F-MPM110 Multifunction Power Meter Installation & Operation ManualV1.0



Xiamen Four-Faith Smart Power Technology Co., Ltd.



Danger and warning!

This device can be installed only by professionals.

The manufacturer shall not be held responsible for any accident caused by the failure to comply with the instructions in this manual.

Risks of electric shocks, burning, or explosion

- This device can be installed and maintained only by qualified people.
- Before operating the device, isolate the voltage input and power supply and short-circuit the secondary winding all current transformers.
- Use appropriatevoltage tester to make sure the voltage has been cut-off.
- Put all mechanical parts, doors, or covers in their original positions before energizing the device.
- Always supply the device with the correct working voltage during its operation.

Failure to take these preventive measures could cause damage to equipment or injuries to people.

Operating environment

- Operating temperature: -10℃~+55℃
- Storage temperature: -40°C~+70°C
- Relative humidity: 5%~95%,non-condensing

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- Height: ≤2000m
- Operating power supply: (Have 2 options, please check the label on the meter)



- (1) 85Vac ~265Vac, 85Vdc ~265Vdc, 45-65Hz,10VA
- (2) 100~420Vac, 100~400Vdc, 45~60Hz,10VA
- MAINS supply voltage fluctuations up to ±10 % of the nominal voltage
- Pollution degree: 2
- The product is for indoor use only.

Meaning of the symbols



Attention! This symbol warns you of dangers that could occur during assembly,

commissioning and operation.



Dangerous voltage! Risk of death or serious injury. Disconnect the power before

working on the system and device.



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This Listing Mark is used for products going into the Canadian and US marketplace. It shows that compliance with both Canadian and US requirements for listed products has been met.

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A double insulated electrical appliance means product no only use basic insulation to prevent electric shock, but also including safety measure, such as double insulation or reinforced insulation, but earth protection or protection based on installation conditions is not included.





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1. General Information

F-MPM110 Three Phase Multifunction Power Meter is designed for monitoring and displaying all kinds of electricity parameters. It's widely used in low voltage and medium voltage distribution/ automation system.

F-MPM110 provide the main function as below:

- Real-time measuring data, true RMS
- All energy data (include real energy, multi-tariff energy, history energy, 1st ~13th harmonic energy.
- Power quality analysis
- Demand calculation
- Build-in clock and event log
- Over/ under limit alarm
- Phase sequence checking
- Modbus-RTU / BACnet MS/TP / MODBUS TCP/IP communication (Optional)
- Digital input/ Digital output (DI/ DO)
- Analog input/ Analog output (AI/ AO, optional)
- 2 pulse output (optional) etc.



Measuring Function of F-MPM110 Basic Unit	High class
Voltage, Current, Power (P, Q, S), Power factor,	
Energy (kwh, kvarh in 4 quadrant), CO2(for active energy)	
Frequency, Phase Angle, Demand,	
Max./ min. value (U, I, P, Q),	v
Multi-tariff energy,Load rate	
One RS485 (Modbus-RTU), Real-time clock,	
3 status input + 2 relay output	
Over / under limit alarm	\checkmark
SOE event log	
Voltage/Current unbalance rate,	
THD, 31 st harmonic, Harmonic RMS(0~31 st), Harmonic	
energy (1~13 th),	
Voltage crest factor, Current K factor,	
Voltage deviation, Frequency deviation	
Record for voltage/ frequency deviation,	\checkmark
Record history multi-tariff energy	
Voltage unbalance rate record	
Record Demand Maximum value	
Record real time parameters maximum value	
Running time record	



2. Order Information

Model No.F-MPM110-E - ① - ② - ③ - ④			
Function of basic unit			
E	High class		
①Optional Module			
(Multiple choice, one meter can add no more than 3 modules. One meter			
can add	2pcs of	Module SW or SD, but only 1pcs of other modules.)	
SW DI module: 4 Digital Input (wet contact),		DI module: 4 Digital Input (wet contact),	
SD DI module: 4 Digital Input (dry contact),		DI module: 4 Digital Input (dry contact),	
R DO module: 2 Relay output		DO module: 2 Relay output	
C RS485 module: the 2 nd RS485 port (Modbus-RTU protocol)		RS485 module: the 2 nd RS485 port (Modbus-RTU protocol)	
AC	AO AO module: 2 Analog output (4-20mA)		
AI	AI AI module: 2 Analog input (4-20mA)		
EP Pulse module: 2 pulse output		Pulse module: 2 pulse output	
BA BACnet module: BACnet protocol		BACnet module: BACnet protocol	
64M+TC	64M+TCP/IP 64Mbit Memory (8M byte) + Ethernet Port		
②Rated input voltage(Vph-N/ Vph-ph) and current			
V1	57.7/100V (via PT), 5A		
V2	57.7/100V (via PT), 1A		
V3	220/380V (direct), 5A		
V4	220/380V (direct),1 A		



V5	120/208V (direct), 5A	
V6	240/415V (direct), 5A	
V7	277/480V (direct), 5A	
V8	63.5/110V (via PT), 5A	
V9	120/208V (direct),1 A	
V10	240/415V (direct),1 A	
V11	277/480V (direct),1 A	
V12	63.5/110V (via PT),1 A	
V13	398/690V(direct), 5A	
③Rated input frequency (Not choose will be deem as 50Hz)		
F1	50Hz	
F2	60Hz	
Aux. power supply (Not choose will be deem as P1)		
P1	85~265Vac, 85 ~ 265Vdc, 45-65Hz	
P2	100 ~ 420Vac ,100 ~ 400Vdc, 45~60Hz	

For example:

Order No.: F-MPM110-E-AI-V3-F1-P1 indicates the meter is the basic type +2 Analog input, rated input 220/ 380V, 5A, rated input frequency 50Hz, and the Aux. power supply: 85-265Vac, 85 ~ 265Vdc.



3. Packing list



Packing box included:

1. F-MPM110Basic Unit (and optional modules)

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2. User Manual



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4. Figure and Terminals4.1 Dimension

Unit: mm

Cut size: 90*90mm; panel size: 96x96mm

Depth: 45.1mm (no module); 66.6mm (add module)



4.2Installation

Unit: mm





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4.3 Terminals

4.3.1 Terminal of Basic Unit

No.	Mark	Definition
1	N/-	Negative wire, Aux. power supply AC/ DC 220V
2	L/+	Positive wire, Aux. power supply AC/ DC 220V
3	V1	Phase A voltage
4	V2	Phase B voltage
5	V3	Phase C voltage
6	VN	Voltage neutral line
7	SHLD	RS485 shield
8	485-	RS485 com port -1, negative wire
9	485+	RS485 com port -1, positive wire
10	RL21	Relay output 2, positive
11	RL22	Relay output 2, negative
12	RL11	Relay output 1, positive
13	RL12	Relay output 1, negative
14	SG	Digital input, common earth
15	S3	Digital input 3, positive
16	S2	Digital input 2, positive
17	S1	Digital input 1, positive
18	l1+	In line, phase A current





19	11-	Out line, phase A current
20	12+	In line, phase B current
21	12-	Out line, phase B current
22	13+	In line, phase C current
23	13-	Out line, phase C current

