ME435 Poly-phase Handhold Power Meter

Connectivity advantages	
Model	ME435
Support Extra sensor	BNC terminal 333mV CT BNC terminal Rogowski coil
Storage	1GB SD card(Max 6GB) (save intervals 1mins default)
Power	4*AA battery(wroking time: approx 7 hours) Or 9V DC power supply(included adaptor)

Feature

Specification	
Model	ME435
Product component type	Handhold poly-phase power meter
Poles description	3PH4W 3PH3W 1PH2W (L-N); 1PH2W(L-L);1PH3W(L-L-N)
Device application	Power analysis Energy meter
Input type	External Rogowski coil External CT(333mV only)
Display	3.5 inch TFT screen display
Sampling rate	8k samples per second
Harmonic	52th Max
Mechanical characteristics	
Weight	350g
Dimension	L*W*D:21.5*10*3.5CM

Power Meter Characteristics

The power meter measures currents and voltages and reports real-time RMS values for all 3-phases and neutral. In addition, the power meter calculates power factor, realpower, reactive power, and more.

The following sections list the metering characteristics of the power meter.

Real-Time Measuring

The following table lists the metering characteristics of the power meter for the real-time measurement:

Characteristics	Description
Current	Per phase, neutral, and average of 3 phases
Voltage	L-L, L-N, and average of 3 phases
Frequency	45...65 Hz
Active power	Total and per phase (signed)
Reactive power	Total and per phase (signed)
Apparent power	Total and per phase(signed)
Power factor (True)	Total and per phase 0.000 to 1 (signed)
Current unbalance	Per phase, most unbalanced of 3 phases
Voltage unbalance	most unbalanced of 3 phases

Minimum/Maximum Values

When any one-second real-time reading reaches its highest or lowest value, the power meter saves the minimum and maximum values in its nonvolatile memory.

From the power meter display, you can:

• view all min./max. values since the last reset and the reset date and time.

• reset min./max. values.

All running min./max. values are arithmetic minimum and maximum values. For example, the minimum phase A-N voltage is the lowest value in the range from 0 to 999.9GV that has occurred since last reset of the min./max. values.

The power meter provides time stamping for all minimum/maximum values.

The following table lists the minimum and maximum values stored in the power meter:

Characteristics	Description
Current	Per phase and average
Voltage	per phase and average
Active power	Per phase and total
Reactive power	Per phase and total
Apparent power	Per phase and total

Demand Readings

The power meter provides the following demand readings.

Characteristics	Description
Current	Per phase and average
Active, reactive, apparent power	Per phase and Total
Peak Demand Values	
Current	Per phase and average
Active, reactive, apparent power	Per phase and Total

Demand Calculation Methods

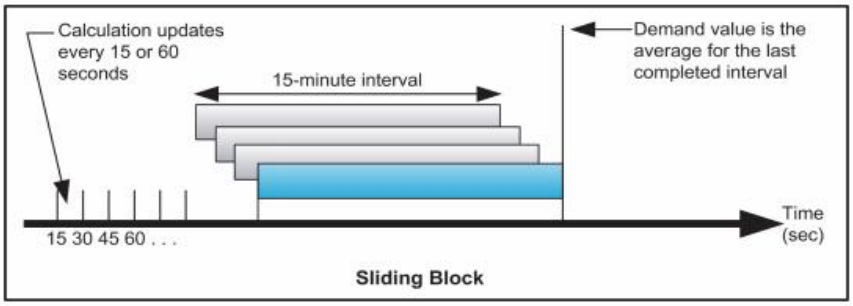
Power demand is the energy accumulated during a specified period divided by the length of the period. Current demand is calculated using arithmetical integration of the current RMS values during a time period, divided by the length of the period. How the power meter performs this calculation depends on the selected method. To be compatible with electric utility billing practices, the power meter provides block interval power/current demand calculations.

