



## Technical Data Sheet

# ALPHA 40A+/41A+/42A+



**ALPHA 40A+/41A+/42A+** is a compact multifunction instrument which is specially designed for Active, Reactive and Apparent Energy Measurement including per phase THD, Powers and others parameters as per different models.

### Special Features

- True RMS Measurement
- Energy as per IEC 62053
- Onsite Programmable
- Low Back Depth
- Error Diagnosis Mode
- LCD Display with Back-lit
- RS485, Limit or Pulse Output

## Application

**ALPHA 40A+/41A+/42A+** measures important electrical parameters in 3 phase and single phase Network & replaces the multiple analog panel meters. It measures electrical parameters like Active / Reactive / Apparent energy & power as per models. The instrument has optional output as one pulse output for energy measurement. It is also applicable for **Energy billing, Electrical load monitoring, Sub-metering, Genset, Test Benches and Laboratories.**

## Product Features

<b>True RMS measurement</b>	Measures distorted waveform up to 15th Harmonic.	<b>Configurable Error Diagnosis Mode</b>	Incorrect phase sequence, phase reversal and phase missing error detection.
<b>Energy as per IEC 62053</b>	Independent Import and Export Energy counter.  Active energy (kWh), Reactive energy (kVArh), Apparent energy (kVAh) measurement.  Accuracy as per IEC 62053-21, IEC62053-23.	<b>LCD Display with Backlit</b>	LCD shows 3 Parameters at a glance.
<b>THD Measurement</b>	The instrument measures THD per phase voltage & current up to 15th Harmonic.	<b>Parameter Screen recall</b>	In case of power failure, the instrument memorizes the last displayed screen.
<b>On-site programmable</b>	Onsite Programmable System Configuration 3PH4W / 3PH3W / 1PH2W.  Onsite Programmable CT ratios and PT ratios	<b>Hour Run, ON Hour, Number of Interruptions</b>	Hour run records the number of hours load is connected. ON Hour is the period for which the auxiliary supply is ON. Number of Interruptions indicates the number of times the Auxiliary Supply was interrupted.
<b>Direct remote access(Optional)</b>	Remote configuration of the Instrument via MODBUS.  Remote access of measured parameters.  Programmable baud rates up to 38.4kbps.	<b>Onsite selection of Auto scroll / Fixed Screen</b>	User can set the display in auto scrolling mode or fixed screen mode locally via front panel keys by entering into Programming mode or remotely via MODBUS (Rs485).
<b>Limit (Alarm) or Pulse Relay Output (Optional)</b>	Potential free, very fast acting relay contact.  Configurable as pulse output which can be used to drive an external counter for energy measurement.  Configurable as limit (alarm) switch.	<b>Enclosure Protection for dust and water</b>	Conforms to IP 54 and IP 65 (optional) (front face) as per IEC60529
<b>Low back depth</b>	The instrument has very low back depth (behind the panel) of less than 60 mm.	<b>Compliance to International Safety standards</b>	Compliance to International Safety standard IEC 61010-1- 2010
		<b>EMC Compatibility</b>	Compliance to International standard IEC 61326
		<b>User configurable features</b>	User can select any five or ten measurement screens which will be shown on display. Also backlit can be programmed to switched ON or OFF.

## Technical Specifications

Accuracy	
Reference Conditions	23°C +/- 2°C (As per IEC 62053 - 21)
Active Energy	Class 1 as per IEC 62053 - 21
Reactive Energy	Class 2 as per IEC 62053 - 23
Apparent Energy	Class 1
Active Power	±0.5% of nominal value at $\cos \phi = 1$
Re-Active Power	±1.0% of nominal value at $\sin \phi = 1$
Apparent Power	±0.5% of nominal value
Power Factor/Phase Angle	±3°
Voltage	±0.5% of nominal value
Current	±0.5% of nominal value
Neutral Current	± 4% of range
Frequency	± 0.2% of mid frequency
THD (Voltage / Current)	±2.0% (60..100% of nominal voltage) & (20...100% of nominal current)

