



*-power in control*

## DESCRIPTION OF OPTIONS



## TCP/IP Ethernet module user's manual

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The information contained in this document is believed to be accurate at the time of publication, however, DEIF assumes no responsibility for any errors which may appear here and reserves the right to make changes without notice. Please ask your local representative for the latest product specifications before ordering.

Please read this manual carefully before installation, operation and maintenance of the MIC-2 multi-instrument.

The following symbols are used in this user's manual and on the MIC-2 multi-instrument:

 High voltage symbol. Electrical hazard voltage can cause shock, burns or person injury or death. Failure to observe the information may result in injury or death.

 Danger symbol. Observe the information after the symbol to avoid possible injury or death.

 Focus symbol, unintended actions may lead to abnormal instrument behaviour, instrument damage or physical harm.

Installation and maintenance of the MIC-2 multi-instrument should only be performed by qualified, competent personnel trained and experienced in working with high voltages and currents.

This document is not fit for any untrained people. DEIF is not responsible or liable for any damages cause by improper installation and/or operation.

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This manual concerns the Ethernet module for DEIF's MIC-2 multi-instrument. With the Ethernet module, the MIC-2 can be connected to Ethernet networks easily, and it can realise distribution automation based on Ethernet.

Please read this manual carefully before operating or setting the MIC-2 to avoid unnecessary trouble.

Chapter 1 helps you to understand the fundamental concept of Ethernet, and the application points of the Ethernet module.

Chapter 2 describes hardware features of the Ethernet module in detail.

Chapter 3 describes the function application of the Ethernet module in detail.

The Ethernet module is an extended communication module of the MIC-2 unit. With the Ethernet module, the MIC-2 can be linked to the Ethernet easily.

## **1.1 Ethernet introduction**

Ethernet was originally developed by Xerox and then developed further by Xerox, DEC, and Intel. Ethernet uses a Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol, and provides transmission speeds up to 10 Mbps.

Now Ethernet stands for LAN with CSMA/CD protocol.

Ethernet is not a material network, and it is the technology standard. Ethernet is the most current communication standard in LAN. This standard defines the used type of cable and the used method of signal processing in LAN.

Please read the appendix concerning technical data and specifications of the Ethernet module before using it.

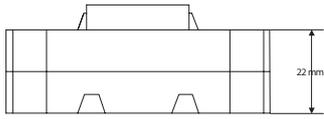
- The Ethernet module supports Modbus/TCP protocol. It is used as a server. The default value of the protocol port is 502, and the user-defined range of the protocol port is 2000~5999. The device address is the same as for the MIC-2.
- The Ethernet module supports SMTP protocol. It has mail function and supports "Send mail for timing" mode and "Send mail for event" mode.
- The Ethernet module supports HTTP protocol. It is used as HTTP server, and the default value of protocol port is 80, and the scope of protocol port is 6000~9999.

The Ethernet module must be linked to the MIC-2 when it is to be used. In addition, the Ethernet module must be the first extended module linked to the MIC-2.

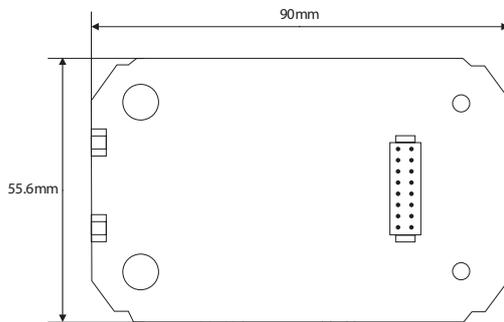


### NOTE

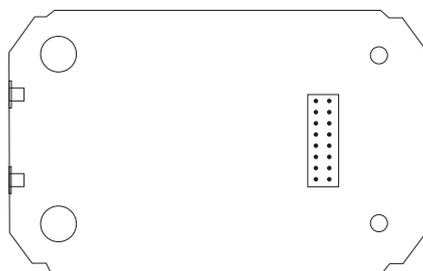
The environment temperature and humidity should meet the requirements of the MIC-2. Otherwise, it may cause damage to the unit.



(Side View)



(Top View)



(Bottom View)

### Environment

Please check the environment temperature and humidity to ensure they fall within the MIC-2 and optional modules requirement before installing the unit.

### Temperature

Operation: -25°C to 70°C

Storage: -40°C to 85°C

### Humidity

5% to 95% non-condensing.

### Position

The MIC-2 and modules should be installed in a dry and dust-free environment. Avoid heat, radiation and high electrical noise sources.

### Installation method

With the link pins, optional modules are linked to the MIC-2 and each other. The maximum number of extended modules linked to MIC-2, including I/O module, Ethernet module and PROFIBUS module, is three. The communication modules must be installed first. No other module can be installed before them.



Disconnect your MIC-2 from any live voltages and currents before following the below instructions!

