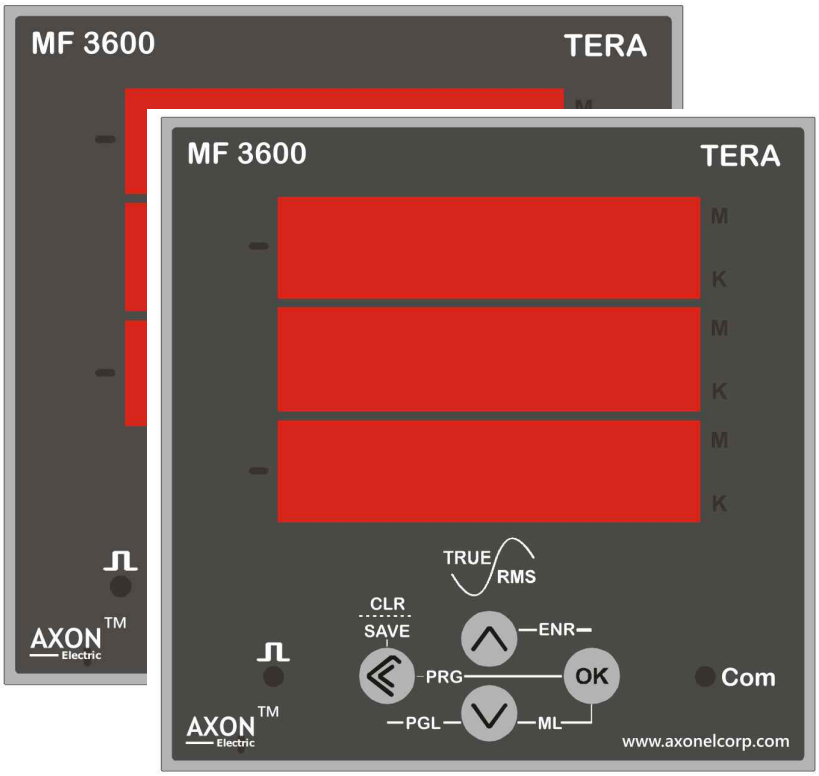
Digital Multi Function Meter

MF 3600 / TERA Series



Safety information

Important information

Read these instructions carefully and look at the equipment to be come familiar with The device before trying to install, operate, service or maintainit. Thefollowing Special messages may appear throughout this bulletin or on the equipment to warn Of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that An electrical hazard exists which will result in personal injury if the instructions are Not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury Hazards. Obey all safety messages that follow this symbol to avoid possible injury Or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please note

Electrical equipment should be installed, operated, serviced and maintained only By qualified personnel. No responsibility is assumed by Phaser Electric for any Consequences arising out of the use of this material. A qualified person is one who Has skills and knowledge related to the construction, installation, and operation of Electrical equipment and has received safety training to recognize and avoid the Hazards involved.

Safety precautions

Installation, wiring, testing and service must be performed in accordance with all Local and national electrical codes.

⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment(PPE) and follow safe Electrical work practices. See NFPA70E in the USA, CSAZ462 or applicable Local standards.
- Turn off all power supplying this device and the equipment in which it is Installed before working on the device or equipment.
- Always use a properly rated voltage sensing device to confirm that all power Is off.
- Do not exceed the device's ratings for maximum limits.
- Never short the secondary of a potential/voltage transformer(PT/VT).
- Never open circuit a current transformer(CT).
- Always use grounded external Cts for current inputs.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

UNINTENDED OPERATION

Do not use this device for critical control or protection applications where human Or equipment safety relies on the operation of the control circuit.

Failure to follow these instructions can result in death, serious injury, or Equipment damage.

Overview

The Accu Smart series meters are digital Energy meters that offers comprehensive 3-phase electrical instrumentation and load management facilities in a compact and rugged package.

