7 MODULAR with MODBUS RTU

THREE PHASE DIN RAIL ENERGY METER

INTRODUCTION

Modular DIN Rail Products offer a wide range of functions to be integrated in electrical installations with significant benefits for the user, we have complete range of DIN-mounted electricity Meters together with communication options. It is designed for high level performance and are safe and fast to install.

The meters are available in several configurations to suite different applications, with the increasing energy cost, measuring of the electricity consumption is getting more and more important, If you can identify where you have used you are one step closer to reducing your energy cost, Now start to make energy usage smarter.

FUNCTIONS

♦ Meter case: ABS anti flaming, environment friendly material

♦ Dimension: 125mm width, 88mm length, 68mm height

♦ Display: LCD display 6+2 digits

♦ Standard configuration pulse output passive (polarity)

♦ Forward active energy and reverse active energy measurement

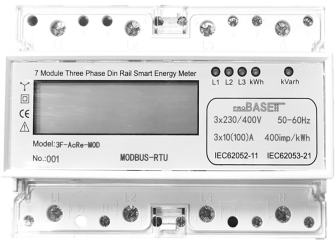
♦ Directly connect operation, Maximum 100A or through external current transformer

♦ Approved by international standard IEC62052-11, IEC62053-21

♦ Communicate RS485 Modbus RTU protocol, baud rate: 1200~9600bps

♦ Voltage (V); Current (A); Frequency (Hz); Active Power (KW); Power factor (COS)

♦ Reactive power(kVar), Reactive Energy(KVarh)

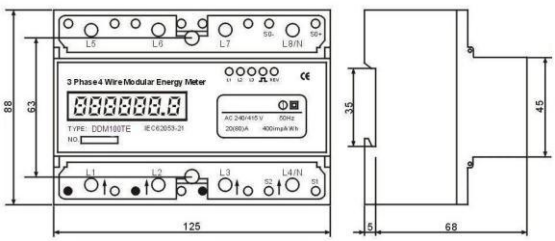


Modbus RTU Protocol

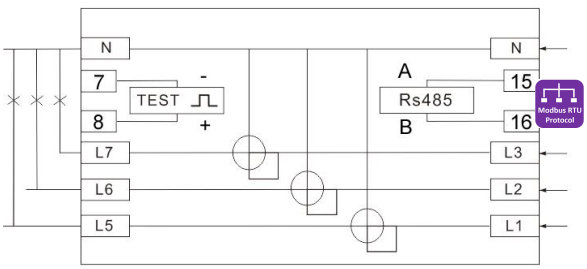
TECHNICAL PARAMETERS

Model NO.	3F-AcRe-MOD-7
Accuracy	Active Class 1.0; Reactive Class 2.0
Installation	35mm Din Rail Mounted
Rated voltage	3x230/400V
voltage range	0.8 ~ 1.2Un
Rated current	1.5(6)A, 10(100)A
Operation current range	0.05Ib~ Imax
Starting current	0.4%Ib
Rated frequency	50-60 Hz
Power consumption	1W / 8VA Per Phase
Impulse constant	400imp/kWh, 3200imp/kWh
Relative humidity	≤ 85%
Operation temperature	-20°C ~ +55°C
Insulation capabilities	AC voltage withstand 4kV for 1 minute Impulse voltage withstand 6kV - 1.2/50μs waveform

DIMENSION



WIRING DIAGRAM



MODBUS MAP

The format (11 bits)for each byte in RTU mode is:
Bits per byte: 1 start bit
8 data bits,least significant bit sent first 1 bit for parity completion
1 stop bit
Each character or byte is sent in this order (left to right):
Least Significant Bit(LSB).....Most Significant Bit(MSB)

READ REGISTER:

An example of a request to read input register 0-4 from slave address 2 using RTU format, where the registers contains the 32-bit floating point value
0x3F9D70A4(Decimal is 1.23),0x411DEB85(Decimal is9.87).