1. Remove the Ext. Port protection lid.
1. Insert the installation clips in the counterpart of MIC-2, and then press the module gently, so linking is established. Handle the installation with care to avoid damage to the optional module and/or the MIC-2 unit.
2. Tighten the installation screw.
3. Install other modules in the same way.

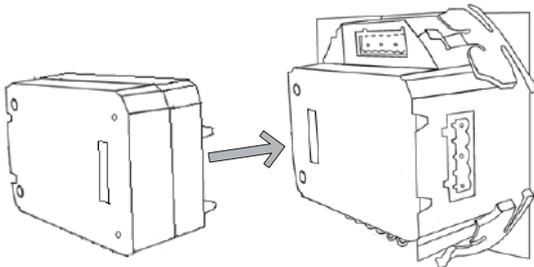
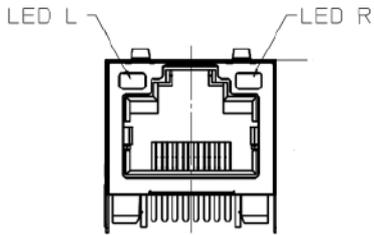


Figure 2-2 Installation of optional modules

The Ethernet module uses standard RJ45 connector access Ethernet network. The mechanical and electrical characteristics of the connector are consistent with the requirements of IEC 603-7.



(Top View)

Script	ID	Content
1	TX+	Tranceive Data+
2	TX-	Tranceive Data-
3	RX+	Receive Data+
4	n/c	Not connected
5	n/c	Not connected
6	RX-	Receive Data-
7	n/c	Not connected
8	n/c	Not connected

LED\_L (yellow): display speed status. LED on indicates 100Mbps, while LED off indicates 10Mbps.

LED\_R (green): display link and activity status combined. LED on indicates link status, while LED flash indicates activity.

Shielded twisted-pair cable (standard 568A or standard 568B) is usually recommended as reference to the EIA/TIA standard.

### 1. Direct connect

The Ethernet module uses cross line (standard 568A) to connect to computers. Users may refer to the third chapter "Function description of Ethernet module" for using the Ethernet module. The module supports Modbus/TCP and HTTP functions for direct connect.

### 2. Indirect connect

The Ethernet module uses straight line (standard 568B) access Ethernet through router or hub. Users may refer to the third chapter "Function description of Ethernet module" for using the Ethernet module.

Details of the Ethernet module will be described in this chapter. It includes how to set parameters of the module, how to get IP address and Mac address of the module, information about Modbus/TCP protocol, how to visit webs, and how to use mail function.

### 3.1 Initialising the Ethernet module

AXM-Net default settings are  
 IP Address (192.168.1.254);  
 Subnet Mask (255.255.255.0);  
 Gateway (192.168.1.1);  
 Primary DNS Server (202.106.0.20).

If you do not know the settings of the module when powering on for the first time, you may use the panel of the MIC-2 to get them and to configure them.

This procedure shows how to configure the Ethernet module settings using the panel:

a) Press "H" key and "V/A" key simultaneously on the MIC-2 will open the menu selecting mode. The cursor "Meter" flashes in this mode.

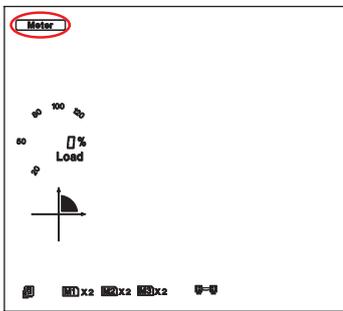


Figure 3-1

b) Press "P" key or "E" key, move cursor to "Setting". Press "V/A" key, go to the meter parameter setting mode. Device address page is the first page of "Setting" mode. It shows the Modbus address of the device for several seconds, and then the screen goes to Access Code page. Press "V/A" key, go to the parameter setting page. Press "P" key or "E" key, move cursor to "NET", press "V/A" key, go to the Ethernet module setting page.

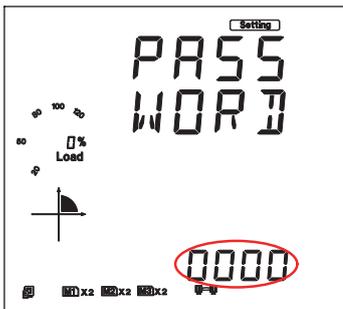


Figure 3-2

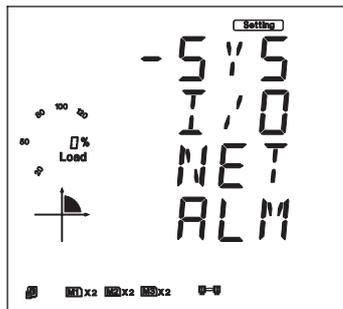


Figure 3-3

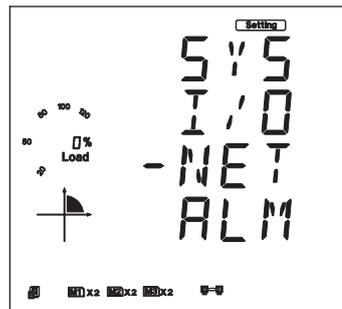


Figure 3-4

c) Set configuration mode in the first setting page. "AUTO" means that users configure module settings with DHCP protocol while "MANU" means that users configure module settings with manual setting. Press "V/A" key, go to setting state, and the pointed area will flash. Press "P" key or "E" key to select configuration mode, press "V/A" key to affirm. Again press "P" key, go to the second setting page for IP Address.