The Accu Smart series meters offer value for the demanding needs of your energy monitoring and cost management applications. All meters in the Accu Smart series range comply with Class1,Class0.5S, or Class0.2S accuracy standards and feature high quality, reliability, and affordability in a compact and easy to install.

Features

- LED display screen: Intuitive self-guided navigation using three buttons LED display, with three lines of concurrent values along with parameter name being displayed.
- True RMS Measurement.
- Class0.2S, Class0.5S, Class1.0 Models.
- Energy accounting and balancing.
- THD% and individual harmonics up to15th order for voltage and current.
- Active, reactive, and apparent energy readings.
- Min/Max values of instantaneous parameters with a timestamp.
- Event Logging Option upon threshold limit reaches.
- Auto-Scaling of Kilo, Mega, Giga and Decimal Points.
- RS485 RTU Communication.
- Optional LoRaWAN / Wi-Fi IoT Communication.
- Digital Input and Output Options.
- Suppression current: The meter can be configured to disregard the measurement of induced/ auxiliary load current in the circuit (can be set from 5 to 99mA).

You can use the meter as a stand-loned device, but it extensive capabilities are fully realized when used as part of an energy management system.

Feature summary

Parameter	iE8311
Accuracy Class for Wh	Class1 Class0.5S Class0.2S
Accuracy Class for VARh	2.0 1.0
Sampling rate per cycle	83

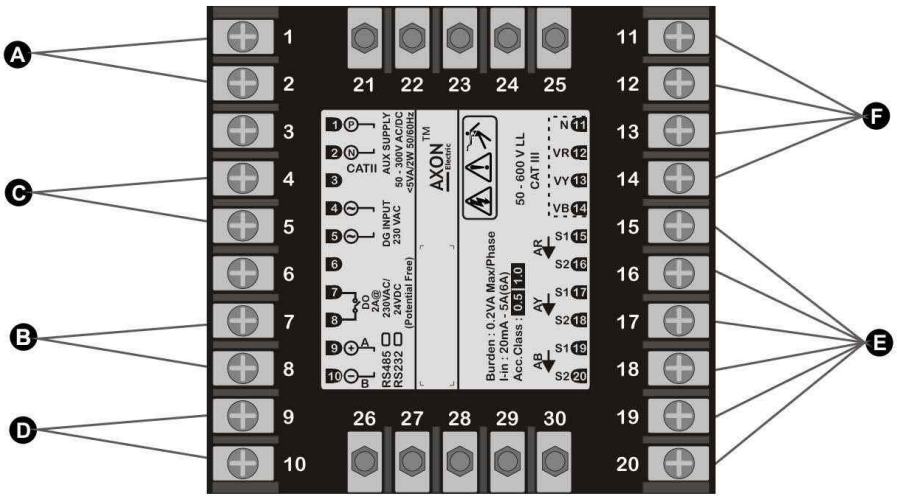
Parameter	DISPLAY	RS485	LoRaWAN	Wi-Fi
Voltage: • VL-N-per-phase and 3phase average • VL-L-per-phase and 3phase average	 Avg ✓ Per-Ph ✓ Avg ✓ Per-Ph ✓	 Avg ✓ Per-Ph ✓ Avg ✓ Per-Ph ✓	 Avg ✓ Per-Ph Avg ✓ Per-Ph ✓	 Avg ✓ Per-Ph Avg ✓ Per-Ph ✓
Current: • Per-phase and 3phase average • Calculated neutral current	Avg ✓ Per-Ph ✓	Avg ✓ Per-Ph ✓ ✓	Avg ✓ Per-Ph ✓	Avg ✓ Per-Ph ✓
Power Factor • Per phase and 3phase total (TruePF)	Tot ☑ Per-Ph ☑	Tot ☑ Per-Ph ☑	Tot ☑ Per-Ph ☑	Tot ☑ Per-Ph ☑
Frequency	☑	☑	☑	☑
Power: • Active power(kW)-Phase wise and total • Apparent power(kVA)-Phase wise and total • Reactive power(kVAR)-Phase wise and total	 Tot ☑ Per-Ph ☑ Tot ☑ Per-Ph ☑ Tot ☑ Per-Ph ☒	 Tot ☑ Per-Ph ☑ Tot ☑ Per-Ph ☑ Tot ☑ Per-Ph ☑	 Tot ☑ Per-Ph ☑ Tot ☑ Per-Ph ☒ Tot ☑ Per-Ph ☒	 Tot ☑ Per-Ph ☑ Tot ☑ Per-Ph ☒ Tot ☑ Per-Ph ☒
3Phase unbalance	Current ☒ Voltage ☒	Current ☒ Voltage ☒	Current ☒ Voltage ☒	Current ☒ Voltage ☒
Demand parameters(kW,kVA,kVAR,I) • Last demand • Present demand • Predictive demand • Peakdemand:Timestamp for peakdemand	 ☒ ☒ ☒ ☒	 ☒ ☒ ☒ ☒	 ☒ ☒ ☒ ☒	 ☒ ☒ ☒ ☒
Energy:kWh,kVAh,kVARh(4Quadrant) • Delivered(Import/Forward) • Received(Export/Reverse) • Last Cleared(Old)	Delivered ☑ Received ☒ Old ☑	Delivered ☑ Received ☑ Old ☑	Delivered ☑ Received ☒ Old ☒	Delivered ☑ Received ☒ Old ☒
Meter On hours Load Run hours Power Interruptions	☒ ☑ ☒	☒ ☑ ☒	☒ ☑ ☒	☒ ☑ ☒
THD: • VoltageL-N • VoltageL-L • Current per phase	 ☒ ☒ ☒	 ☒ ☒ ☒	 ☒ ☒ ☒	 ☒ ☒ ☒
IndividualHarmonics	☒	☒	☒	☒
Min/Max with time stamp • VL-L average • VL-N average • Current average • Frequency • Active power,Total • Apparent power,Total • Reactive power,Total • Power factor,Total	 ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒	 ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒	 ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒	 ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒
RTC	☒	☒	☒	☒