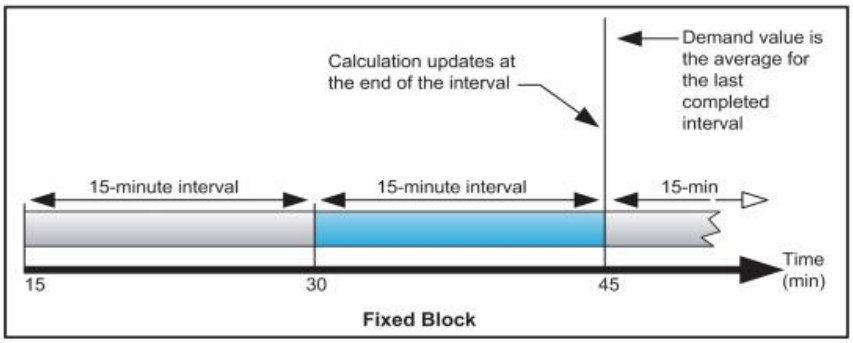
For block interval demand calculations, you select a block of time (interval) that the power meter uses for the demand calculation and the mode the meter uses to handle he interval. 2 different modes are possible:

• Fixed block - Select an interval from 1 to 60 minutes (in 1 minute increments). The power meter calculates and updates the demand at the end of each interval.

• Sliding block - Select an interval from 1 to 60 minutes (in 1 minute increments). For demand intervals less than 15 minutes, the value is updated every 15 seconds. For demand intervals of 15 minutes and greater, the demand value is updated every 60 seconds. The power meter displays the demand value for the last completed interval.

The following figures illustrate the 2 ways to calculate demand power using the block method. For illustration purposes, the interval is set to 15 minutes.





Peak Demand

In nonvolatile memory, the power meter maintains a maximum operating demand value called peak demand. The peak is the highest value (absolute value) for each of these readings since the last reset.

You can reset peak demand values from the power meter display. You should reset peak demand after changes to basic power meter setup such as power system configuration.

Energy Readings

The power meter calculates and stores Per phase and total energy values for active,reactive, and apparent energy. You can view energy values from the display. The resolution of the energy value automatically changes from kWh to MWh to GWh (kVAh to MVARh to GWh).

The energy values automatically resets to 0 when it reaches the limit of 999.9GWh, 999.9GVAh, or 999.9GVARh.

The following table lists the energy readings from the power meter:

Characteristics	Description
Energy values	
Active energy	0 to 999.9GWh Auto reset to 0 in case of over limit
Reactive energy	0 to 999.9GVARh Auto reset to 0 in case of over limit
Apparent energy	0 to 999.9GVAh Auto reset to 0 in case of over limit

Power Quality Analysis Values

The power quality analysis values use the following abbreviations:

• Fundamental phase current rms: I1

• Fundamental phase voltage rms: V1

• RMS of up to three harmonics of phase current:

Ix, Iy, Iz, x, y, z = 2, 3,…, N

• RMS of up to three harmonics of phase voltage:

Vx, Vy, Vz, x, y, z = 2, 3,…, N

•Total harmonic distortion of the phase current

$$(THD)_I = \frac{\sqrt{I^2 - I_1^2}}{I_1}$$

• Total harmonic distortion of the phase voltage

$$(THD)_V = \frac{\sqrt{V^2 - V_1^2}}{V_1}$$

• Harmonic distortion of up to three harmonics on the phase current

$$HD_{I_x} = \frac{I_x}{I_1}, x = 2, 3,\ldots, N$$

$$HD_{I_y} = \frac{I_y}{I_1}, y = 2, 3,\ldots, N$$

$$HD_{I_z} = \frac{I_z}{I_1}, z = 2, 3,\ldots, N$$

• Harmonic distortion of up to three harmonics on the phase voltage:

$$HD_{V_x} = \frac{V_x}{V_1}, x = 2, 3,\ldots, N$$

$$HD_{V_y} = \frac{V_y}{V_1}, y = 2, 3,\ldots, N$$

$$HD_{V_z} = \frac{V_z}{V_1}, z = 2, 3,\ldots, N$$

THD provides a measure of the total distortion present in a waveform. THD is the ratio of harmonic content to the fundamental and provides a general indication of the quality of a waveform. THD is calculated for both voltage and current.

The following table lists the power quality values of the power meter:

Characteristics	Description
THD	Per phase current Per phase voltage

Data Record

The power meter records data to SD card, the following table lists data record of the power meter.