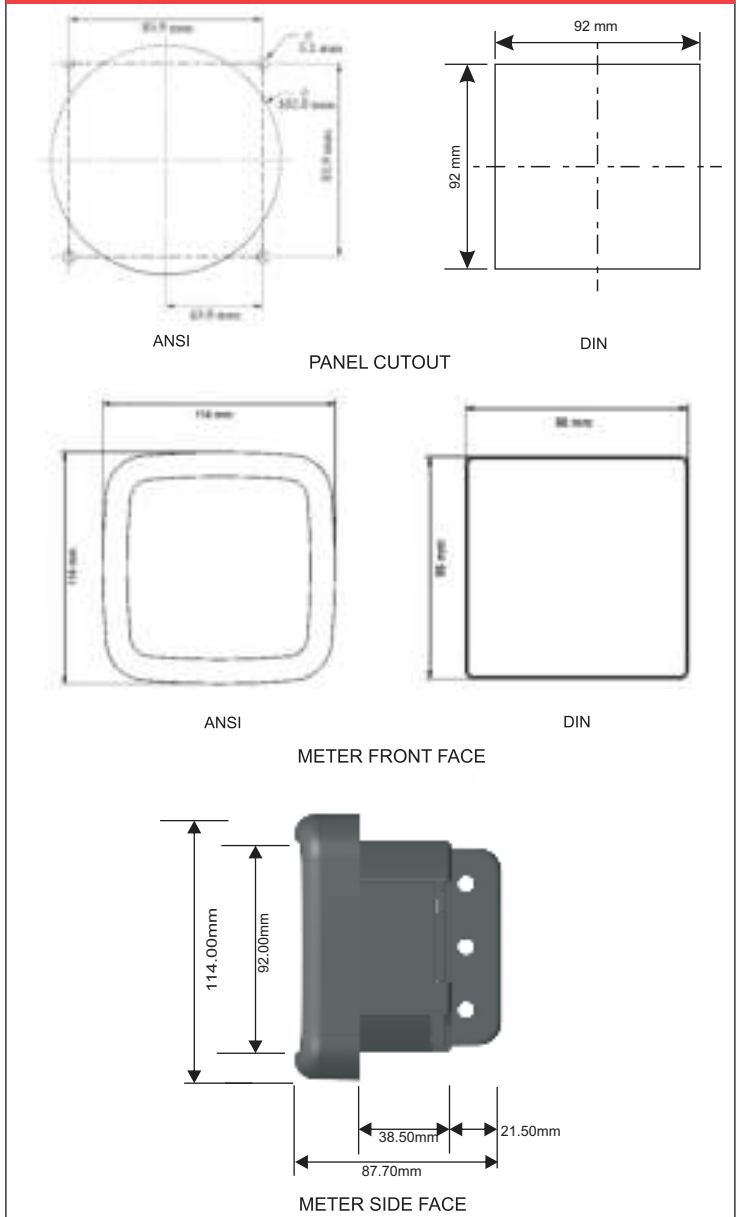
Input Voltage		
Nominal input voltage (AC RMS)	<b>Phase -Neutral</b>	<b>Line-Line</b>
	63.5 VL-N	110 VL-L
	133 VL-N	230 VL-L
	239.6 VL-N	415 VL-L
System PT primary values	100VLL to 1200kVLL programmable on site.	
Max continuous input voltage	120% of nominal value	

Input Current	
Nominal input current	1A/5A AC RMS
System CT primary values	From 1A up to 9999A
Max continuous input current	120% of nominal value
Overload Indication	"-OL-" >121% of Nominal value (For Voltage & Current)

Auxiliary Supply	
Higher Auxiliary Supply	60 V - 300 VAC/DC
Higher Aux Nominal Value	230 VAC, 50/60 Hz / 230 VDC
Lower Auxiliary Supply	20V - 60 V DC / 20V - 40 V AC
Lower Aux Nominal Value	48 V DC/24 V AC 50/60 Hz
Aux Supply frequency range	45 to 65 Hz range