The meter stores all accumulated active, reactive and apparent energy parameters
In non-volatile memory:

- KWh, kVARh, kVAh(delivered)
- KWh, kVARh, kVAh(received)
- KWh, kVARh, kVAh(delivered+received)
- KWh, kVARh, kVAh(delivered-received)

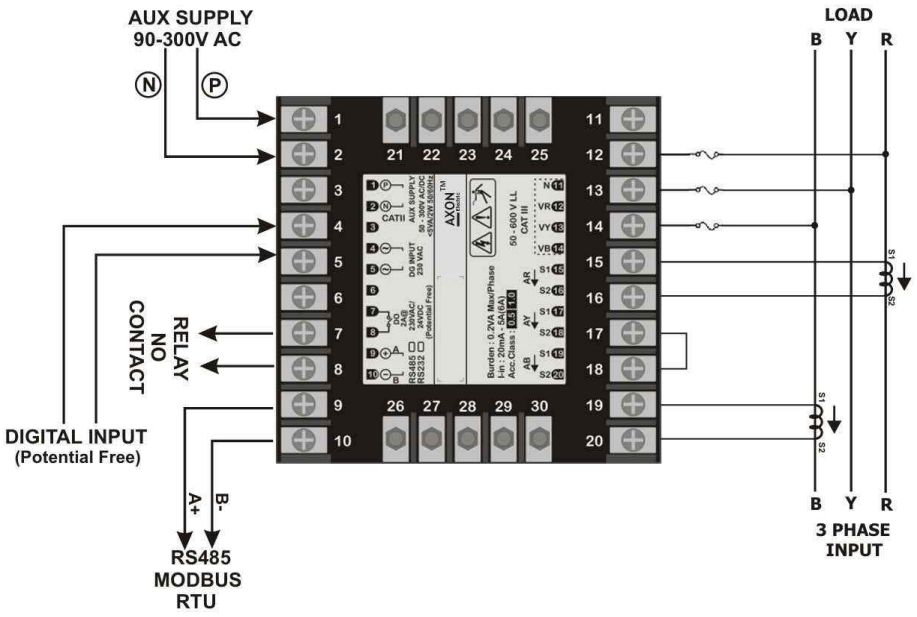
Panelmeter

The back of your meter supports various power system connections.