Record	
Record interval	1s to 9999s（default 1min）
Record format	csv
Record capacity	Micro SD card 1GB（default）
	Store about 1K Bytes data each time
	record 2 years （1min & 1GB）
Record data	Date&time, Voltage(V),UTHD(%),Current(A),ITHD (%), ITHD2(%),ITHD3(%), ITHD4(%), ITHD5(%), ITHD6(%), ITHD2(A), ITHD3(A), ITHD4(A), ITHD5(A), ITHD6(A) Frequency(Hz), PF(power factor), Active Power(W),Reactive Power(Var),Apparent Power(Va), Active Energy(Wh),Reactive Energy(Varh),Apparent Energy(Vah)

Other Characteristics

The following table lists other characteristics of the power meter:

Characteristics	Description
Reset	
Minimum and maximum values	—
Peak demand values	—
Current demand calculation method	1 to 60 minutes
Power demand calculation method	1 to 60 minut

Environmental conditions	
Operating temperature	-25℃ to +55℃
Storage temperature	-40℃ to +85℃
Humidity rating	5 to 95% RH at 50℃(non-condensing)
Pullution degree	2
Overvoltage category	III,for distribution systems up to 277/480VAC
Dielectric withstand	As per IEC61010-1, Doubled insulated front panel display
Altitude	3000m Max
IP degree of protection	IP20 conforming to IEC 60629
Colour	White
Contractual warranty	12months
EMC	
Electrostatic discharge	Level IV(IEC61000-4-2)
Immunity to radiated fields	Level III (IEC61000-4-3)
Immunity to fast transients	Level IV (IEC61000-4-4)
Immunity to surge	Level IV (IEC61000-4-5)
Conducted immunity	Level III (IEC61000-4-6)
Immunity to power frequency magnetic fields	0.5mT (IEC61000-4-8)
Conducted and radiated emissions	Class B (EN55022)
Standard compliance	
EN 62052-11,EN61557-12,EN 62053-21,EN 62053-22,EN 62053-23,EN 50470-1,EN 50470-3, EN 61010-1,EN 61010-2,EN 61010-031	

Specification

Measurement accuracy		
Rated current (5 level selectable)	100A(0.5% from 10A to 120A) 600A(0.5% from 10A to 720A) 1000A(0.5% from 10A to 1200A) 3000A(0.5% from 30A to 3600A) 6000A(0.5% from 60A to 7200A)	
Rogwoski coil connect setting	100A	MRC-16
	600A	MRC-36
	1000A	Y-FCT-200 or Y-FCT-350 or NRC-100
	3000A	NRC-150 or Y-FCT-510
	6000A	NRC-200 or Y-FCT-800
CTs connect setting	Primary setting:	from 1A to 999999A
	Secondary setting:	from 0.001mV to 333mV
Voltage	0.2% from 100V to 500V	
Power factor	±0.005	
Active/Apparent Power	IEC62053-22 Class 0.5	
Reactive power	IEC62053-21 Class 2	
Frequency	0.01% from 45 to 65Hz	
Active energy	IEC62053-22 Class 0.5s	
Reactive energy	IEC62053-21 Class 2	
Input-current characteristics		
Primary current range	Adjustable from 0.1A to 9999A	
Measurement input range	$1/2^{25}$mV-333mV	
Permissible overload	600mV for 10s/hours	
Power Supply		
Power	4*AA battery(working time: approx. 7hours)	
	5V-9V DC power supply(included adaptor)	
power consumption		
Screen Backlight On	1100mW	
Screen Backlight Off	900mW	
Wire diameter for terminals		
Current input	BNC connector	
Voltage input	Banana plug	
DC power supply	DC 5.5*2.1 plug	

Port definition

Port number	Port name	Port function	Remarks
1	IA	A-phase current input	Current input
2	IB	B-phase current input	
3	IC	C-phase current input	
4	UN	N-phase voltage input	Voltage input
5	UC	C-phase voltage input	
6	UB	B-phase voltage input	
7	UA	A-phase voltage input	
8	Power	POWER 5-9V DC	Power 5-9V DC
9	Micro SD	SD card	Take out(in) SD card