Note: If you select the "AUTO" mode, please go to step k) directly and reset the module. Wait until the reset is finished and find the new IP address in



Figure 3-5

d) Set IP Address in the second setting page, such as 192.169.1.100 as shown below. Press "V/A" key, go to setting state. Users may set parameter in the pointed area, and cursor starts at the first digit bit. After setting IP Address completely, press "V/A" key to affirm. Again press "P" key, go to the third setting page for Subnet Mask.

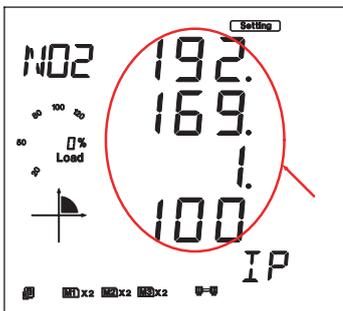


Figure 3-6

e) Set Subnet Mask in the third setting page, such as 255.255.255.0. Press "V/A" key, go to setting state. Users may set parameter in the pointed area, and cursor starts at the first digit bit. After setting Subnet Mask completely, press "V/A" key to affirm. Again press "P" key, go to the fourth setting page for Gateway.

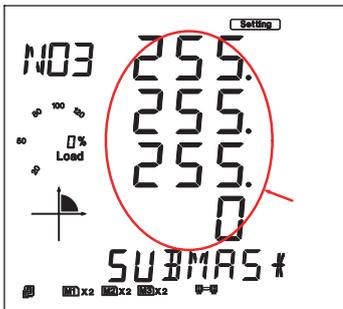


Figure 3-7

f) Set Gateway in the fourth setting page, such as 192.169.1.1. Press "V/A" key, go to setting state. Users may set parameter in the pointed area, and cursor starts at the first digit bit. After setting Gateway completely, press "V/A" key to affirm. Again press "P" key, get into the fifth setting page for DNS Primary Server.

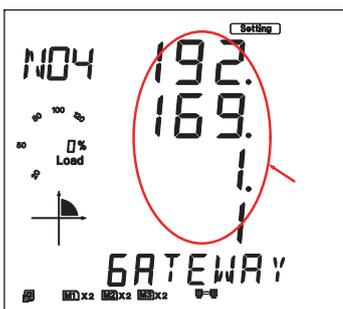


Figure 3-8

g) Set DNS Primary Server in the fifth setting page, such as 202.106.0.20. Press “V/A” key, go to setting state. Users may set parameters in the pointed area, and cursor starts at the first digit bit. After setting DNS Primary Server completely, press “V/A” key to confirm. Again press “P” key, go to the sixth setting page for DNS Secondary Server.

Note: if you want to use the SMTP function, DNS parameters must be set correctly.

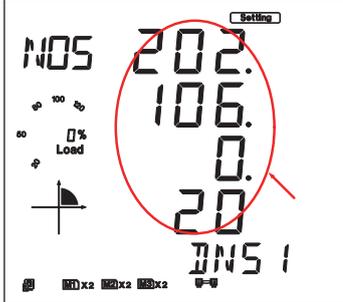


Figure 3-9

h) Set DNS Secondary Server in the sixth setting page, such as 202.106.196.115. Press “V/A” key, go to setting state. Users may set parameter in the pointed area, and cursor starts at the first digit bit. After setting DNS Secondary Server completely, press “V/A” key to confirm. Again press “P” key, go to the seventh setting page for Modbus/TCP port.

Note: if you want to use SMTP function, DNS parameters must be set correctly.

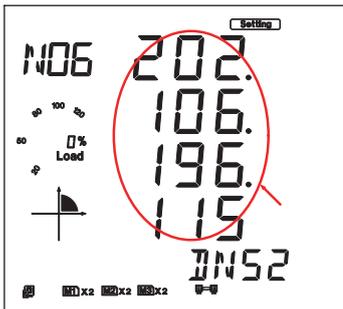


Figure 3-10

i) The password of AXM-NET module can be reset. Select “RESET”, the password is changed to “12345678”. “NO” means no change. Then press “V/A” key to confirm. Set Modbus/TCP port in the seventh setting page, such as 502. Press “V/A” key, go to setting state. Users may set parameter in the pointed area, and cursor starts at the first digit bit. After setting Modbus/TCP port completely, press “V/A” key to confirm. Again press “P” key, go to the eighth setting page for HTTP port. Modbus/TCP port’s default value is 502, and the user defined range of port is 2000~5999. If the set port is not in the range, the set port will return default value.