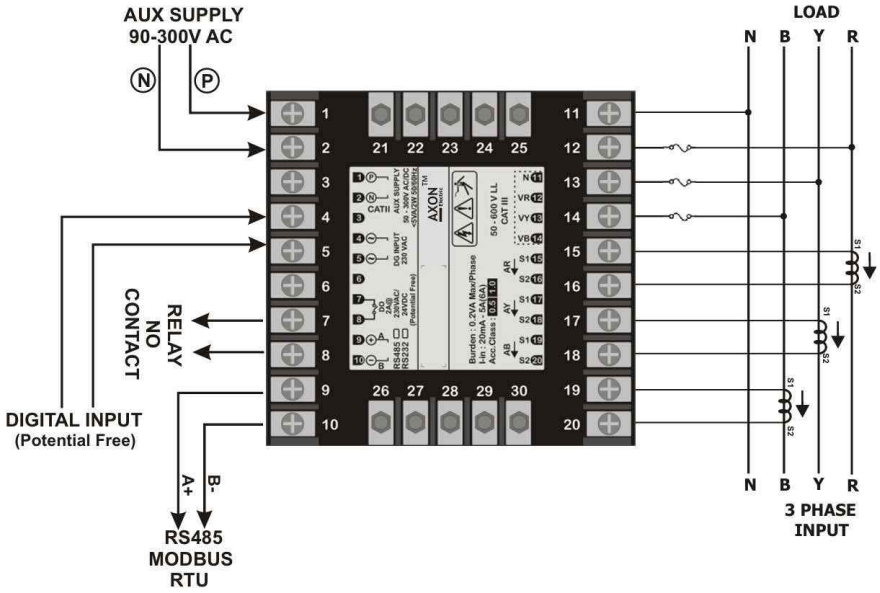


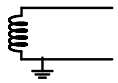
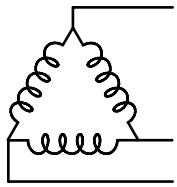
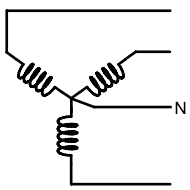
A	Auxiliary power supply(control power)terminals(P+,N-)
B	Digital Output(Potential Free Relay 'NO' Contact)
C	Digital Isolated Input(+, -)
D	RS-485communications(A+,B-)
E	Input current terminals[A1(S1,S2),A2(S1,S2),A3(S1,S2)]
F	Input voltage terminals(V1,V2,V3,VN)