Accessories

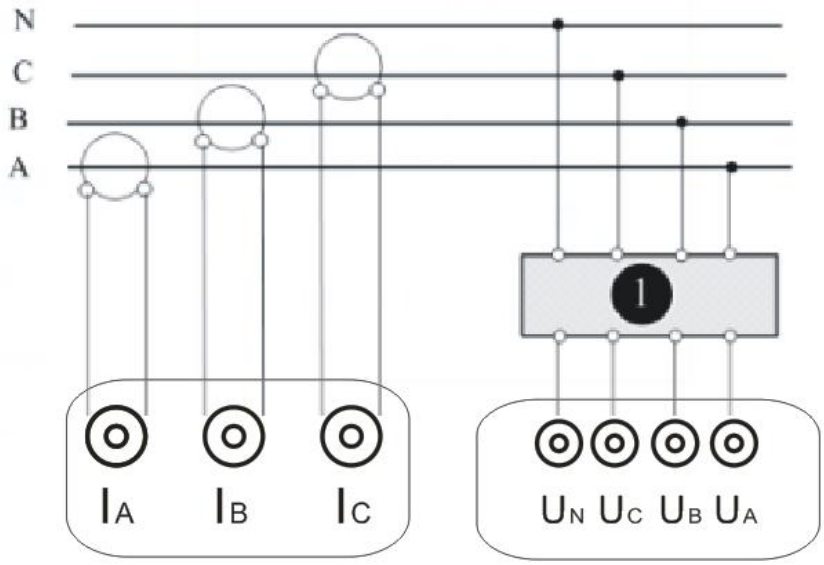
Accessories	
Voltage wires	4pcs voltage clamp wires with banana plug (2 meters,1.5mm^2)
Adaptor	85-265 AC to 9V DC adaptor
SD card	1GB
Remark	**Rogowski coil and AA battery not included**

Wiring

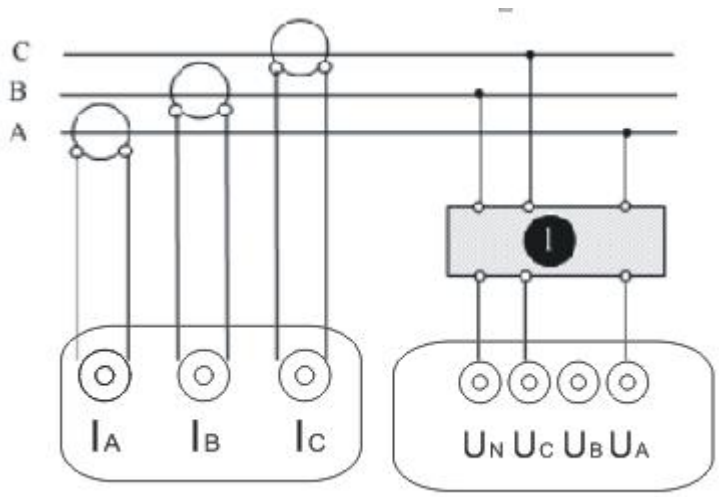
*：Rogowski coil secondary output voltage can not over 333mV rms.

^：CT must be voltage output,secondary output can not over 333mV rms.