4.3.2 Terminals of DI module (F-MPM110-SW):



Digital Input Module			
(one meter maximum can add 2 DI module)			
No.	Mark	Definition	
PIN1	EX S4(S8)	Digital input 4 (or 8), positive	
PIN2	EX S5(S9)	Digital input 5 (or 9), positive	
PIN3	EX S6(S10)	Digital input 6 (or 10) , positive	
PIN4	EX S7(S11)	Digital input 7 (or 11) , positive	
PIN5	EX SG1 (SG2)	Common earth	



Terminals of DI module (F-MPM110-SD):



Digital Input Module			
(one meter maximum can add 2 DI module)			
No.	Mark	Definition	
PIN1	EX S12(S16)	Digital input 12 (or 16) , positive	
PIN2	EX S13(S17)	Digital input 13 (or 17) , positive	
PIN3	EX S14(S18)	Digital input 14 (or 18) , positive	
PIN4	EX S15(S19)	Digital input 15 (or 19) , positive	
PIN5	EX SG3 (SG4)	Common earth	



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4.3.3 Terminals of DO module (F-MPM110-R):



Relay Output Module			
(One meter can add one DO module only)			
No.	Mark	Definition	
PIN1	EX RL22	Extend relay-2 output 2	
PIN2	EX RL21	Extend relay-2 output 1	
PIN3	NC	Null	
PIN4	EX RL12	Extend relay-1 output 2	
PIN5	EX RL11	Extend relay-1 output 1	



4.3.4 Terminals of AO module (F-MPM110-AO):



Analog Output Module				
(One meter can add one AO module only)				
No.	Mark	Definition		
PIN1	EX AO2	Positive wire, analog output 2		
PIN2	EX AG	Negative wire, analog output 2		
PIN3	NC	Null		
PIN4	EX AO1	Positive wire, analog output 1		
PIN5	EX AG	Negative wire, analog output 1		







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4.3.5 Terminals of AI module (F-MPM110-AI):



Analog Input Module				
(One meter can add one Al module only)				
No.	Mark	Definition		
PIN1	EX AI1	Positive wire, analog input 1		
PIN2	EX AG	Negative wire, analog input 1		
PIN3	NC	Null		
PIN4	EX AI2	Positive wire, analog input 2		
PIN5	EX AG	Negative wire, analog input 2		



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4.3.6 Terminals of RS485 Module (F-MPM110-C):



Extend RS485 Communication Module				
(One meter can add one C module only)				
No.	Mark	Definition		
PIN1	NC	Null		
PIN2	NC	Null		
PIN3	NC	Null		
PIN4	EX 485-	Extend RS485 output, negative		
PIN5	EX 485+	Extend RS485 output, positive		





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4.3.7 Terminals of Pulse Output Module (F-MPM110-EP):



Pulse Output Module				
(One meter can add one EP module only)				
No.	Mark	Definition		
PIN1	EX P1+	Pulse output for kWh, positive		
PIN2	EX P1-	Pulse output for kWh, negative		
PIN3	NC	Null		
PIN4	EX P2+	Pulse output for kvarh, positive		
PIN5	EX P2-	Pulse output for kvarh, negative		



5. Connection Mode and Wiring

F-MPM110 supports 2 kinds of connection mode: 3P4W and 3P3W..



(1) 3-phase 4-wire, no PT, 3CT:



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(2) 3-phase 4-wire, 3PT, 3CT:



(3) 3-phase 3-wire, no PT, 3CT:



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(5) 3-phase 3-wire , 2PT, 3CT:





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3-phase 3-wire, 2PT, 2CT: (6)







6. Display and Key-press Operation

6.1 Display Instruction





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6.2 Keys

6.2.1. General Information

F-MPM110 has a back-light LCD, user-friendly display.

Users can query/ set different information by 4 keys according to the menu prompt.

If press the keys, the back-light will be on lasting for 60s. If no continue pressing key,

the back-light will be off.



6.2.2. Menu Prompt and Keys Instruction

Keys or Prompt	Instruction
>	To next item, it is for menu rolling search
D	Return to previous menu or cancel
SET	Setting
Menu prompt	Enter into the menu of corresponding parameter.



6.3 Map of Display Data





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7. Query Procedure

7.1 Initial Display





7.2 Voltage Value





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Max. Voltage



Record of Voltage Deviation



Menu Prompt:

UP: Page up to next record

DOWN: Page down to previous record

START: Event occurs time

END: Event end time

Special notice: the digit on the right of the number

08-00-00.01

It means: Hour, Minute, Second,

After decimal point, it means the records number



7.3 Current Value



Menu Prompt:

UNBAL: Positive (I-2), Negative (I-1), Neutral (I-0)

Max.: Max. current & time stamp

Min.: Min. current & time stamp





7.4 Frequency





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7.5 Power Value





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7.6Energy





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7.7 Harmonic





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RMS (Harmonic RMS): (Picture 4)

0~31st harmonic RMS for V

0~31st harmonic RMS for I

0~31st harmonic RMS for Ptot

CF: Voltage crest factor (Picture 5)

K-FAC: Current K factor(Picture 6)

ENRGY: kWh of1~13th harmonic

(Picture 7)







7.8 Demand





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POWER: Power demand

IA: Max. demand for la& time stamp(Picture 2)

IB: Max. demand for Ib& time stamp

IC: Max. demand for Ic& time stamp

P: Max. demand for Ptot& time stamp

Q: Max. demand for Qtot& time stamp

S: Max. demand for Stot& time stamp





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7.9 Analog Input (Optional)

Analog input menu:

(If F-MPM110 add the AI module, it will has this menu)

From up to low will be first analog input, second analog input



7.10 Running time display



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8. Setting

8.1 Instruction

In initial display, we can see the "SET" prompt, press F4 to SETUP menu.

Meter display: (Picture 1)

METER: Basic setting

COM: Communication setting

CLEAR: Clear data

RELAY: Relay setting

AO: Analog output setting

LIMIT: Under/Over limit setting

ERROR: Error record

MEM-T: time interval setting for Memory

Enter into parameter setting interface If the parameter can be set, then it will appear "CODE" (Input Password)—Picture 2 If appear "EDIT" (Password right)-Picture 3 METER COM ----- ? Picture 1



Password Edit

Just enter into correct password can set the

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Parameters, press "CODE" button,

"****" change to "0000"

UP: add +1

LEFT: move left 1 digit

ENTER: confirm



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RETURN: give up

EX-Work password is 0001

Super password is 2011

Parameter setting After password confirmation, press "EDIT" key Current setting subject flash, change the parameter Information by UP, LEFT, ENTER, RETURN key If the entered parameter is not correct, after press "ENTER", it will return back to the original parameter

	• 000 P-R 5-E	0050°; 5 ;
UP	LEI	TENTER 7

Notice: "Analog output setting" just effect after plug analog output module

8.2 Setting Site-map

INFO: Basic information

EX-M: Extend module information

PT: PT primary and secondary

setting

CT: CT primary setting





MODE: Connection model

DATE: System date

TIME: System time

DMD: Demand setting

PULSE: Pulse output setting

DEFAU: Restore factory setting

CODE: Password setting

CALIB: Auto calibration

CHECK: Self Check

DEMO: DEBUG mode

RUN-T: Running time setting

Parameter Setting Illustration:

Enter into INFO (meter information) interface, display software version (V-S).

hardware version (V-H), serial number (SN), this interface for checking, can not modify

Enter into EX-M (extend module information) interface, from up to down to display extend module type; null (no extend module), rS485 (communication module), PULSE (pulse output module). DI (digital input module), DO (digital output module). AI (analog input module), AO (analog output), this interface for checking, can not modify

Enter into PT (PT primary and PT secondary) interface, the first line display PT



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Enter into CT (CT primary) interface, the first line display CT primary value, unit A, the second line display system rated current value, unit A. CT primary setting range is 1A—9999A, the setting primary value not less than system rated value

Enter into MODE (connection wiring mode) interface, the second line display at present connection wiring mode

	4y	3 P 4 W	
Connection	3d	3 P 3 W	
Wiring		Single	
Mode	1P	phase	

Enter into DATE (system date) interface, the first line display "Year", the second line display "Month", the third line display "Day". The sequence of setting is Year-Month-Day, just after the first subject setting correct can comes to the next, otherwise will stay in the first subject. Setting range of Year is: 2000-2999, Setting range of Month is: 1-12, Setting range of Day is: 1-31, if there is no 31 days in this month, it will comes to the 1st day of next month

Enter into TIME (system time) interface, the first line display "Hour", the second line display "Minute", the third line display "Second", The sequence of setting is Hour-Minute-Second. Just after the first subject setting correct can comes to the next, otherwise will stay in the first subject. Setting range of Hour is: 0-23, Setting range of



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Enter into DMD (demand setting) interface, if current demand model is Slip, the indicate will be "TYPE"(demand model), "PERIO" (demand cycle), "SLIP" (slip time). If current model is fixed, then there is no "Slip"

Demand	STAC	Fixed model	
mode	SLIP	Slip model	

Enter into PULSE (pulse setting) interface, can set for PUL-1 & PUL-2. "OBJ" is pulse object (the first channel is active, the second channel is reactive), "SONST" is pulse constant, "WIDTH" is pulse width (unit: ms)

Туре	Default	Range	
CONST	1000	1000~9999	
WIDTH	80	60~100	

Enter into DEFAU (restore factory setting) interface, If set to "YES" will start restore

factory setting

Enter into CODE(password setting) interface, can modify the checking password

(super password not be changed), password setting range: 1-9999

Enter into CALIB (auto calibration) interface, choose "YES" and comes to "START"

interface, press "START" and comes to "RMS RATIO BIG"

First length ratio error calibration: after enter into this interface, adjust input signal to

220V/5A/1.0 (voltage: 220V, current: 5A, power factor: 1.0), press "START" key, will



start first length ratio error calibration, the 4th line of data display area will show "WAIT". After calibration, if success, it will show "DONE", press "NEXT" button and come to "RMS DEG BIG(first length angular difference calibration)". Otherwise will display "ERROR", press "NEXT" button will recalibrate the first length ratio error calibration First length angular difference calibration: adjust input signal to 220V/5A/0.5L (voltage: 220V, current: 5A, power factor: 0.5L), calibration process the same. After calibration, press "NEXT" will comes to "RMS RTO SMALL (second length ratio error calibration)" interface

Second length ratio error calibration: adjust input signal to 220V/0.25A/1.0 (voltage: 220V, current: 0.25A, power factor: 1.0), calibration process the same as before. After calibration finish, press "NEXT" will turn to "RMS DEG SMALL(second length angular difference calibration)" interface

Second length angular difference calibration: adjust input signal to

220V/0.25A/0.5L(voltage:220V, current:0.25A, power factor:0.5L), calibration process same as before, after calibration, press "NEXT" will turn to "FINISH" and notice for "END"

Notice: If calibration failed, it will keep the original calibration value, the new calibration value just effect after calibration success.

Enter into CHECK (self check) interface, choose "YES", the meter will start self-check. The meter will check LCD, ferroelectric and button key one by one LCD self check: the LCD will all ON for 4s, then all OFF for 2s Ferroelectric self check: If there is no question on ferroelectric, will display "Hard PASS", otherwise will display "Hard FAIL"



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Enter into DEMO (DEBUG mode) interface, choose "YES" will start DEBUG mode: VPh-N is 220V, VPh-Ph is 381.05V, Current is 5A, Active Power is 1100W, Total active power is 3300W, Reactive power is -500var, Total reactive power is -1500var, Apparent power is 1100VA, Total apparent power is 3300VA, Power factor -0.5, Total power factor is -0.5

Enter into DEMO (DEBUG mode) interface, if choose "NO", display will comes to normal

Notice: If there is pulse output module, "PULSE" interface exist

Enter into Running Time setting interface, if current running control object is Voltage, the button key notice will be "OBJ"(running time object), "HI"(up limit) and "LOW"(low limit). If current running control object is Current, there will be no "LOW"(low limit). If current running control object is Power or Null, there will be no "HI" and "LOW" subject

	nuLL	null
	U	Voltage
Object	А	Current
	P-on	Power



8.3 COM—Communication Setting Menu



8.4 CLEAR—Clearing Data Menu







8.5 RELAY—Relay Setting Menu



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8.6 AO—Analog Output Setting Menu (Optional)



8.7 LIMIT—Deviation Limit Setting Menu



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8.8 ERROR



Note: The meter can record 10 errors for each type. The prompt " A " appears on LCD if there is error. Please contact the After-sales Dept. for solution.



9. Measuring Function Description

Parameter	Accuracy	Resolution	Measuring Range	
			Direct: 5%~120% of rating	
Voltage	0.2%	0.01V	PT primary: 0~65.00kV	
			PT secondary:100Vph-ph or 110V	
Current	0.2%	0.0001.0	CT primary: 0~9,999A	
Current	0.2%	0.0001A	CT secondary: 1 A or 5A	
Damas	0.5%	0.0001	Per phase: 0~649.9MW/ Mvar/ MVA	
Power	0.5%	kW/kvar/ kVA	Total: 0~1949.8MW/ Mvar/ MVA	
Power factor	0.5%	0.001	-1.000~+1.000	
Frequency	1.0%	0.01Hz	45~ 65 Hz	
Active energy	0.5%	0.1kWh	0~ 99,999,999.9 kWh	
Reactive energy	2.0%	0.1kvarh	0~ 99,999,999.9 kvarh	
THD	1.0%	0.001	0~100.0%	
Individual	1.09/	0.001	0 100 0%	
harmonic		0.001	0~100.0%	
Un-balance	1.0%	0.001	0~100.0%	



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9.1 Voltage

F-MPM110 has several type of voltage input for option, as below:

Description	Rated input	Symbol in model No.	Connection	Mode
High voltage	57.7/ 100V	V1, V2		3-phase 3-wire
meter	63.5/110V	V8, V12	VIAPIS	3-phase 4-wire
Low voltage meter	120/208V	V5, V9		
	220/380V	V3, V4		2 phone 2 with
	240/415V	V6, V10	Direct input	3-phase 3-wire
	277/480V	V7, V11		5-phase 4-wire
	398/ 690V	V13		

While measuring voltage lower than 398Vph-N / 690Vph-ph, F-MPM110 do not need to connect external PTs, it can be input directly. While measuring other higher voltage, F-MPM110 need external PTs. If F-MPM110 is connected via PTs, the PTs direct affect the measurement accuracy of the meter. So, users should consider the linearity and accuracy rate of PTs.