3P3W- DELTA CONNECTION

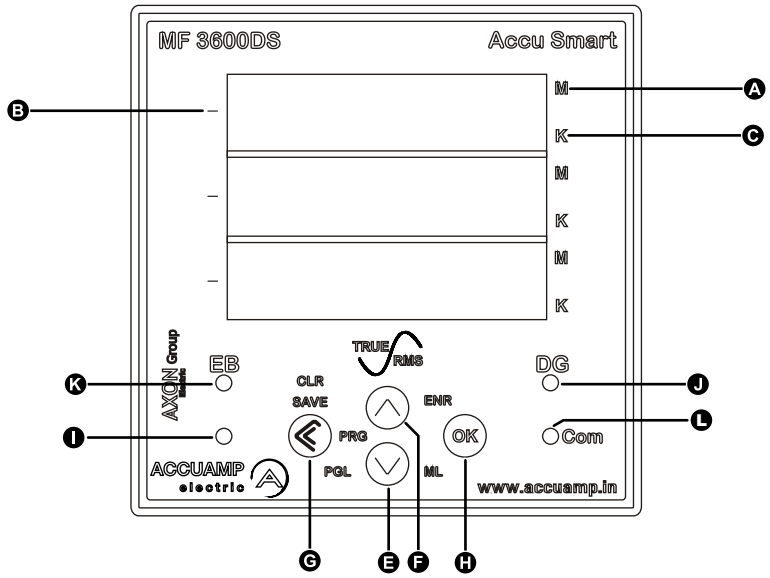


3P4W- STAR CONNECTION



Powersystem description	Meter Setting Display	Symbol	Direct connect maximum(UL/IEC)	
			Installation categoryIII	Installation categoryII
Single-phase Line to Neutral	1P.Ln		≤277VL-N	≤347VL-N
Single-phase Line to Line	1P.LL		480VL-L	600VL-L
3-phase3-wire Delta Connection	StAr		480VL-L	600VL-L
3-phase4-wire Star Connection	dELtA		≤277VL-N/480 VL-L	≤347VL-N/600 VL-L

Displayoverview



A	Mega Indicator	
B	Negative indicator	
C	Kilo Indicator	
D	LoRa SMA Antenna socket	
E	Navigation key	To navigate down
F	Navigation key	To navigate up
G	SET key	Menu Set key
H	OK	Enter key
I	Energy pulsing LED	
J	DG Input status indicator	
K	EB Input status indicator	
L	Serial Communication Indicator	

LEDindicators

Energy pulsing LED

Energy pulsing LED that can be configured for Energy pulsing.

This LED flashes at a rate proportional to the amount of energy consumed.

Serial communications LED

The serial communications LED blinks to indicate the meter's Modbus communications Status.

Kilo & Mega Indicator

Kilo "ON" — Parameter reading in Kilo.

Mega '"ON" — Parameter reading in Mega.

Kilo and Mega both "ON" — Parameter reading in Giga.

Minus Indicator

Minus "ON" — Negative/Lag & Minus "OFF" — Positive/Lead.

Parameters Display

Page 1	Voltage Line to Line	V_{L-L}	UPP 000.0
	Voltage Line to neutral	V_{L-N}	UPn 000.0
	Avg Current	I	A 000.0
Page 2	Voltage Line to neutral	V_{L-N}	UPn 000.0
	Avg Current	I	A 0.000
	Frequency	F	F -----
Page 3	Total Active Power	W_{Total}	W 000.0
	Avg Power Factor	pf	PF -----
	Total Apparent Power	VA_{Total}	UA 000.0
Page 4	RY Line to Line Voltage	V_{RY}	Ury 000.0
	YB Line to Line Voltage	V_{YB}	Uyb 000.0
	BR Line to Line Voltage	V_{BR}	Ubr 000.0
Page 5	R Voltage Line to neutral	V_R	Ur 000.0
	Y Voltage Line to neutral	V_Y	Uy 000.0
	B Voltage Line to neutral	V_B	Ub 000.0
Page 6	R Phase Current	I_R	Ar 0.000
	Y Phase Current	I_Y	Ay 0.000
	B Phase Current	I_B	Ab 0.000
Page 7	R Phase Power Factor	PF_R	Pr -----
	Y Phase Power Factor	PF_Y	Py -----
	B Phase Power Factor	PF_B	Pb -----
Page 8	R Phase Active Power	W_R	Wr 0.000
	Y Phase Active Power	W_Y	Wy 0.000
	B Phase Active Power	W_B	Wb 0.000
Page 9	R Phase Apparent Power	VA_R	UAr 0.000
	Y Phase Apparent Power	VA_Y	UAy 0.000
	B Phase Apparent Power	VA_B	UAb 0.000

Page 10	Total Active Energy	kWh	kWh
			0.000
			0.000
Page 11	Load Hour	Ld.h	Ldh
		Hours	0
		mm.ss	00.00
Page 12	On Hour	On.h	onh
		Hours	0
		mm.ss	00.00
Page 13	Power Interrupt Count	P.Int.	P.int.
			0
			0.000
Page 14	Total Old Active Energy	kWh.o	kWh.o
			0.000
			0.000
Page 15	Old Load Hour	Ld.h.o	Ldh.o
		Hours	0
		mm.ss	00.00
Page 16	Revolutions per minute	RPM	rPM
			0.000
			0.000

Button functions

The meter supports single press and combination press functions of the buttons.