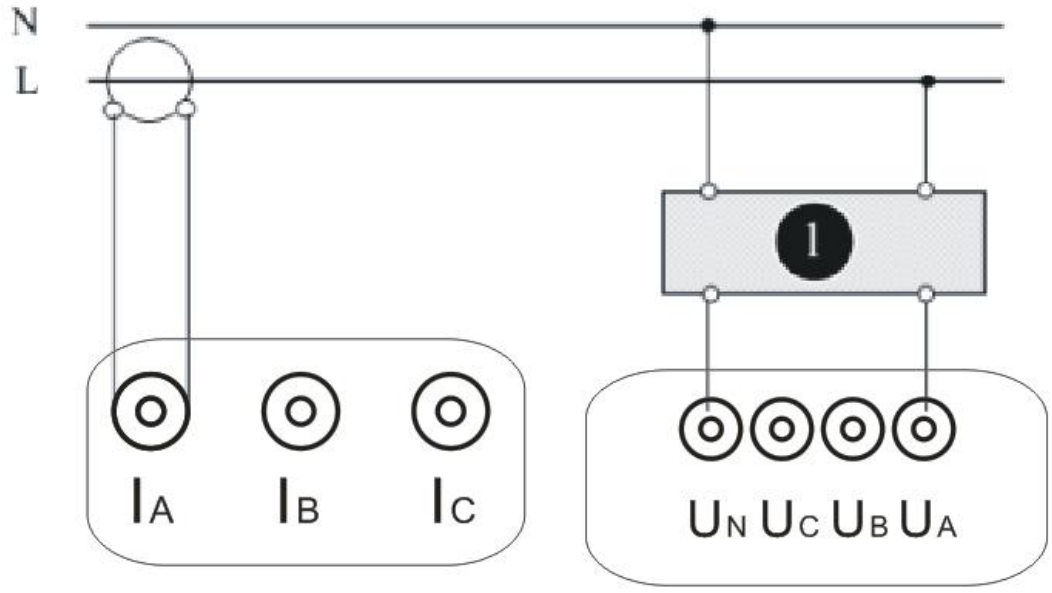
3PH4W



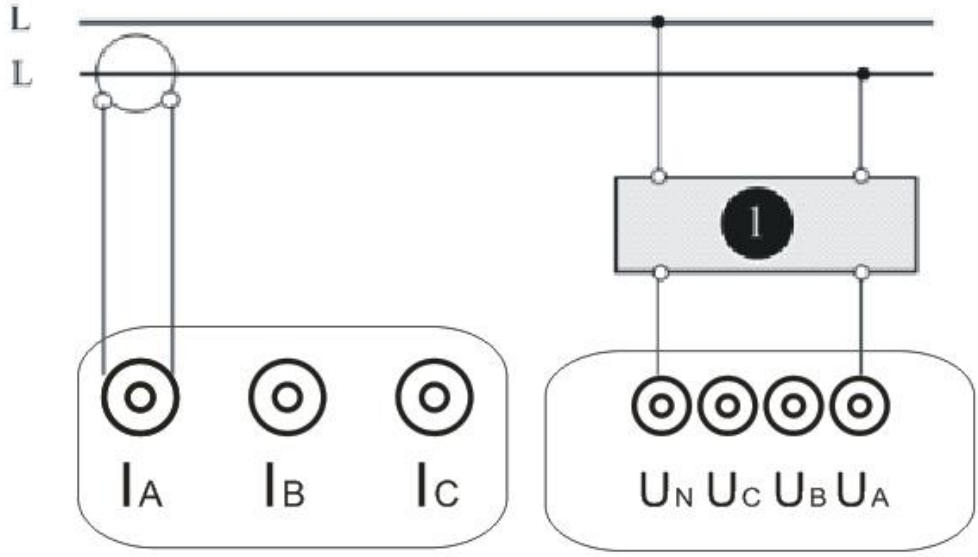
3PH3W



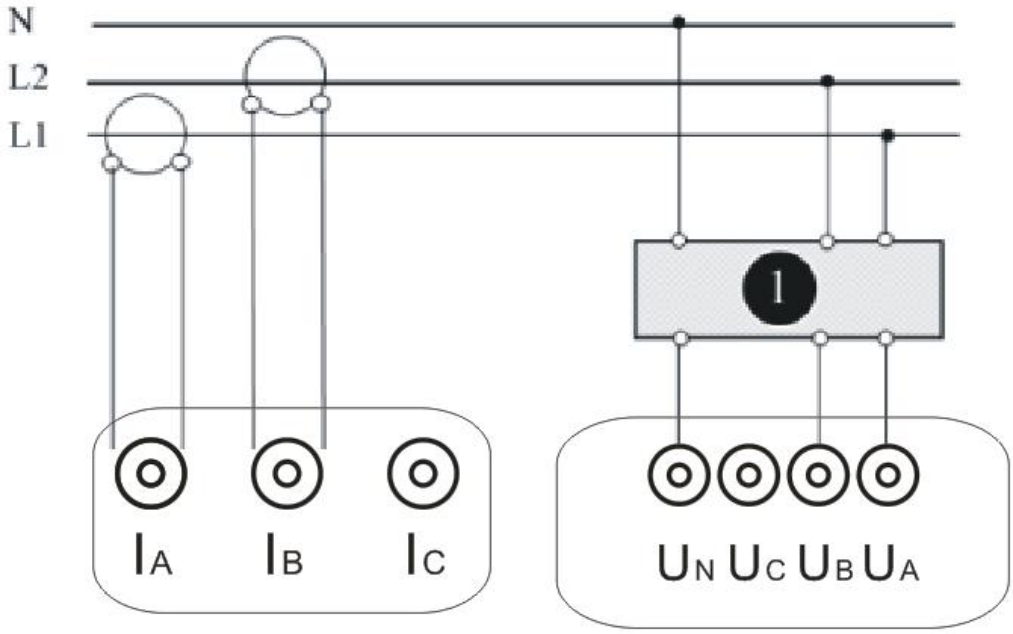
1PH2W L-N



1PH2W L-L



1PH3W L-L-N



Installation

Current input

Voltage input

Battery

Power and SD Card

Meter operation

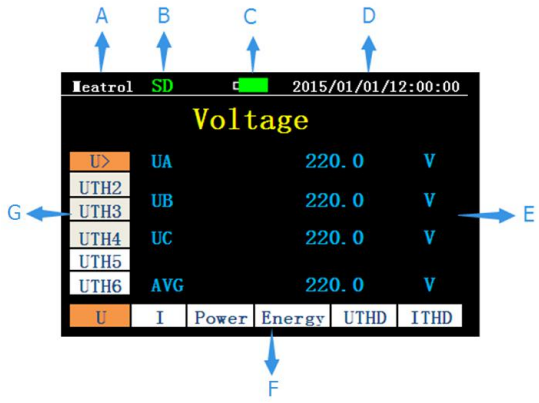
Introduction

The power meter features a panel with TFT LCD, a graphic display, and contextual menu buttons for accessing the information required to operate the power meter and modify parameter settings.

The Navigation menu allows you to display, configure, and reset parameters

General display

The general display of the power meters is shown in the following picture:



Number	Description
A	Web site
B	Micro SD Card Status Green color: SD Card status OK Red color: SD Card is not detected Yellow color: SD Card storage off
C	Battary Capacity
D	Date and time
E	Values Parameters
F	Main menu
G	Sub menu

Key function

Change Data display

One press Down/Up keys to change Sub menu display

Long press Down/Up keys to change Main menu display

Configuration mode

The default factory settings are listed in the following table:

Function	Factory settings
Wiring	3PH4W; VT Direction connection; 3 Rcoils on I1, I2, and I3 50Hz
Ratio	Rcoil FSA=1000A VT ratio=NA
SD Card	Switch=ENABLE Period=60s
Harmonic	H1=3 H2=5 H3=7 H4=9 H5=11
Password(Low)	1000
Date/Time	-
BackLight	Switch=ON Period=60s Backlight=5