Request

Field Name	(Hex)
Slave Address	0x02
Function Code	0x03
Starting Address High	0x00
Starting Address Low	0x00
Quantity of Input Register High	0x00
Quantity of Input Register Low	0x04
Check Sum	CRC
Check Sum	CRC

Response

Field Name	(Hex)
Slave Address	0x02
Function Code	0x03
Byte count	0x08
Input Register 0 High	0x3f
Input Register 0 Low	0x9d
Input Register 1 High	0x70
Input Register 1 Low	0xA4
Input Register 2 High	0x41
Input Register 2 Low	0x1D
Input Register 3 High	0xEB
Input Register 3 Low	0x85
Check Sum	CRC
Check Sum	CRC

WRITE REGISTER:

An example of a writing to register 3504(Device ID) the value 12, to slave address 1 in RTU mode

Request

Field Name	(Hex)
Slave Address	0x01
Function Code	0x10
Starting Address High	0x0d
Starting Address Low	0xb0
Quantity of Register High	0x00
Quantity of Register Low	0x01
Byte count	0x02
Register value High	0x00
Register value Low	0x0c
Check Sum	CRC
Check Sum	CRC

Response

Field Name	(Hex)
Slave Address	0x0c
Function Code	0x10
Starting Address High	0x0d
Starting Address Low	0xb0
Quantity of Register High	0x00
Quantity of Register Low	0x01
Check Sum	CRC
Check Sum	CRC

APPENDIX I : METER WITH COMMUNICATION OF RS485-MODBUS (OPTIONAL FUNCTION)

BAUD RATE	9600bps
PARITY	Even
DATA BITS	8
STOP BITS	1

BASIC ENERGY METER

REGISTER ADDRESS (DECIMALISM)	CONTENT	DATA TYPE IEEE-754	READ
0000, 0001	Total active energy（kWh）	Float 32	●
0010, 0011	Reverse active energy (kWh)	Float 32	●

SINGLE PHASE PHASE ADVANCE ENERY METER

REGISTER ADDRESS (DECIMALISM)	CONTENT	DATA TYPE IEEE-754	READ
0000, 0001	Total active energy（kWh）	Float 32	●
0010, 0011	Reverse active energy (kWh)	Float 32	●
0100, 0101	Voltage（V）	Float 32	●
0106, 0107	Current（A）	Float 32	●
0118, 0119	Active power（kW）	Float 32	●
0142, 0143	Total Power Factor	Float 32	●
0144, 0145	Grid frequency（Hz）	Float 32	●

THREE PHASE ADVANCE ENERY METER

REGISTER ADDRESS (DECIMALISM)	CONTENT	DATA TYPE IEEE-754	READ
0000, 0001	Total active energy（kWh）	Float 32	●
0010, 0011	Reverse active energy (kWh)	Float 32	●
0100, 0101	Phase A Voltage（V）	Float 32	●
0102, 0103	Phase B Voltage（V）	Float 32	●

0104, 0105	Phase C Voltage（V）	Float 32	●
0106, 0107	Phase A Current（A）	Float 32	●
0108, 0109	Phase B Current（A）	Float 32	●
0110, 0111	Phase C Current（A）	Float 32	●
0112, 0113	Phase A Active Power (kW)	Float 32	●
0114, 0115	Phase B Active Power (kW)	Float 32	●
0116, 0117	Phase C Active Power (kW)	Float 32	●
0118, 0119	Active power（kW）	Float 32	●
0142, 0143	Total Power Factor	Float 32	●
0144, 0145	Grid frequency（Hz）	Float 32	●

APPENDIX II : SMART METER (OPTIONAL FUNCTION)

OPTIONAL FUNCTION			
0020, 0021	Total reactive energy（kVarh）	Float 32	●
0030, 0031	Reverse reactive energy（kVarh）	Float 32	●
0200, 0201	Last 1 total active energy (kWh)	Float 32	●
0210, 0211	Last 1 Reverse active energy (kWh)	Float 32	●
0220, 0221	Last 1 Total reactive energy（kVarh）	Float 32	●
0230, 0231	Last 1 Reverse reactive energy（kVarh）	Float 32	●
0300, 0301	Last 2 total active energy (kWh)	Float 32	●
0310, 0311	Last 2 Reverse active energy (kWh)	Float 32	●
0320, 0321	Last 2 Total reactive energy（kVarh）	Float 32	●
0330, 0331	Last 2 Reverse reactive energy（kVarh）	Float 32	●
0400, 0401	Last 3 total active energy (kWh)	Float 32	●
0410, 0411	Last 3 Reverse active energy (kWh)	Float 32	●
0420, 0421	Last 3 Total reactive energy（kVarh）	Float 32	●
0430, 0431	Last 3 Reverse reactive energy（kVarh）	Float 32	●
0500, 0501	Last 4 total active energy (kWh)	Float 32	●
0510, 0511	Last 4 Reverse active energy (kWh)	Float 32	●
0520, 0521	Last 4 Total reactive energy（kVarh）	Float 32	●
0530, 0531	Last 4 Reverse reactive energy（kVarh）	Float 32	●