Normally, Overload capacity of voltage measurement is 120% of rated voltage. Users should pay attention on the voltage input when using the device, and avoid getting wrong data caused by over-scope measurement. Max. rated measuring range is



65KV.

Connection mode of voltage input can be set via panel or communication.

Four-Faithlow voltage meter and high voltage meter support both 3-phase 3-wire and

3-phase 4-wire

Tips: It is recommended to clear the energy after change the connection mode PT primary setting range: 0.001KV to 65KV, and PT secondary value should be in the range of 1V—398V.

9.2 Current

Only when adopt CTs can F-MPM110 measures current.

CT secondary rated output must comply with rated current input of F-MPM110 (5A or

1A). When connecting external CTs, users must make sure the current is not open

circuit. Otherwise, primary excitation will generate high voltage at secondary circuit,

causing personal injury or death and equipment damage.

Normally, overload capacity of current measurement is 120% of rated current. Users

should pay attention to the current input when using the device, and avoid getting

wrong data caused by over-scope measurement.

Rated measuring range of current is 0to 9999A.

CT primary setting range is from 1A to 9999A, and it should not smaller than the rated current value.



9.3 Active power

F-MPM110 calculates three phase active power and total active power: Pa, Pb, Pc,

and Ptot

Measuring range: per phase 0~ 649.9MW, total: 0~ 1949.8MW.

9.4 Reactive power

F-MPM110 calculates three phase reactive power and total reactive power: Qa, Qb,

Qc, and Qtot

Measuring range: per phase 0~ 649.9MVar, total: 0~ 1949.8MVar

Attention

1. Both active power and reactive power value have signs.

2. When wiring, users should pay attention to the phase sequence of voltage and

current. Otherwise, it may cause wrong measuring data. Besides, it is necessary to

connect the CTs terminals correctly; otherwise there will be negative power value.

9.5 Apparent power

F-MPM110 calculates three phase apparent power and total apparent power: Sa, Sb,

Sc and Stot.

Measuring range: per phase 0~ 649.9MVA, total: 0~ 1949.8MVA



9.6 Power factor

F-MPM110 measures per phase power factor and total power factor: PFa, PFb, PFc and PFtot. Measuring range: -1.000 to +1.000.

Like active / reactive power value, the wiring and CTs terminals connecting will affect actual calculated value of power factor.







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9.7 Frequency

In different connection modes, F-MPM110 samples the system frequency from different channels. In 3-phase 3-wire connection mode, F-MPM110 samples the frequency from line AB voltage channel. In other connection modes, it samples frequency from phase A voltage channel. In case phase A voltage is failure, it samples frequency from phase C voltage channel. In case both phase A and C voltage are failure, it samples from phase B voltage channel.

9.8Phase Angle

F-MPM110 with phase angle measurement function for fundamental wave, phase angle information can be checked by communication.

9.9 Demand calculation

F-MPM110 provides demand analysis for three phase current, total active power, total reactive power and total apparent power.

F-MPM110supports two demand modes: Fixed Block and Rolling Block.

Users can set demand interval as 5min, 10min, 15min, 30min or 60min.

In Fixed Block mode, users do not need to set the subinterval.

In Rolling Block mode, users should set subinterval the subinterval: 1min, 2 min, or 3 min. Show as below sheet:



Optional Intervals (mins)	Programmable Subintervals (mins)
5	1
10	1 or 2
15	1 or 3
30	1, 2, or 3
60	1, 2, or 3

Max. Demand: In nonvolatile memory, F-MPM110 maintains a running maximum for

power and current demand values with date & time stamp, called "Max. Demand".

User can read the demand value from LCD or RS485 communication.

Below figure is a sample of Rolling Block mode:

(Demand intervals is 10 mins, subintervals is2 mins.)







9.10 Phase sequence detect

F-MPM110can detect the voltage phase sequence. After input 3-phase voltage and 3-phase current signals to the meter, users can press the button to display real-time phase voltage or line voltage and see the present phase sequence.

Note: Only after provide 3 phase voltage and current signal to the meter can it detect the phase sequence.





10. Power Quality Analysis

Item	Perometer	Measuring	Accuracy
	Parameter	Range	
	THD for voltage	0~100%	Class B
	TOHD for voltage	0~100%	Class B
тир	TEHD for voltage	0~100%	Class B
טחו	THD for current	0~100%	Class B
	TOHD for current	0~100%	Class B
	TDHD for current	0~100%	Class B
	HR for voltage	2~31 st	Class B
Harmonic Ratio	HR for current	2~31 st	Class B
	Harmonic voltage RMS	0~31 st	Class B
Llarmania DMC	Harmonic current RMS	0~31 st	Class B
	Harmonic power RMS	0~31 st	Class B
	Harmonic energy	1~13 th	Class B
	Voltage crest factor	/	Class B
	Current K factor	/	Class B
Other	Frequency deviation	0~100%	Class B
	Voltage deviation	0~100%	Class B
	Voltage Current unbalance	0~100%	Class B



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10.1General Description

Harmonics are any "non-linear" current or voltage in an electrical distribution system. With these harmonics flowing into the power system, it will affect the reliability of the transformers and protection relays, and it will accelerate the ageing of metalized polyester film, increase the power loss of transmission, and disturb communication or measurement accuracy of instruments.

F-MPM110 provides up to 31stharmonics analysis which is strong helpful for power quality analysis.

10.2 THD

F-MPM110measures voltage and current harmonic up to 31st, and calculates THD, TOHD (Odd) and TEHD (Even).

Users can read THD data (%) from the LCD or communication. For example, the data is 20.00, the actual THD value is 20.00%

10.3 Harmonic Ratio for Voltage

F-MPM110 measures up to 31st voltage harmonic. Users can read 2~31st voltage harmonic (%) from the LCD or communication. For example, the data is 10.00, the actual harmonic value is 10.00%

10.4 Harmonic Ratio for Current

F-MPM110 measures up to 31st current harmonic. Users can read 2~31st current harmonic (%) from the LCD or communication. For example, the data is 10.00, the actual harmonic value is 10.00%



10.5Voltage Crest Factor

F-MPM110 measures 3 phase voltage crest factor, data resolution: 0.001. If no voltage input, the CF value is 0. Users can read CF value from the LCD or communication.

Crest Factor Formula:

 $CF = 1.414 \times \sum_{h=1}^{N} U_h / U_1$

In the formula, U_h is the *h*harmonic RMS, U_1 is fundamental harmonic RMS. *N* is the highest order harmonic.

10.6 Current K Factor

F-MPM110 measures 3 phase current K factor, data resolution: 0.001. If no current input, the K Factor value is 0. Users can read K Factor value from the LCD or communication.

K Factor Formula:

K Factor =
$$\sum_{h=1}^{N} (I_h \times h)^2 / \sum_{h=1}^{N} (I_h)^2$$

In the formula, I_h is the *h*harmonic current ratio, *h* is the harmonic order number, *N* is the highest order harmonic.