Environmental	
Operating temperature	-10 to +60°C
Storage temperature	-20 to +65°C
Relative humidity	0... 90% non condensing
Warm up time	Minimum 3 minute
Shock	Half sine wave, Peak acceleration 30 gn (300 m/s <sup>2</sup> ), duration 18 ms
Vibration	10... 150...10 Hz, 0.15mm amplitude
Number of sweep cycles	10 per axis
Enclosures	Front IP 54, IP 65 (optional)
Temperature Coefficient	0.05%/°C

## Dimension Details



## Technical Specifications

### PT Secondary Ranges for Various Input Voltage

Input Voltage	PT Secondary Settable Range
110V L-L (63.5V L-N)	100V - 125V L-L (57V - 72V L-N)
230V L-L (133V L-N)	126V - 250V L-L (73V - 144V L-N)
415V L-L (239.6V L-N)	251V - 480V L-L (145V - 277V L-N)

It is recommended that the wires used for connections to the instrument should have lugs soldered at the end. That is, the connections should be made with Lugged wires for secure connections. The Maximum diameter of the lug should be 7.0 mm and maximum thickness 3.5mm. Permissible cross section of the connections wires: ≤ 4.0 mm sq. single wire or 2x2.5mm sq. fine wire

## Technical Specifications

### VA Burden

Nominal input voltage burden	< 0.3 VA approx. per phase
Nominal input current burden	< 0.3 VA approx. per phase
Auxiliary Supply burden	< 4 VA approx.(without Addon card) < 6 VA approx (with Addon card)

### Overload Withstand

Voltage	2 x rated value for 1 second, repeated 10 times at 10 second intervals
Current	20x rated for 0.5 second,

### Operating Measuring Ranges

Current (Energy Measurement)	Starting current : 2mA for 1A & 10mA for 5A Range: 20mA to 1.2A for 1A 100mA to 6A for 5A
Voltage	50... 120% of nominal value
Power Factor	0.5 Lag ... 1... 0.8 Lead
Frequency	50Hz / 60Hz
THD	0..50%

### Display update rate

Response time to step input	1 sec approx.
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### Applicable Standards

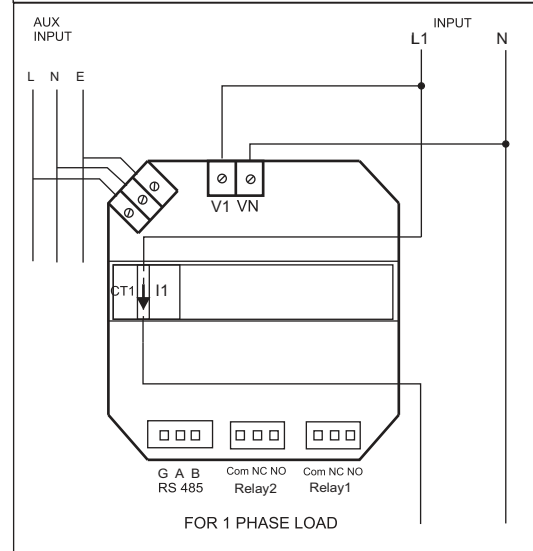
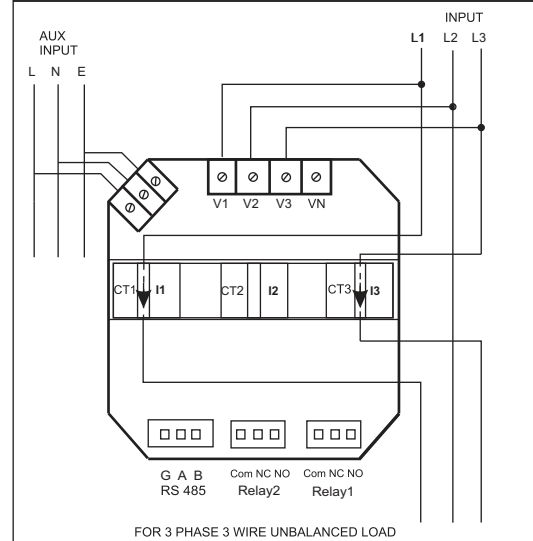
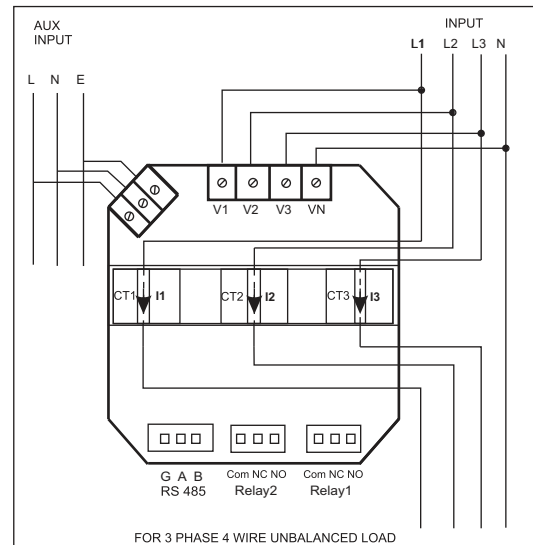
EMC	IEC 61326
Immunity	IEC 61000-4-3. 10V/m min - Level 3 industrial Low level
Safety	IEC 61010-1-2010 , Permanently connected use
IP for water & dust	Front IP 54, Front IP 65 (Optional) Back IP 20, as per IEC60529
Pollution degree	2
Installation category	III
High Voltage Test	3.7 kV AC for 1min ( Between Circuits ) 4.0 kV AC for 1min ( Aux+Input Vs Case)