Symbol	Description
▽	To navigate down the parameter list.
▽	To move cursor to the left. Press and hold for 2 seconds.
△	To navigate up the parameter list.
△	To move cursor to the right. Pressandholdfor2 seconds.
OK	To select a parameter.
▽ + △	Press and hold 3 secs simultaneously to enter in to or exit Setup page.
▽ + OK	Press and hold 3secs simultaneously and to enter in to clear page.

Display Parameters

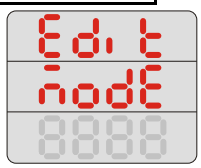
Display	Parameter Description
8888Pn	Line to Neutral Voltage
8888PP	Line to Line Voltage
88888A	Average Current
88888F	Frequency
8888PF	Power Factor - : Leading PF, + : Lagging PF
8888Yt	Active Power total (Watt)
8888VA	Apparent Power total (VA)

Parameter display

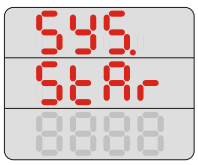
Display	Parameter Description
	Active Energy Total Received/Import(Wh)
	Apparent Energy Total (Vah)
	Reactive Energy Total Capacitive/Inductive (Varh)
	Old Active Energy Total Received/Import(Wh) which is recently cleared
	Line to Line Voltage between R-phase and Y Phase
	Line to Line Voltage between Y-phase and B Phase
	Line to Line Voltage between B-phase and R Phase
	R phase Line to Neutral Voltage
	Y phase Line to Neutral Voltage
	B phase Line to Neutral Voltage
	R phase Line Current
	Y phase Line Current
	B phase Line Current
	R phase Active Power(Wr)
	Y phase Active Power(WY)
	B phase Active Power(Wb)
	R phase Apparent Power(VA-R)
	Y phase Apparent Power(VA-Y)
	B phase Apparent Power(VA-B)

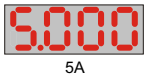
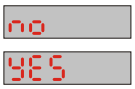
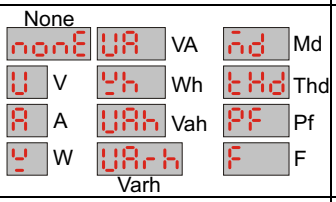
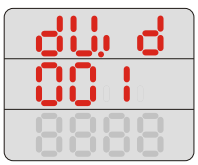
Display	Parameter Description
	R phase Power Factor
	Y phase Power Factor
	B phase Power Factor
	Load Hour
	Load Hour Old (Which was cleared recently)
	Power Interrupts counts

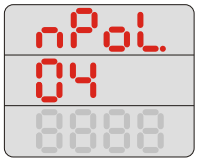
Setup screen menus



1. Press and hold the “Left” and “OK” buttons simultaneously for 5seconds to enter Setup.
2. Enter password. Default password is **1000**.
3. Press OK.
4. Press the Up or Down button to select a parameter to edit.
   The selected parameter flashes the digit, value, or decimal point that is required to be set.
5. Increase or decrease the digit value, move the decimal point, or select a value from a pre-programmed list using the Up or Down button.
6. Press OK after making the required changes.
7. Press and hold the Up and Down buttons simultaneously for 2seconds to exit setup.
8. Select Yes to save your settings.