10.7 Harmonic Voltage RMS

F-MPM110 measures 0~31stharmonic voltage RMS, data resolution: 0.01V. Users can read every order of harmonic voltage RMS from the LCD or communication.



10.8 Harmonic Current RMS

F-MPM110 measures 0~31stharmonic current RMS, data resolution: 0.0001A. Users can read every order of harmonic current RMS from the LCD or communication.

10.9 Harmonic Power RMS

F-MPM110 measures 0~31stharmonic power (total active power) RMS, data resolution: 0.1W. Users can read every order of harmonic power RMS from the LCD or communication.

10.10 Harmonic Energy

F-MPM110 measures 0~13thharmonic energy (total kWh), data resolution: 0.1 kWh. Users can read every order of harmonic energy from the LCD or communication.

10.11 Frequency Deviation

F-MPM110 calculates the Frequency Deviation, data resolution: 0.01Hz Frequency deviation means the difference between the actual frequency and the nominal frequency

Formula: Frequency Deviation = Actual Frequency – Nominal Frequency

Users can set the *Nominal Frequency* in F-MPM110via communication. There are 50Hz or 60Hz for option.

Besides, F-MPM110 records the over-limit event for frequency deviation. Users can set a limit value for the frequency deviation.

When the real-time frequency deviation is out of limit, F-MPM110 will record the event



with time stamp, its duration time and the Peak value. F-MPM110 can store 30 events log for frequency deviation.

10.12 Voltage Deviation

F-MPM110 calculates 3-phase voltage deviation which is the percentage of deviation compared with its nominal value.

Formula:

Voltage Deviation(%) = (Actual voltage - Nominal voltage)/ Nominal voltage ×100%

In above formula, the *Nominal voltage* is rated voltage. The voltage deviation has a negative or positive sign.

Besides, F-MPM110 records the over-limit event for voltage deviation. Users can set a limit value for the voltage deviation.

When the real-time voltage deviation is out of limit, F-MPM110 will record the event with time stamp, its duration time and the Peak value. F-MPM110 can store 30 events log for voltage deviation.

10.13 Voltage Unbalance Rate

F-MPM110 calculates 3 phase voltage unbalancerate. Data resolution: 1%.

Formula:

$$\varepsilon_{U} = \frac{U_2}{U_1} \times 100\%$$

U1 is 3-phase voltage positive-sequence component RMS

U2 is 3-phase voltage negative-sequence component RMS



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Besides, F-MPM110 records the over-limit event for voltage unbalance. Users can set a limit value for the voltage unbalance.

When the real-time voltage unbalance is out of limit, F-MPM110 will record the event with time stamp, its duration time and the Peak value. F-MPM110 can store 30 events log for voltage unbalance. Meanwhile, F-MPM110 also records the Peak unbalance in present day/ month/ history.

10.14 Current Unbalance Rate

F-MPM110 calculates 3 phase current unbalance rate. Data resolution: 1%. Formula:

Current unbalance rate (%) = $U2/U1 \times 100\%$

U1 is 3-phase current positive-sequence component RMS

U2 is 3-phase current negative-sequence component RMS

Users can check the current unbalance rate by communication and panel button.



11. Energy and Multi-tariff Energy Statics

11.1 General Description

According to the direction of power, F-MPM110 calculates 4 quadrant kWh/ kvarh, apparent energy, multi-tariff energy and history energy data,

F-MPM110accumulates the energy value since it was powered on at the first time. (In that case users clear the energy to 0, the meter will re-accumulate the energy from 0) Until the value reach 99,999,999.9 kWh/ kvarh, it will auto-turnover.

Under different connection mode, F-MPM110 accumulates the energy in different way, as below sheet:

Connection mode	Energy calculation
	Per phase 4 quadrant energy
2 phone 4 wire	Total energy
3-pnase 4-wire	Multi-tariff energy
	History energy
	Total energy
3-phase 3-wire	Multi-tariff energy
	History energy

Note: User can clear the energy to 0 on panel by keys, or clear from communication.

11.2 Active Energy

F-MPM110 calculates the active energy according to the accumulated active power.

And it distinguishes the direction of active/ reactive power to separately calculate per phase/ total active energy in 4 quadrants.

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11.3 Reactive Energy

F-MPM110 calculates the reactive energy according to the accumulated reactive power. And it distinguishes the direction of active/ reactive power to separately calculate per phase/ total reactive energy in 4 quadrants.

11.4 Apparent Energy

F-MPM110 calculates the apparent energy according to the accumulated apparent power.

11.5 Multi-tariff Energy

F-MPM110 statistics the import/ export kWh and import/ export kWh in different tariff. F-MPM110 supports 2 tariff lists. Users can set the 2 lists separately. Each tariff list can be set max. 8 periods in one day and 4 different tariff (F1, F2, F3, F4 means 4 kinds of tariff, and F1 for Sharp, F2 for Peak, F3 for Flat, F4 for Valley).

Below example for setting the tariff lists:

Tariff List	Num. of period	Period order	Starting time (to end time)	Tariff
Tariff List 1		1st period	00:00 (to 03:00)	F1
	8	2nd period	03:00 (to 06:00)	F2
		3rd period	06:00 (to 09:00)	F4
		4th period	09:00 (to 12:00)	F3
		5th period	12:00 (to 15:00)	F1
		6th period	15:00 (to 18:00)	F4
		7th period	18:00 (to 21:00)	F2



		8th period	21:00 (to 00:00)	F3
Tariff List 2 5	1st period	06:00 (to 10:00)	F1	
	2nd period	10:00 (to 12:00)	F2	
	3rd period	12:00 (to 14:00)	F1	
	4th period	14:00 (to 20:00)	F3	
		5th period	20:00 (to 06:00 of next day)	F4

There are 2 modes to calculate the multi-tariff energy: Date Mode and Holiday Mode.

Under Date Mode, it divides one year (365 days) into 2 periods

Under Holiday Mode, it divides the days by working day and holiday. Working day is from Monday. to Friday. Holiday is from Saturday to Sunday.

Below example for setting the mode:

Mode	Time Zone 1	Time Zone 2
	(use the Tariff List 1)	(use the Tariff List 2)
Date Mode	From Apr.1 to Sep. 30	From Oct.1 to Mar.31 of next year
Holiday Mode	From Mon. to Fri.	From Sat. to Sun.

- 1. Users can divide one day (24 hours) up to 8 periods, and set 4 tariff maximum.
- 2. Each period must >15 minutes, and the duration must be a multiple of 15.
- 3. The starting time of each period must be in ascending order
- 4. The multi-tariff only can be set from communication. It can't be set on panel.
- 5. If 2 different periods use the same tariff, the meter will combine the energy of 2



periods together.

6. The system default that: Time Zone 1 uses the Tariff List 1, and Time Zone 2 use

the Tariff List 2. User can't change it.