### Interfaces

Impulse Led	For Energy Calibration at front
Relay(Optional)	240 VAC ,5 A Configured as Limit or Pulse output
ModBus(Optional)	RS485,max. 1200m Baud rate: 4.8k,9.6k, 19.2k, 38.4k bps

**NOTE: Variation due to influence quantity is 100% of class index for other parameters except energy.**

## Electrical Connection



## Measured Parameter System wise

Sr No	Displayed Parameters	3 Phase 4Wire	3Phase 3Wire	1Phase 2Wire
1.	Import Active Energy ( kWh)	✓	✓	✓
2.	Export Active Energy ( kWh)	✓	✓	✓
3.	Inductive Reactive Energy (kVArh)	✓	✓	✓
4.	Capacitive Reactive Energy (kVArh)	✓	✓	✓
5.	Apparent Energy (kVAh)	✓	✓	✓
6.	System Active Power (kW)	✓	✓	✓
7.	Active Power L1 (kW)	✓	✗	✗
8.	Active Power L2 (kW)	✓	✗	✗
9.	Active Power L3 (kW)	✓	✗	✗
10.	System Re-active Power (kVAr)	✓	✓	✓
11.	Re-active Power L1 (kVAr)	✓	✗	✗
12.	Re-active Power L2 (kVAr)	✓	✗	✗
13.	Re-active Power L3 (kVAr)	✓	✗	✗
14.	System Apparent Power (kVA)	✓	✓	✓
15.	Apparent Power L1 (kVA)	✓	✗	✗
16.	Apparent Power L2 (kVA)	✓	✗	✗
17.	Apparent Power L3 (kVA)	✓	✗	✗
18.	System Power Factor	✓	✓	✓
19.	Power Factor L1	✓	✗	✗
20.	Power Factor L2	✓	✗	✗
21.	Power Factor L3	✓	✗	✗
22.	System Phase Angle	✓	✓	✓
23.	Phase Angle L1	✓	✗	✗
24.	Phase Angle L2	✓	✗	✗
25.	Phase Angle L3	✓	✗	✗
26.	Current Demand	✓	✓	✓
27.	kVA Demand	✓	✓	✓
28.	Import kW Demand	✓	✓	✓
29.	Export kW Demand	✓	✓	✓
30.	Max Current Demand	✓	✓	✓
31.	Max kVA Demand	✓	✓	✓
32.	Max Import kW Demand	✓	✓	✓
33.	Max Export kW Demand	✓	✓	✓
34.	Run Hour	✓	✓	✓
35.	On Hour	✓	✓	✓
36.	Number of Interruptions	✓	✓	✓
37.	System Voltage	✓	✓	✓
38.	Voltage L1	✓	✗	✗
39.	Voltage L2	✓	✗	✗
40.	Voltage L3	✓	✗	✗
41.	Voltage L12	✓	✓	✗
42.	Voltage L23	✓	✓	✗
43.	Voltage L31	✓	✓	✗
44.	System Voltage THD	✓	✓	✓
45.	Voltage L1 THD	✓	✓	✗
46.	Voltage L2 THD	✓	✓	✗
47.	Voltage L3 THD	✓	✓	✗