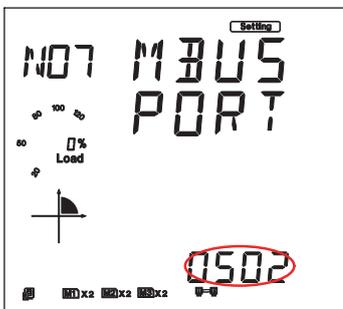


Figure 3-11

j) Set HTTP port in the eighth setting page, such as 80. Press “V/A” key, go to setting state. Users may set parameter in the pointed area, and cursor starts at the first digit bit. After setting HTTP port completely, press “V/A” key to confirm. Again press “P” key, go to the ninth setting page for resetting mode. HTTP port’s default value is 80, and the user defined range of port is 6000~9999. If the set port is not in range, the set port will return default value.

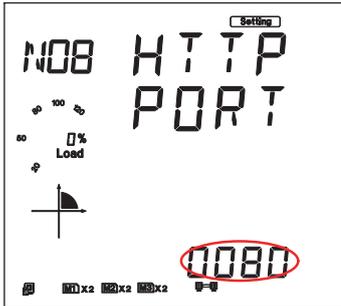


Figure 3-12

k) Set resetting mode in the ninth setting page. Select "RESET" to reset module. Selecting "NO" means not to reset module. Select "DEFAULT" means load module with default settings and reset module. Press "V/A" key, go to setting state, and the pointed area flashes. Press "P" key or "E" key to select configuration mode, press "V/A" key to confirm.

Note: When configuring Ethernet module settings completely, users must select "RESET" to restart the module and new settings will take effect.

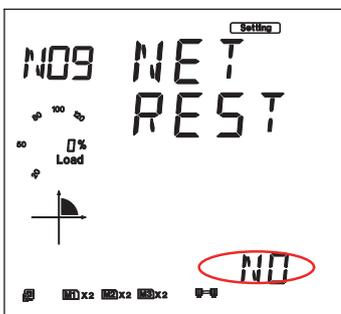


Figure 3-13

l) After configuring AXM-Net settings completely, press "H" key and "V/A" key simultaneously to return to the menu selecting mode. Users can do other operation.

The Modbus/TCP protocol is used for communication in the Ethernet module. The protocol sets up master/slave link in Ethernet. First, master device (client) sets up TCP link with slave device (server). Second, master device sends request frame to slave device, and slave device receives request frame and returns response frame to master device. Figure 3-16 displays the working mode of Modbus/TCP protocol.

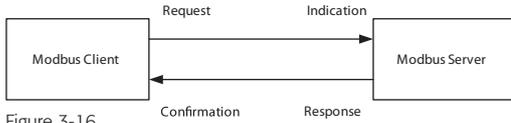


Figure 3-16

## 1. Protocol

### 1) Data Frame Format

MBAP Header	Function	Data
7x8-Bits	8-Bits	Nx8-Bits

### 2) Modbus Application Header (MBAP Header) Field

Modbus application header field is start of data frame, and it is consist of seven bytes.

Field	Length	Description
Transaction Identifier	2 Bytes	Identification of a Modbus Request/Response transaction
Protocol Identifier	2 Bytes	Modbus protocol=0
Length	2 Bytes	Number of following bytes
Unit Identifier	1 Byte	Slave address, in the range of 0~247 decimal.

### 3) Function Field

The function code field of a message frame contains eight bits. Valid codes are in the range of 1~255 decimal. When a message is sent from a client to a server device the function code field tells the server what kind of action to perform.

Code	Meaning	Action
01	Read Relay Output Status	Obtain current status of Relay Output
02	Read Digital Input(DI) Status	Obtain current status of Digital Input
03	Read Data	Obtain current binary value in one or more registers
05	Control Single Relay Output	Force Relay to a state of on or off
16	Write Multiple-registers	Place specific value into a series of consecutive multiple-registers

Table 3-3

### 4) Data Field

The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF hexadecimal. The data field of messages sent from a master to slave devices contains additional information which the slave must use to take the action defined by the function code. This can include items like discrete and register addresses, the quantity of items to be handled, and the count of actual data bytes in the field. For example, if the master requests a slave to read a group of holding registers (function code 03), and the data field specifies the starting register and how many registers are to be read. If the master writes to a group of registers in the slave (function code 10 hexadecimal), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

## 2. Format of communication

Explanation of frame

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	06H	01H

Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo
03H	40H	00H	00H	48H

Table 3-4

As shown in table 3-4 the meaning of each abbreviated word is:

Transaction identifier hi: Transaction identifier high byte

Transaction identifier lo: Transaction identifier low byte

Protocol identifier hi: Protocol identifier high byte

Protocol identifier lo: Protocol identifier low byte

Length hi: length high byte

Length lo: length low byte

Unit identifier: slave address

Fun: function code

Data start reg hi: start register address high byte

Data start reg lo: start register address low byte

Data #of regs hi: number of register high byte

Data #of regs lo: number of register low byte

### 1) Read Status Relay (Function Code 01)

Function Code 01

This function code is used to read relay status in the MIC-2.                      1 = On                      0 = Off

There are 8 Relays in the MIC-2, and the start address is 0000H. The following query is to read 2 Relays Status of MIC-2 Address 1.

### Query

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	06H	01H

Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo
01H	00H	00H	00H	02H

Table 3-5 Read 2 Relays Status Query Message

### Response

The MIC-2 response includes MBAP Header, function code, quantity of data byte, the data. An example response to read the status of Relay 1 and Relay 2 is shown as Table 3-6. The status of Relay 1 and Relay 2 is responding to the last 2 bit of the data.

Relay 1: bit0                      Relay 2: bit1

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	04H	01H

Fun	Byte count	Data
01H	01H	02H

The content of the data is,

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	0
MBS						LSB	

(Relay 1 = OFF , Relay 2=ON)

Table 3-6 Read 2 Relays Status Response Message

### 2) Read Status of DI (Function Code 02)

Function Code 02                      1 = On                      0 = Off

There are 38 DIs in MIC-2, and the start address is 0000H. The following query is to read the 4 DIs Status of address 1 of MIC-2.

### Query

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	06H	01H

Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo
02H	00H	00H	00H	04H

Table 3-7 Read 4 DIs Query Message

### Response

The response includes MBAP Header, function code, quantity of data characters, the data characters. An example response to read the status of 4 DIs (DI1=On, DI2=On, DI3=On, DI4= On) is shown in Table 3-8. The status of each is responding to the last 4 bit of the data.

DI1: bit0

DI2: bit1

DI3: bit2

DI4: bit3

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	04H	01H

Fun	Byte count	Data
02H	01H	0FH

The content of the data is,

7	6	5	4	3	2	1	0
0	0	0	0	1	1	1	1
MSB					LSB		

Table 3-8 Read 4 DIs Response Message

### 3) Read Data (Function Code 03)

### Query

This function allows the users to obtain the measurement results of MIC-2.

Table 3-9 is an example to read the 6 measured data (Time) from server device address 1, the data start address is 1040H.

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	06H	01H

Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo
03H	10H	40H	00H	06H

Table 3-9 Read Time Query Message

### Response

An example response to read Time (2006-12-18 14:15:20) is shown as Table 3-10.

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	0FH	01H

Fun	Byte count	Data1 hi	Data1 lo	Data2 hi	Data2 lo	Data3 hi	Data3 lo	Data4 hi	Data4 lo	Data5 hi	Data5 lo	Data6 hi	Data6 lo
03H	0CH	07H	D6H	00H	0CH	00H	12H	00H	0EH	00H	0FH	00H	14H

Table 3-10 Read Time Response Message

### 4) Control Relay (Function Code 05)

### Query

The message forces a single relay either on or off. Any relay that exists within the MIC-2 can be forced to be either status (on or off). The address of Relay starts at 0000H, and MIC-2 has eight Relay. The data value FF00H will set the relay on and the value 0000H will turn it off; all other values are illegal and will not affect that relay.

The example below is a request to the MIC-2 address 1 to turn on Relay 1.

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	06H	01H

Fun	Data start reg hi	Data start reg lo	Value hi	Value lo
05H	00H	00H	FFH	00H

Table 3-11 Control Relay Query Message

### Response

The normal response to the command request is to retransmit the message as received after the Relay status has been altered.

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	06H	01H

Fun	Data start reg hi	Data start reg lo	Value hi	Value lo
05H	00H	00H	FFH	00H

Table 3-12 Control Relay Response Message

5) Preset/Reset Multi-Register (Function Code 16)

### Query

Function code 16 allows the user to modify the contents of a Multi-Register. The example below is a request to an MIC-2 address 1 to preset CT1 (500) and CT2 (5). CT1 data address is 1008H, and CT2 data address is 1009H.

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	0BH	01H

Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo	Byte count	Value1 hi	Value1 lo	Value2 hi	Value2 lo
10H	10H	08H	00H	02H	04H	01H	F4H	00H	05H

Table 3-13 Preset CT Value Query Message

### Response

The normal response to a preset Multi-Register request includes MBAP Header, function code, data start register, the number of registers.