11.6History Energy

F-MPM110 statistics daily energy of last 31 days, and statistics monthly energy of last

12 months. User can read the history energy as below:

Daily energy of last 31 days	Import kWh/ kvarh, Export kWh/ kvarh
Monthly onergy of last 10 months	(Each tariff) Import kWh/ kvarh,
Monthly energy of last 12 months	(Each tariff) Export kWh/ kvarh



12. Record Function

12.1 General Description

In order to facilitate users to do various fault analysis, F-MPM110 provides up to 100 records of SOE event and 30 records of over-limit event for frequency deviation/ voltage deviation/ voltage unbalance. Users can easily and quickly position seeking the fault from the SOE event counter.

Additional, F-MPM110 also provides records of Max. demand and Max./ Min. data for users doing analysis of electricity consumption.

12.2 SOE Event Log

F-MPM110 can record the event of switch and relay position (i.e. ON/ OFF status.) The event is recorded with time stamp which is stored in F-MPM110 by UNIX time format. Time resolution is 1ms. The UNIX time is a system for describing instances in time, defined as the number of seconds that have elapsed since the midnight 00:00:00 on January 1, 1970.

From Four-Faith software, users can see the event as below format:

No.		Event
1	2011-07-28 09:31:34 792ms	Relay 1 ON

. For more details, please refer to F-MPM110 Modbus Register List



12.3Frequency Deviation Record

User can set the frequency deviation over-limit value in F-MPM110 (default limit:

0.2Hz, setting range: 0~10Hz).When the | frequency deviation | > limit, F-MPM110 records the deviation starting time, ending time, and the Max. deviation (value with sign). Users can find the record from panel and communication.

Once the event happen, users can find the record in Four-Faith software as below format:

No.	Event
1	2011-07-28 09:31:34 to 2011-07-28 09:32: 15, frequency deviation,
	Max. value is 0.50Hz

For more details, please refer to F-MPM110 Modbus Register List

12.4Voltage Deviation Record

User can set the voltage deviation over-limit value in F-MPM110 (default limit: 10%,

setting range: 0~99.99%).When the | voltage deviation | > limit, F-MPM110 records

the deviation starting time, ending time, and the Max. deviation (value with sign).

Users can find the record from panel and communication.

Once the event happen, users can find the record in Four-Faith software as below

format:

No.	Event	
1	2011-07-28 15:02:25to 2011-07-28 15:30:46, voltage deviation, Max.	
	value is -14%	

For more details, please refer to F-MPM110 Modbus Register List


12.5 Voltage Unbalance Rate Deviation Record

User can set the voltage unbalance over-limit value in F-MPM110 (default limit: 20%, setting range: 0~100%).When unbalance > limit, F-MPM110 records the unbalance starting time, ending time, and the Max. unbalance value. Users can find the record from panel and communication.

Once the event happen, users can find the record in Four-Faith software as below format:

No.	Event		
1	2011-07-28 06:05:25to 2011-07-28 06:28:35, voltage unbalance Max.		
	unbalance value is 24%		

For more details, please refer to F-MPM110 Modbus Register List

12.6 Max. Demand Record

F-MPM110 records the max. demand for 3-phase current, total active power, total

reactive power, total apparent power.

When the instant demand exceeds the history maximum demand, F-MPM110 will

record the new maximum data with time stamp.

User can clear the Max. demand record from panels and communication.

12.7 Real time Max./ Min. Record

F-MPM110 records the max./ min. for 3-phase voltage (ph-N and ph-ph)/ 3-phase

current/ active power/ reactive power/ apparent power.

When the instant value exceeds the history maximum or lower than history minimum,

F-MPM110 will record the new max./ min. data with time stamp.



User can clear the Max./ Min. record from panels and communication.

12.8 Running Time Record

F-MPM110 provide running time record function. Record object including: 1: Null. 2.: Voltage measurement. 3: Current measurement. 4: Power of the Meter. Just one subject can be regarded as the standard of running time, when the conditions meet the requirement, running time measurement function start.

Null: Running time forbid

Voltage measurement: When the voltage (for 3 phase at the same time) within a certain range, running time start. Voltage up limit / lower limit can be set by the client, data format same as measuring value (secondary side); If the condition can not meet, time stop, 3 phase 4 wire object is phase-N voltage, 3 phase 3 wire is Ph-Ph voltage. Single phase 2 wire is Ph-Ph voltage.

Current measurement: When the current (for 3 phase at the same time) large than a certain value, running time start. Current value can be set by the client, data format same as measuring value (secondary side); If the condition can not meet, time stop, single phase 2 wire is Ph-N current

Power for the Meter: When power On, running time start

When the object changed from one to the other, running time will be cleared automatically,

Running time Unit: Hour, resolution: 0.1



13. Setpoint Alarm

13.1 General Description

F-MPM110 provides setpoint alarm for all parameters. It supports monitor 2 parameters at the same time.

There are 2 setpoint types: Over-limit and Under-limit. Users can set the limit as per requirement.

13.2 Setpoint Object

F-MPM110 can monitor 27 kinds of parameters, as below:

Object	Parameter			
Voltage	Va, Vb, Vc, neutral voltage, average phase voltage,			
	Vab, Vbc, Vca, average line voltage			
Current	la, lb, lc, neutral current, average current			
Power factor	PFa, PFb, PFc, PFtot			
Frequency	Frequency			
	Voltage unbalance,			
	Phase A voltage THD			
	Phase B voltage THD			
Power quality	Phase C voltage THD			
	Phase A current THD			
	Phase B current THD			
	Phase C current THD			
Null	No object			



13.3Alarm Condition

13.3.1 Set over/ under limit

After set the monitoring object, users need to set the alarm condition, i.e. set the over/ under limit value. For setting range of the parameter, please refer to *F-MPM110*

Modbus Register List

Note: When setting the over/ under limit, if the limit value is out of measuring range, the setting will be invalid.

Take the frequency for example:

Measuring range for frequency: 45-65Hz, default rated voltage is 50Hz. Setpoint limit range: 0-65535

13.3.2 Set the delay time

After set the over/ under limit, users need to set the delay time. Setting range: 0~99s. Only it satisfy two conditions that, the monitored object over/ under limit and lasting to delay time, will the setpoint channel be activated. If set the delay time to 0, it means setpoint channel will be activated once the object over/ under limit.

13.4 Alarm Output

When the setpoint channel of one relay output is activated, the relay will output signal. One SOE event is record.

13.5 Example

Users want to monitor phase A voltage and set the over-limit to 65535 Ue, linking with relay 1, set the delay time to 30s. If the actual phase A voltage exceed to the limit and



lasting to 30s, then the relay 1 will output the signal. If the phase A voltage return to limit value within 30s, the relay 1 will not respond.

Note

1. If set the delay time to 0, it means setpoint channel will be activated once the

object over/ under limit.

2. If no setting the monitor object, it means no relay alarm function.



14. Auxiliary Function

14.1 Communication

F-MPM110 provides one RS485 port in basic module, and provides another one as

optional function. The two RS485 ports are independent from each other. Normally,

on site, one RS485 is enough. Please refer to below connection diagram.

Attention: In the field, in order to avoid signal reflecting, it's common to connect a

120 Ω resistance at the end of RS485 network for signal matching.



14.1.2 Communication Medium

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The communication medium is No. 22 STP (Shielded twisted pair). Maximum 32 units of meters can be connected in one RS485circuit. If there is no repeater, the communication bus shouldnotlonger than 1,200m.