0600, 0601	Last 5 total active energy (kWh)	Float 32	●
0610, 0611	Last 5 Reverse active energy （kWh）	Float 32	●
0620, 0621	Last 5 Total reactive energy（kVarh）	Float 32	●
0630, 0631	Last 5 Reverse reactive energy（kVarh）	Float 32	●
0700, 0701	Last 6 total active energy (kWh)	Float 32	●
0710, 0711	Last 6 Reverse active energy （kWh）	Float 32	●
0720, 0721	Last 6 Total reactive energy（kVarh）	Float 32	●
0730, 0731	Last 6 Reverse reactive energy（kVarh）	Float 32	●
0800, 0801	Last 7 total active energy (kWh)	Float 32	●
0810, 0811	Last 7 Reverse active energy （kWh）	Float 32	●
0820, 0821	Last 7 Total reactive energy（kVarh）	Float 32	●
0830, 0831	Last 7 Reverse reactive energy（kVarh）	Float 32	●
0900, 0901	Last 8 total active energy (kWh)	Float 32	●
0910, 0911	Last 8 Reverse active energy （kWh）	Float 32	●
0920, 0921	Last 8 Total reactive energy（kVarh）	Float 32	●
0930, 0931	Last 8 Reverse reactive energy（kVarh）	Float 32	●
1000, 1001	Last 9 total active energy (kWh)	Float 32	●
1010, 1011	Last 9 Reverse active energy （kWh）	Float 32	●
1020, 1021	Last 9 Total reactive energy（kVarh）	Float 32	●
1030, 1031	Last 9 Reverse reactive energy（kVarh）	Float 32	●
1100, 1101	Last 10 total active energy (kWh)	Float 32	●
1110, 1111	Last 10 Reverse active energy （kWh）	Float 32	●
1120, 1121	Last 10 Total reactive energy（kVarh）	Float 32	●
1130, 1131	Last 10 Reverse reactive energy（kVarh）	Float 32	●
1200, 1201	Last 11 total active energy (kWh)	Float 32	●
1210, 1211	Last 11 Reverse active energy （kWh）	Float 32	●
1220, 1221	Last 11 Total reactive energy（kVarh）	Float 32	●
1230, 1231	Last 11 Reverse reactive energy（kVarh）	Float 32	●
1300, 1301	Last 12 total active energy (kWh)	Float 32	●
1310, 1311	Last 12 Reverse active energy （kWh）	Float 32	●
1320, 1321	Last 12 Total reactive energy（kVarh）	Float 32	●
1330, 1331	Last 12 Reverse reactive energy（kVarh）	Float 32	●

Appendix I.

MODBUS protocol communication parameter explanation:

Meter ID : 1 (Hex) Read Total active energy (kWh) Command:

01 03 00 00 00 02 C4 0B

Respond Command, If the Meter is 100kWh

01 03 04 42 C8 00 00 6F B5

(Eg: If change Meter ID from 01 to 20) **Write**

01 10 0D B0 00 01 02 00 14 60 AF

01(Meter ID) 14（New Meter ID in Hex, 20 in Decimalism）

60 AF（CRC verify）

Meter ID : 1 Revise parity check

01 10 0D B7 00 01 02 00 00 61 17 None

01 10 0D B7 00 01 02 00 01 A0 D7 Odd

01 10 0D B7 00 01 02 00 02 E0 D6 Even

Meter ID : 1 Revise baud rate

01 10 0D B6 00 01 02 04 B0 (63 B2) 1200

01 10 0D B6 00 01 02 09 60 (66 B3) 2400

01 10 0D B6 00 01 02 12 C0 (6C 36) 4800

01 10 0D B6 00 01 02 25 80 (7B F6) 9600

Meter ID : 01 Relay function

On：01 10 0D B8 00 01 02 11 11 AD B4

Off：01 10 0D B8 00 01 02 22 22 F9 51

Register address: 0DB8, 0x1111 is ON, 0x2222 is OFF

Meter ID : 01 Relay Status

01030DBA0001 + CRC

Meter ID : 01 CT/PT setting

CT address : 0DC0

PT address : 0DC1

Read : 01 03 0DC0 00 01 +CRC (HEX)

Respond : 01 03 02 00 64 + CRC (CT value is 100)

CT Setting : 01 10 0D C0 00 01 02 00 0A EB 97 (EB 97 is CRC)

00 0A = CT =10, If CT=100 is 00 64

Respond : 01 10 0D C0 00 01 03 59

PT Setting : 01 10 0D C1 00 01 02 00 64 6B AA (6B AA is CRC)

00 64 = PT = 100

Respond : 01 10 0D C1 00 01 52 99