Demand	Method: sliding block; Interval: 15 minutes

Modifying parameters

There are two methods for modifying a parameter, depending on the type of parameter:

• selecting a value in a list (for example, selecting Rcoil from a list of availablepower systems)

• modifying a numerical value, digit by digit (for example, entering a value for the VT primary).

NOTE: Before you modify any parameters, ensure that you are familiar with the display functionality and navigation structure of your device in configuration mode.

Selecting the value in a list

To select a value in a list:

1. One press the or button to scroll through the parameter values until you reach the desired value.

2. Press to confirm the new parameter value.

Modifying the numerical value

The parameters listed below are the only ones for which you set a numerical value:

• Voltage Transformer (VT) Primary,Secondery

• Current Transformer (CT) Primary,Secondary

• SD Card period

• Password

• Date

• Time

• Backlight period

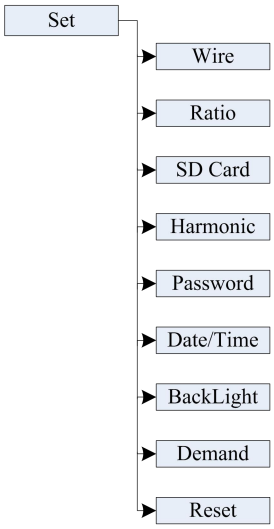
To modify a numerical value:

1. One press the or button to modify the selected digit.

2. Long press the or to shift to the next digit. Modify the next digit

NOTE: If you enter an invalid setting and press OK, the cursor stays in the field for that parameter until you enter a valid value.

Configuration mode menu trees



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