14.1.3 Communication Protocol

F-MPM110 support standard Modbus-RTU protocol. For more details, please refer to

F-MPM110 Modbus Register List.

14.1.4 Communication Parameters

Communication between master and slave device will be available under correctly setting the communication parameters.

The parameters include:

- ♦ Address: Every meter has its exclusive address. Setting range: 1~247.
- ♦ Baudrateof RS485 port 1: 2400, 4800, 9600, 19200, 38400 (programmable)
- Baudrate of RS485 port 2: 2400, 4800, 9600, 19200, 38400 (programmable)

14.1.5 Strong Power Prevention

The RS485 terminals of F-MPM110 have the strong power burning prevention function. It means that, even there is 220VAC access to the RS485 terminals (within 5 minutes), the communication board will not be burnt. And the communication will be recovered once cut off the power.

14. 2 Status Input

F-MPM110 provides 3 status input as basic feature apply to monitor the ON/ OFF position of breakers or switchers etc.. Besides, it also provides up to 8 optional status input which is flexible to meet different requirement.

The status input of F-MPM110 is wet contact, requires connecting external power supply 220VAC/ 50Hz. The example of connection as below:





External active contact input (wet contact)

Generally, when external contact is ON, the linking status input channel on F-MPM110 LCD will be ON. When external contact is OFF, the linking status input channel on F-MPM110 LCD will be OFF.

From the communication, 0 means OFF, 1 means ON.

14. 3 Relay Output

F-MPM110basic unit provides 2 relay output, and Users can add one optional Relay Output Module which provides the other 2 relay output.

Relay node capacity: 250VAC/5A. There are 2 kinds of relay control mode: Local control and Remote control.

Under local mode, the relay is used for the setpoint function to monitor the parameter.

In case the parameter is over/ under limit, the relay will respond, and output signal.

(Please refer to Chapter13Setpoint Alarm for more description).

Under remote control mode, users can remote control the relay according to requirement.



The action of relay is different in two modes. So, users should firstly distinguish the relay is in remote control mode or in local control mode.

The default relay control mode of F-MPM110is remote control. Users can change the mode by keys on panel or via communication.

 Remote control (external): The relay is controlled by a PC or PLC using commands through communication.

Release time: Release time is defined as the time since from the relay status is changed by PC or PLC to the relay recover. If set the release time to 0, it means that the relay will not recover.

User can set the release time by keys on panel or via communication.

 Local control (internal) - The relay will respondence the electrical parameters satisfy alarm conditions. (Please refer to *Chapter13Setpoint Alarm* for more description).

Delay time: Delay time is defined as the time since over/ under limit happens. If set the delay time to 0, it means the relay responds as soon as over/ under limit happens.

When the relay is under remote control mode, even though the local control conditions have been set, the relay will not respond. The relay mode must be set to local control mode, otherwise, it will not alarm for over/ under limit.



14.44~20mA Analog Input (optional module)

In some projects, for example where request to monitor the main transformers, to measure the non-electric parameters such as the temperature or pressure, users can choose one AI module. Each AI module provides 2 channels of 4~20mA analog input. Each meter can only support one AI module.

14.5 Pulse Output (optional module)

Each meter can only support one PO module. The PO Module provides 2 channels of pulse output for statistic the energy.

The first channel is for active energy (kWh), second channel is for reactive energy (kvarh). The formula is 1 pulse = 1÷ pulse constant \times CT \times PT (kWh or kvarh).

Pulse constant: 1000 ~9999 programmable, factory default set 1000

Pulse width: 60~100ms programmable, factory default set 80ms

User can set the pulse constant and width by keys on panel or via communication.

Below figure is a typical example of pulse output wiring.

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14.6Analog Output (optional module)

Each meter can only support one AO module. The AO module provides 2 channels of

4~20mA analog output.

Output maximum load is 500 ohm, output range is 4~20mA, overload: 1.2 times.

The analog output channels can be defined to associate with various parameters

include 3-phase voltage (ph-ph, or ph-N), 3-phase current, total active power, total

reactive power, total power factor, frequency etc.

Below figure is a typical example of pulse output wiring.



The Analog Output Curve as below, Magnification factor is $\boldsymbol{\lambda}$







The analog output channels can be defined to associate with any one of below

parameters

Analog output object		
Valtage	Phase voltage: Va, Vb, Vc	
vollage	Line voltage: Vab, Vbc, Vca	
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Current	la, lb, lc
Active power	Ptot
Reactive power	Qtot
Power factor	PFtot
Frequency	F

Remark: if set the analog output object to frequency or PFtot, it's meaningless to set the magnification factor, default =1

14.7Ethernet TCP/IP& 64M bit Memory (optional module)

The module support Ethernet TCP/IP and memory function (space of the Memory module is 64M bit). Each meter can only support one Memory module. It realized function as below:

- Modbus TCP function
- Support Web real-time inquiry data
- Support parameter setting of the web
- Support to save monitoring data regularly
- Support FTP for download memory data

Note:

(1) In case the power meter is suddenly power off, it could cause the data lost in one

hour.

(2) The data can be stored after continuous power on for one hour.



14.7.1 Install

This Module can be directly inserted to the extend interface of F-MPM110 basic unit. The module is not hot-swappable (the module is not hot swappable, after insert the memory module, the meter should be restarted to recognize the memory function). Before insert or pull out the Memory Module, users should power off the meter. Otherwise, it can damage to the meter.

Network structure as blow:



14.7.2 Specification of Memory Module

Parameter	Specification	
Space	64Mbit	
Time for Device from		
power on to full start	≤3 second	



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Module house electrostatic protection level	Level 4
Speed	500~1000ms
OperatingTemperature	-10~55 ℃
Humidity	20%~90% (non-condensing)
Storage temperature	-20~60 ℃
Average failure-free time	300000 hours
When Ethernet is connect, rate of communication failure	<0.02%
Data save interval	5 min

14.7.3 Function Description

The memory module works with the F-MPM110 basic unit to save the measured data regularly (interval is settable: 1min, 5 min, 10min, 15min, 30min). It saves the parameters as below:

- 3-phase voltage
- 3-phase current
- Frequency
- Voltage unbalance rate
- 3-phase power factor



- Import/Export active energy
- Import/Export reactive energy
- Demand current
- Demand total active power
- Demand total reactive power
- Demand total apparent power

Time interval for data saving	Data saving cycle	Max. missing data time	Power on time period for data saving
1min	60 days	10 minutes	10 minutes
5min	1 year	1 hour	1 hour
10min	1 year	2 hour	2 hour
15min	1 year	3 hour	3 hour
30min	1 year	6 hour	6 hour

Note: 1) when modify time interval, if it is 1min to change to other time interval or other time interval to change to 1 min, then it need to clean the memory data, then re-save. But if it is not between 1 min, then no need to clean the memory data.

14.7.4 Web function

The module support web real-time data inquiry and web parameter configuration function. When log-in the web, we need to set the IP of the PC the same with F-MPM110 segment, but different IP.