Display	Description	Range	Default
	SyS. -> PowerSystem Configurations	StAr 3 phase Star Connection dELt 3 phase Delta Connection 1 PLL 1 phase Line to Line 1 PLn 1 phase Line to Neutral	 3 phase Star Connection
	Vt.Pr -> Primary Voltage(V_{L-L})	0100V to 999000V AC	 415.0V AC
	Vt.SE -> Secondary Voltage (V_{L-L})	0100V to 999000V AC	 415.0V AC
	Ct.Pr -> CT Primary	1A to 32760A	 5A

display	Description	Range	Default
	Ct.SE -> CT Secondary	1A to 32760A	 5A
	Rev.L -> Reverse lock	 No Yes	 No
	VA.SL -> VA Selection	 Vector  Arithmatic	Vector
	ALARM -> Alarm Parameter Selection	None  VA Md V Wh Thd A Vah Pf W Varh F	None
	AL.Lt -> Alarm lower threshold	1 to 9999 k	100
	AL.Ht -> Alarm higher threshold	1 to 9999 k	200
	d.inP -> Digital Input setting	 No  Yes	No
	E.SEL -> Display Energy Selection	 Wh  Vah	 Wh
	DU.id -> Device id (Slave id)	1 to 247	 1
	BAUd -> Baud Rate	 9600 bps  19.20k (19200 bps)  38.40k (38400 bps)	 38.40k

display	Description	Range	Default
	PrtY -> Parity	 None  Odd  Even	 None
	nPoL. -> Number of Poles	02 to 40	 04
	PASS -> Set New Password	0001 to 9999	 1000

Button functions in menu setup

Mode	Button	Function
Setup Menu	▽	To navigate to the next parameter Configuration screen.
	△	To navigate to the previous parameter Configuration screen.
	OK	Enter setup mode to configure the displayed Parameter value.
	▽ + △	Press and hold the Up and Down buttons Simultaneously for 2seconds to enter Setup. Exit setup with the same button sequence.

Button functions in editing setup parameters

Mode	Button	Function
Setup Menu	▽	■ Use to decrease the numeric value for the flashing digit. ■ Use to view the next value from the list ■ Use to move the decimal point to the left for the flashing decimal Point.
	△	■ Use to increase the numeric value for the flashing digit. ■ Use to view the previous value from the list ■ Use to move the decimal point to the right for the Flashing decimal Point.
	Press and hold for 2seconds. ▽	Use to move the position of the cursor to left for the Flashing digit/Flashing Decimal Point.
	Press and hold for 2seconds. △	Use to move the position of the cursor to right for the Flashing digit/Flashing Decimal Point.
	OK	To select a parameter to edit the values. To select configured parameter values. To save the changes made to setup parameter.
	▽ + △	Press and hold the Up and Down buttons Simultaneously for 2seconds to enter Setup. Exit setup with the same button sequence.

Clear Energy/Load Hour

Entering Clear screen

1. Press and hold the OK & Down buttons simultaneously for 3 seconds and release.
2. Enter Password using UP and Down buttons, Default password is **1000.**
3. Press OK to enter Password.
4. Press OK once again to select “Yes/No” selection.
5. Press the Down button to select “Yes”.
6. Press OK.

Clear parameters

Resets the energy values. The meter supports reset of the following parameter values:

- Active energy-Import/Export
- Reactive energy-Import/Export
- Apparent energy-Import/Export
- Run Hour

Mode	Button	Function
Clear Screen	OK + ▽	Press and hold OK and Down buttons for 3seconds and release to enter Clear.
	▽ △	Enter Password using UP and Down buttons, Default password is **1000.**
	OK	Press OK to enter Password.
	OK	Press OK once again to select “Yes/No” selection.
	▽	Press the Down button to select “Yes”.
	OK	Press OK.

Old Energy/Load Hour parameters

Old Total Active energy-Import -> Holds and display previous cleared Total Active Energy-Import value.

Old Total Load Hour -> Holds and display previous cleared Total Load Hour value.