✓ : Available      ✗ : Not Available

## Measured Parameter System wise

Sr No	Displayed Parameters	3 Phase 4Wire	3Phase 3Wire	1Phase 2Wire
48.	System Current	✓	✓	✓
49.	Current L1	✓	✓	✗
50.	Current L2	✓	✓	✗
51.	Current L3	✓	✓	✗
52.	System Current THD	✓	✓	✓
53.	Current L1 THD	✓	✓	✗
54.	Current L2 THD	✓	✓	✗
55.	Current L3 THD	✓	✓	✗
56.	Neutral Current	✓	✗	✗
57.	Frequency	✓	✓	✓
58.	RPM	✓	✓	✓
59.	Phase Reversal Indication	✓	✓	✗
60.	Current Reversal Indication	✓	✓	✓
61.	Phase Absent Indication	✓	✓	✗
62.	Old Import Active Energy ( kWh)	✓	✓	✓
63.	Old Export Active Energy ( kWh)	✓	✓	✓
64.	Old Inductive Reactive Energy (kVArh)	✓	✓	✓
65.	Old Capacitive Reactive Energy (kVArh)	✓	✓	✓
66.	Old Apparent Energy (kVAh)	✓	✓	✓
67.	Old Run Hour	✓	✓	✓
68.	Old On Hour	✓	✓	✓
69.	Old Number of Interruptions	✓	✓	✓

✓ : Available      ✗ : Not Available

## Measured Parameter model wise

Sr. No	Parameters	ALPHA 42A+		ALPHA 41A+		ALPHA 40A+	
		On Display	On Modbus	On Display	On Modbus	On Display	On Modbus
1.	Import Active Energy ( kWh)	✓	✓	✓	✓	✓	✓
2.	Export Active Energy ( kWh)	✓	✓	✓	✓	✓	✓
3.	Inductive Reactive Energy (kVArh)	✗	✓	✗	✓	✓	✓
4.	Capacitive Reactive Energy (kVArh)	✗	✓	✗	✓	✓	✓
5.	Apparent Energy (kVAh)	✗	✓	✗	✓	✓	✓
6.	System Active Power (kW)	✗	✓	✓	✓	✓	✓
7.	Active Power L1 (kW)	✗	✓	✓	✓	✓	✓
8.	Active Power L2 (kW)	✗	✓	✓	✓	✓	✓
9.	Active Power L3 (kW)	✗	✓	✓	✓	✓	✓
10.	System Re-active Power (kVAR)	✗	✓	✗	✓	✓	✓
11.	Re-active Power L1 (kVAr)	✗	✓	✗	✓	✓	✓
12.	Re-active Power L2 (kVAr)	✗	✓	✗	✓	✓	✓
13.	Re-active Power L3 (kVAr)	✗	✓	✗	✓	✓	✓
14.	System Apparent Power (kVA)	✗	✓	✗	✓	✓	✓
15.	Apparent Power L1 (kVA)	✗	✓	✗	✓	✓	✓
16.	Apparent Power L2 (kVA)	✗	✓	✗	✓	✓	✓
17.	Apparent Power L3 (kVA)	✗	✓	✗	✓	✓	✓
18.	System Power Factor	✗	✓	✓	✓	✓	✓
19.	Power Factor L1	✗	✓	✓	✓	✓	✓
20.	Power Factor L2	✗	✓	✓	✓	✓	✓
21.	Power Factor L3	✗	✓	✓	✓	✓	✓