For example, if F-MPM110 IP is 192.168.8.100, subnet mask is 255. 255.240.0



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IP address of PC can set as 192.168.N.M (N range from 0~15, M range from 1~254) After setting, customer can login 192.168.8.100 from IE. The Web will monitoring below data:

Data item	Option module	
3-phase phase voltage	•	
3-phase line voltage	•	
3-phase current	•	
3-phase active power & total active		
power		
3-phase reactive power & total reactive		
power		
3 phase apparent power & total		
apparent power	• 	
Total input/output active power	•	
Total input/output reactive power	•	
Frequency	•	
DI	11	
DO	2	
AI	2	
Parameter configuration	•	
System information		

14.7.5MODBUS-TCP function

The module is only for convert MODBUS-RTU to MODBUS-TCP.



14.7.6FTP download saving regularly memory data

Same as web configuration, before visit the web, customer should set the IP of the PC the same with F-MPM110 segment, but different IP. Then Input ftp://192.168.8.100 (192.168.8.100 is the Ethernet address of F-MPM110) then customer can see the memory data of the meter. Download all the bin to PC then customer can use Four-Faith's memory data reading software to analysis all the data.

14.7.7Read the Data from Memory Module

The F-MPM110 only support to read the data from RS485 communication. Please refer to the *F-MPM110 Modbus Communication Protocol* for more details





15. Technical Specification

Metering	True RMS, 1 sec refresh time			
	Rated current : 1A or 5A			
	Rated voltage:			
Input	Optional 120V, 220V, 240V, 277V, 398Vph-N (direct)			
mput	Or 100V, 110Vph-ph (via PT)			
	PT secondary: 100Vor 110Vph-ph (optional)			
	Frequency: 50 or 60 Hz (optional)			
	120% of rated, continuously			
Overload	Instantaneous current: 10 times / sec			
	Instantaneous voltage: 2 times / sec			
	Wet contact.			
	Require external power supply			
	For high voltage meter, require power supply for DI:			
Status input	100Vac ± 25%.			
	For low voltage meter, require power supply for DI:			
	220Vac ± 25%.			
Relay output	Node capacity: 250Vac/5A			
Pulse output	Pulse output value: 1000~9999imp/ kWh			



	Pulse width: 60~100ms programmable		
Starting current	0.1%ln		
Power frequency withstand voltage	AC 2KV/minute		
Insulation resistance	≥50MΩ		
Impulse withstand voltage	4kV (peak), 1.2/50 <i>u</i> S		
Power supply	When order No. is P1: 85~265Vac, 85~265Vdc When order No. is P2: 100~420Vac, 100~400Vdc		
Power loss	When order No. is P1, power loss <10VA When order No. is P2, power loss<15VA		
Communication	RS485 serial, support Modbus-RTU Baud rate: 2400, 4800, 9600, 19200, 38400bps Address: 1~247		
Dimension (L x W x H)	Panel: 96 x 96 x 13.5 mm Cut-out: 96 x 96 x 58.6mm (basic unit) 96 x 96 x 80.1 mm (basic unit + optional module)		
IP index	IP52 (front panel) and IP30 (case)		
Weight	Basic unit: approx 400gr.		



	Operating temperature: -10 $^\circ C \sim$ +55 $^\circ C$
Environment	Storage temperature: -40 $^\circ \! \mathbb{C} \sim$ +70 $^\circ \! \mathbb{C}$
	Humidity: 5%~95% non-condensing
	Height:≤2000m

Parameter	Accuracy	Resolution	Measuring Range
	0.2%	0.01V	Direct: 5%~120% of rating
Voltage			PT primary: 0~65.00kV
			PT secondary:100Vph-ph or 110V
Current	0.2%	0.0001A	CT primary: 0~9,999A
Current			CT secondary: 1 A or 5A
_	0.5%	0.0001 kW/ kvar/ kVA	Per phase: 0~649.9MW/ Mvar/ MVA
Power			Total: 0~1949.8MW/ Mvar/ MVA
Power factor	0.5%	0.001	-1.000~+1.000
Frequency	0.5%	0.01Hz	45~ 65 Hz
Active energy	0.5%	0.1kWh	0~ 99,999,999.9 kWh
Reactive energy	2.0%	0.1kvarh	0~ 99,999,999.9 kvarh
THD	1.0%	0.001	0~100.0%
Individual	1.0%	0.001	0 100 0%
harmonic	1.0%	0.001	U~100.070
Un-balance	1.0%	0.001	0~100.0%



Time	±0.5s		0~ 24 hours	
Item		Standard	Level	
Oscillatory waves immunity test		IEC61000-4-12:1995	ш	
Electrostatic discharge immunity		IEC61000-4-2:2001	ш	
Radiated,radio-frequency,Electromagnetic field immunity test		IEC61000-4-3:1998	IV	
Electrical fast transient/burst immunity test		IEC61000-4-4:1998	ш	
Surge immunity test		IEC61000-4-5:2005	ш	
Immunity to conducted disturbances, induced by radio-frequency fields		IEC61000-4-6:1998	Ш	
Power frequency magnetic field immunity test		IEC61000-4-6:2001	ш	
Electromagnetic emission limit value		IEC60255-25:2000	ОК	
Power frequency immunity test			IEC61000-4-8:2001	A
Overvoltage class		UL61010-1:2008	CAT III	



16. Maintenance and Trouble Shooting

Possible problem	Possible cause	Possible solution
The meter has no indication after the control power supply is imposed.	The power supply fails to be imposed on the meter.	Check if the correct working voltage has been imposed on the L/+ and N/- terminals of the meter. Check if the fuse for the control power supply has been burnt down.
The measured value is not correct or does not conform to the expectation.	The voltage measurement is not correct.	Check if the neutral point has been connected reliably. Check if the measured voltage matches the rated parameter of the meter. Check if PT ratio has been set correctly.
	The current measurement is not correct.	Check if the measured current matches the rated parameter of the meter. Check if CT ratio has been set correctly.



		Check if the connection mode has been
		set correctly.
	The power	Check if the phase sequence
	measurement is not	corresponding to the voltage and the
	correct.	current is correct.
		Check if the wiring of current terminals
		are correct
The DI status is not change	The DI operating voltage is not correct.	Check if the types of external nodes
		match the rated parameters of the meter.
		Check if the external connection is
		correct.
The relay no respond	The relay does not receive the control command.	Check if the communication link is correct.
	The working mode of the relay is not correct.	Check if the current relay is under the correct control mode.



	The operating time has not been set correctly.	Check the setting of the operating time of the relay. For the specific information, refer to the content regarding relays of the operation manual.
No analog output.	The analog is set as "disable" or wrong object.	Check through communication the setting of analog.
No pulse output or incorrect pulse output	The setting of the pulse object or constant is wrong.	Check if the pulse output channels isactivated Check if the pulse constant is set correctly.
The upper end devicecan not communicate with the meter.	Communication address error	Check if the address of the meter is consistent with its definition or if there are more than two identical addresses in the same network.
	Baud rate error	Check if the baud rate setting on the meter is consistent with the upper end device.



The communication	
link has not been	Check if the 120-Ohm resistor has been
connected to the	connected.
terminal resistor.	
The communication link suffers interference.	Check if the communication-shielding layer has been earthed effectively.
The communication	Check if the communication cable has
line is interrupted.	been disconnected.

Notice:

Four-Faith reserves the right to modify this manual without prior notice in view

of continued improvement.

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