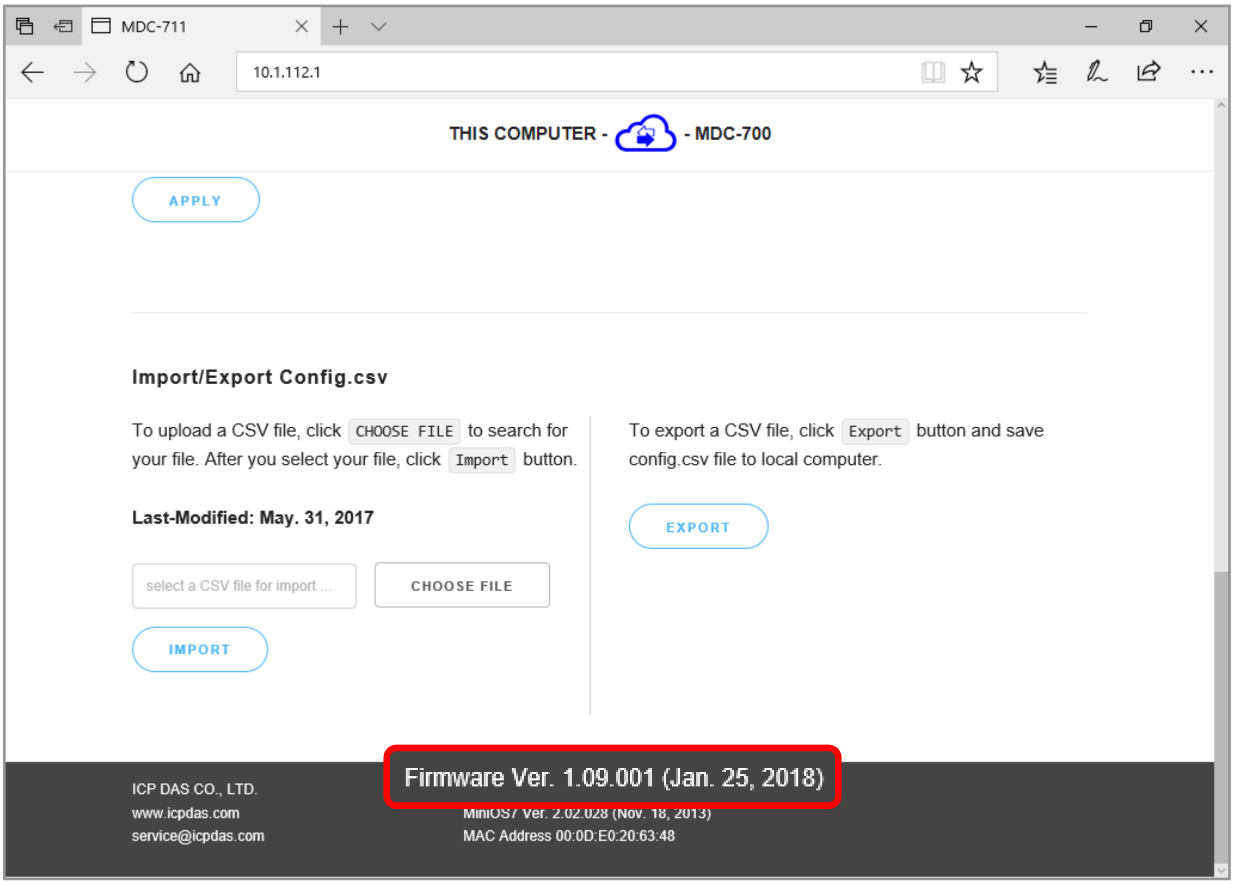
3. Check the Firmware Version

Step 1: Open a web browser and enter the IP address of the MDC-700 in the URL.



10.1.112.1

Step 2: Check the version information at the bottom of the page.



Import/Export Config.csv

To upload a CSV file, click CHOOSE FILE to search for your file. After you select your file, click Import button.

Last-Modified: May. 31, 2017

To export a CSV file, click Export button and save config.csv file to local computer.

ICP DAS CO., LTD.
www.icpdas.com
service@icpdas.com

Firmware Ver. 1.09.001 (Jan. 25, 2018)
MiniOS7 Ver. 2.02.028 (Nov. 18, 2013)
MAC Address 00:0D:E0:20:63:48

Q7: Why does the page not display correctly in my browser?

A7: After the firmware version 1.08 was released, the MDC module adopts HTML5 in place of Flash. HTML5 is supported in all modern browsers, but not the older browsers like IE8 and below. If your browser does not support the HTML5, it cannot render the page correctly. It is recommended to use a newer browser.

The browsers support HTML5:

Windows Edge 14 or later

Windows IE9/IE10/IE11 or later

Google Chrome 55 or later

Mozilla Firefox 50 or later

Apple Safari 9.1 or later

Opera 42 or later

If the MDC-700 module is running with firmware version 1.06 or earlier, the page 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/debug_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.

Appendix

A: The differences between Firmware V. 1.06 and V. 1.08

	Firmware V. 1.06	Firmware V. 1.08
Modbus RTU		
Polling Definition	240 Max.	250 Max.
Max. Register Count in one Polling Definition	64 Max.	125 Max.
The data that Master will obtain while timeout error is occurred	Exception Code	Exception Code, the last correct data or the preset value selectable
Web Interface		
Web technique	Flash	HTML5
Scan Time for each COM port	-	Yes

Revision History

Revision	Date	Description
1.0.0	2014/11	First released
1.0.1	2015/07	Added description for MDC-741.
1.0.1	2015/11	Added dimensions, appearance information and Troubleshooting, FAQ sections.
1.03	2018/02	- Modified the description for web page for firmware V1.08 - Added Section 2.5. Mounting the Hardware.