Transaction identifier hi	Transaction identifier lo	Protocol identifier hi	Protocol identifier lo	Length hi	Length lo	Unit identifier
00H	00H	00H	00H	00H	06H	01H

Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo
10H	10H	08H	00H	02H

Table 3-14 Preset Multi-Registers Response Message

For further details, please refer to chapter five of the MIC-2 installation instructions and reference handbook.

When using the Modbus/TCP function, DEIF recommends setting the Scan Interval and Frame Interval below 1000ms for optimum performance.

The Ethernet module supports HTTP protocol and has a web server function. The Ethernet module supports IE browser 6.0 and higher and the webpage settings only support ASCII characters. The default IP address of module is "192.168.1.200".

## 1. Main webpage

Users put the correct IP address and correct HTTP port of module in the address of IE Browser, and enter "Index" webpage. "Index" webpage supplies links to enter "Data" webpage or "Settings" Webpage or "Module Status" webpage.

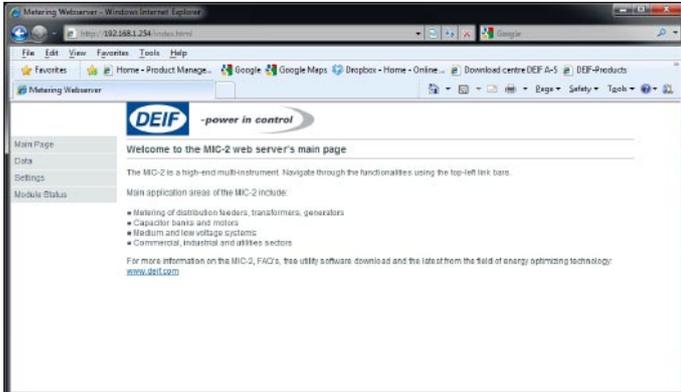


Figure 3-18

## 2. Module Status webpage

Click "Module Status" link to enter module status webpage. The webpage shows the state and settings of the module.

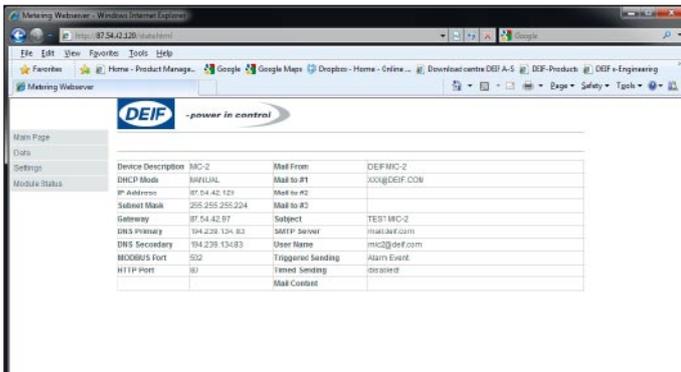


Figure 3-19

## 3. Settings webpage

Click “Settings” link to enter the settings webpage. First IE Browser enters “Password” webpage. The default password is 12345678. There are five kinds of setting webpages. They are “Network Settings” webpage, “Mail Settings” webpage, “Webpage Settings” webpage, “Load Default” webpage, and “Password Setting” webpage.

### 1) “Password” Webpage

Figure 3-20: “Password” webpage. If the password is valid, IE Browser will enter “Network Settings” webpage, if not, the message “invalid password” will appear.

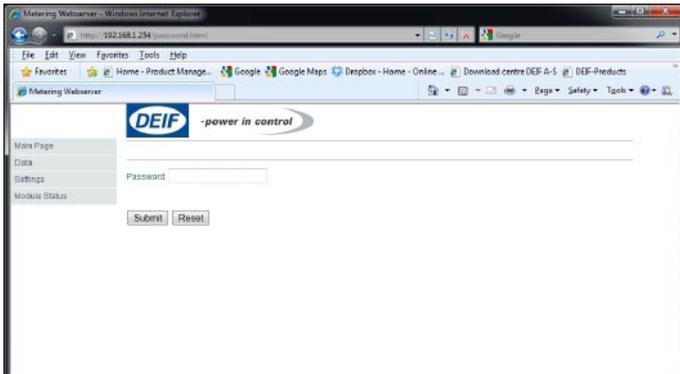


Figure 3-20

### 2) “Network Settings” Webpage

Figure 3-21: “Network Settings” webpage. It supports two network setting modes: Manual or Auto. Except for network setting mode, there are two port settings in webpage. One is the HTTP port, and the other is the Modbus-TCP port. The default value of Modbus-TCP port is 502, and the user-defined range is 2000~5999. The default value of HTTP port is 80, and the user-defined range is 6000~9999.