Communications setup

RS-485 communication parameters

Meter supports RS-485 Modbus RTU protocol(Half-duplex)

Parameter	Values	Description
Address	1 to 255	Set the address for this device. The address must be Unique for each device in a communications loop.
Baud Rate	4800, 9600, 19200(19.20k), 38400(38.40k).	Select the speed for data transmission. The baudrate Must be the same for all devices in a communications loop.
Parity	None Even Odd	Select None if the parity bit is not used. The parity Setting must be the same for all devices in a Communications loop.
Stop bits	1	Stop bit is fixed internally to 1 always by default
Function	03	Read holding registers

Specifications

The specifications contained in this section are subject to change without notice.

For installation and wiring information, refer to the meter installation sheet.

Mechanical characteristics

IP degree of protection(IEC60529-1)	Front display:IP51 Meter body:IP30(except terminals)
Panel thickness maximum	6.0mm(0.25in)maximum
Mounting position	Vertical
Display type	LED display-7Segment
Keypad	3 button
Front panel LED indicators	Green LED(heartbeat/serial communications activity) Red LED(energy pulse output)
Weight	~600gms
Dimensions WxHxD	96x96x73mm max

Electrical characteristics

Measurement accuracy

Current, Phase	±0.5% for Class1.0 and Class0.5
Voltage L-N, L-L	±0.5% for Class1.0 and Class0.5
Power Factor	±0.01 for Class1.0 and Class0.5
Power	Active power:±1% for Class1.0 and Class0.5 Reactive power:±1% for Class1.0 and Class0.5
Frequency	±0.05% for Class1.0 and Class0.5
Active Energy	Active Energy [2] Class1.0 asper IEC62053-21 Class0.5 [3] Asper 62053-22 Class0.2 [4]
Reactive Energy	Class1.0 as per IEC62053-24 for 5A nominal CT

Voltage inputs

VT primary	999 kV L-L max, starting voltage depends on VT ratio
V nominal	UL: 20-277VL-N / 35-480V L-L IEC: 20-347VL-N / 35-600V L-L
Measured V with full range	35 to 600 VAC L-L
Permanent over load	750 VAC L-L
Impedance	≥5MΩ
Frequency	50/60 Hz nominal ±5%
VA burden	<0.2VA at 240 VAC L-N

2. For 1A nominal CT, when I>0.150A. For 1A nominal CT, when I>0.500A under temperature influence
3. For 1ph 2W, when system voltage is ≥110V L-N
4. For 2ph 3W and 3ph 3W, when system voltage is ≥110V L-L. Not applicable for 1ph 2W configuration

Current inputs

CT ratings	Primary adjustable 1A to 32767A Secondary 1A or 5A I-nominal
Measured Amps with over range & Crest Factor	Starting current : 5mA Operating range : 50mA to 8.5A
Suppression current (to disregard Negligible load)	5mA to 99mA
Withstand	Continuous 12A ; 50A at 10sec/hr, 500A at 1sec/hr
Impedance	<0.3MΩ
Frequency	50/60 Hz nominal
VA Burden	<0.1VA at 6A

AC control power

Operating range	44 - 277 VAC ±10%
Burden	<6VA at 277 V L-N
Frequency range	45-65 Hz
Ride-through time	80ms typical at 120 VAC and maximum burden 100ms typical at 230 VAC and maximum burden 100ms typical at 277 VAC and maximum burden

DC control power

Operating range	44-277 VDC ±10%
Burden	<2W at 277 VDC
Ride-through time	50ms typical at 125 VDC and maximum burden

Displays update

Instantaneous	1s

Environmental characteristics

Operating temperature	-10°C to +60°C(14°Fto140°F)
Storage temperature	-25°C to +70°C(-13°Fto158°F)
Humidity rating	5% to 95% RH at 50°C(122°F)(non-condensing)
Pollution degree	2

Safety

Europe	CE, as per IEC61010-1Ed-3
US and Canada	CULus per UL61010-1 CAN/CSA-C22.2 No.61010-1, for 600VAC
Measurement category(Voltage and Current inputs)	CATIII up to 480V L-L CATII up to 600V L-L
Over voltage category(Control power)	CATIII up to 300V L-N
Dielectric	As per IEC/UL61010-1Ed-3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