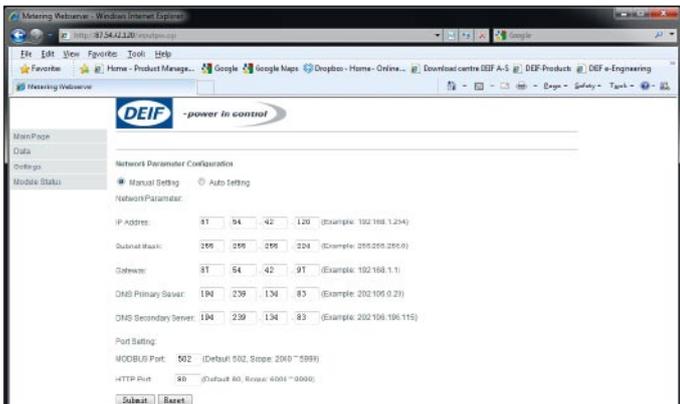


Figure 3-21

### 3.3 “Mail Settings” webpage

Figure 3-22: “Mail Settings” webpage. The select mode of mail includes “Triggered Sending” mode, “Timed Sending” mode, both “Triggered Sending” and “Timed Sending” mode, “None” mode. Every mode requires you to fill out the blanks marked with “\*”. “Triggered Sending” mode means when the meter detects new events, users will receive the mail of the events in their mail box, which includes “Alarm Event” and “SOE Event”. “Timed Sending” mode sends users mails at defined intervals, mail contents including: “Metering”, “Energy”, “Harmonics”, “Sequence”, “Max and Min”, “Alarm Record”, “SOE Record”. The value of time interval can be set by users.

Setting “Triggered Sending” mode, users just select one or all of checkboxes below “Triggered Sending”, including “Alarm Event” and “SOE Event” as you can see on the webpage. Do not select any of them, “Triggered Sending” mode is disabled.

Setting “Timed Sending” mode, users should fill out a number into the blank beside “Timed Sending”, which means interval time between two mails. The range of the number is 5~1440, the default value is 0, which means this mode is disabled. Then select checkboxes below the mode just like above.

Both “Triggered Sending” and “Timed Sending” mode setting require users to select checkboxes below “Triggered Sending” and “Timed Sending” mode.

“None” mode requires “Triggered Sending” and “Timed Sending” to be disabled.

Note: The mail server part includes “SMTP Server”, “User Name” and “Password”. “SMTP Server” can be a domain name such as “mail.deif.com” or an address such as “222.128.6.73”. “User Name” is for instance “xxx@deif.com”. “Password” is for instance “mic2@deif.com”.

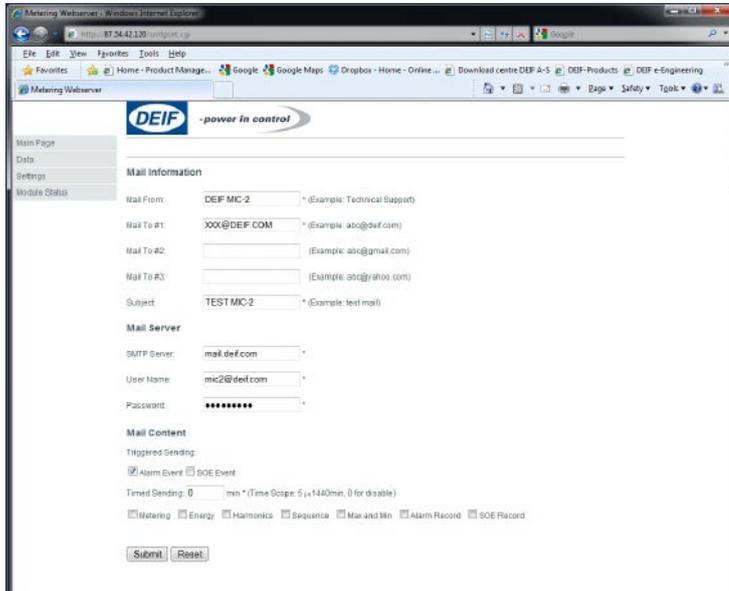


Figure 3-22

#### 4) “Webpage Settings” Webpage

Figure 3-23: “Webpage Settings” webpage. Name the MIC-2 insert a name in the “Device’s Description”.

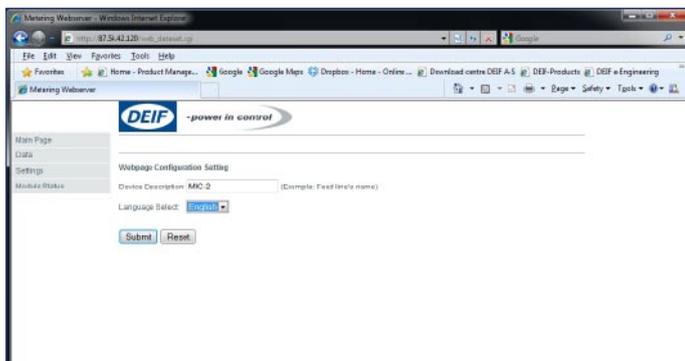


Figure 3-23

### 5) "Load Default" Webpage

Figure 3-24: "Load Default" webpage. Reset AXM-NET Module means resetting the module itself. Select load Default settings and the following settings will take effect:

IP Address:192.168.1.254  
Subnet Mask:255.255.255.0  
Gateway:192.168.1.1  
DNS Primary: 202.106.0.20  
DNS Secondary: 202.106.196.115  
MODBUS Port: 502  
HTTP Port: 80

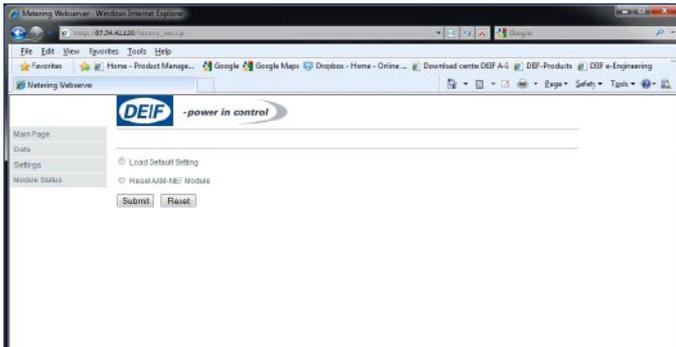


Figure 3-24

### 6) "Password Setting" webpage

Figure 3-25: "Password Setting" webpage. Change the password, users need to input the current password first.

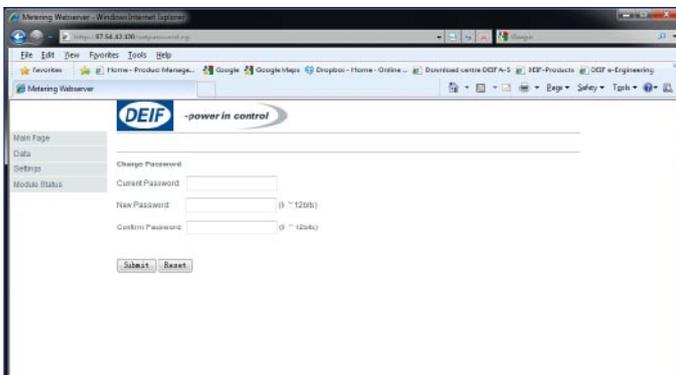


Figure 3-25

## 4. Data Webpage

Click "Data" Link to visit data webpages. There are seven kinds of data webpages: "Metering", "Energy", "Harmonics", "Sequence", "Max and Min", "Alarm Record", and "SOE Record". Each webpage shows the working status of the MIC-2.

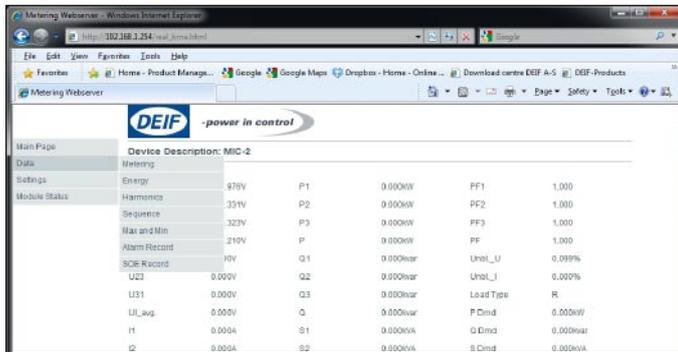


Figure 3-26

"Metering" webpage includes the data of real-time parameters for the MIC-2. There are 39 parameters, such as Volts 1N, L1, Watt 1.

"Energy" webpage includes the data of energy for the MIC-2. There are nine parameters, such as Delivered kWh, kVAh.

"Harmonics" webpage includes harmonics parameters for the MIC-2, such as THD Volts Average.

"Sequence" webpage includes the sequence and angle parameters for the MIC-2. There are 15 parameters, such as positive sequence of V1, the angle V2 to V1.

"Max and Min" webpage includes the max and min data of parameters for the MIC-2. There are 25 parameters, such as Volts 1N, I1, and Watt Total(Demand).

"Alarm Record" webpage includes alarm records for the MIC-2. There are 16 groups record. Each record includes Time Stamp, Limit ID, Status, Alarm Channel and Value.

"SOE Record" webpage includes SOE record for the MIC-2. There are 20 groups record. Each record includes Time Stamp, DI Status.

The Ethernet module supports SMTP protocol to render mail functionality possible. Before sending mails, users must set their own DNS Server. Please refer to "Network settings" which includes DNS Server setting.

There are three modes users can select. The first is "Triggered Sending", which means once new events happens, users can receive the mail on that immediately. The second is "Timed Sending" mode. Users can receive mails at defined intervals, which includes all information on "data Webpage".

The third mode is both "Triggered Sending" and "Timed Sending" available.

Users can set mail function for their own need according to "Mail Settings" Webpage.