✓ : Available      ✗ : Not Available

## Measured Parameter model wise

Sr. No	Parameters	ALPHA 42A+		ALPHA 41A+		ALPHA 40A+	
		On Display	On Modbus	On Display	On Modbus	On Display	On Modbus
22.	System Phase Angle	x	✓	✓	✓	✓	✓
23.	Phase Angle L1	x	✓	✓	✓	✓	✓
24.	Phase Angle L2	x	✓	✓	✓	✓	✓
25.	Phase Angle L3	x	✓	✓	✓	✓	✓
26.	Current Demand	x	✓	x	✓	✓	✓
27.	kVA Demand	x	✓	x	✓	✓	✓
28.	Import kW Demand	x	✓	x	✓	✓	✓
29.	Export kW Demand	x	✓	x	✓	✓	✓
30.	Max Current Demand	x	✓	✓	✓	✓	✓
31.	Max kVA Demand	x	✓	✓	✓	✓	✓
32.	Max Import kW Demand	x	✓	✓	✓	✓	✓
33.	Max Export kW Demand	x	✓	✓	✓	✓	✓
34.	Run Hour	x	✓	✓	✓	✓	✓
35.	On Hour	x	✓	✓	✓	✓	✓
36.	Number of Interruptions	x	✓	✓	✓	✓	✓
37.	System Voltage	x	✓	✓	✓	✓	✓
38.	Voltage L1	x	✓	✓	✓	✓	✓
39.	Voltage L2	x	✓	✓	✓	✓	✓
40.	Voltage L3	x	✓	✓	✓	✓	✓
41.	Voltage L12	x	✓	✓	✓	✓	✓
42.	Voltage L23	x	✓	✓	✓	✓	✓
43.	Voltage L31	x	✓	✓	✓	✓	✓
44.	System Voltage THD	x	x	x	x	✓	✓
45.	Voltage L1 THD	x	x	x	x	✓	✓
46.	Voltage L2 THD	x	x	x	x	✓	✓
47.	Voltage L3 THD	x	x	x	x	✓	✓
48.	System Current	x	✓	✓	✓	✓	✓
49.	Current L1	x	✓	✓	✓	✓	✓
50.	Current L2	x	✓	✓	✓	✓	✓
51.	Current L3	x	✓	✓	✓	✓	✓
52.	System Current THD	x	x	x	x	✓	✓
53.	Current L1 THD	x	x	x	x	✓	✓
54.	Current L2 THD	x	x	x	x	✓	✓
55.	Current L3 THD	x	x	x	x	✓	✓
56.	Neutral Current	x	✓	x	✓	✓	✓
57.	Frequency	x	✓	✓	✓	✓	✓
58.	RPM	x	✓	✓	✓	✓	✓
59.	Phase Reversal Indication	✓	x	✓	x	✓	x
60.	Current Reversal Indication	✓	x	✓	x	✓	x
61.	Phase Absent Indication	✓	x	✓	x	✓	x
62.	Old Import Active Energy ( kWh)	x	✓	x	✓	✓	✓
63.	Old Export Active Energy ( kWh)	x	✓	x	✓	✓	✓
64.	Old Inductive Reactive Energy (kVArh)	x	✓	x	✓	✓	✓
65.	Old Capacitive Reactive Energy (kVArh)	x	✓	x	✓	✓	✓
66.	Old Apparent Energy (kVAh)	x	✓	x	✓	✓	✓
67.	Old Run Hour	x	✓	x	✓	✓	✓
68.	Old On Hour	x	✓	x	✓	✓	✓
69.	Old Number of Interruptions	x	✓	x	✓	✓	✓

✓ : Available      ✗ : Not Available

## Ordering Information

Product Code		ALPHA	X	X	X	X	X	X	X	0000AN
		40A+	2							
		41A+	3							
		42A+	4							
System Type		3PH 3W/4W	3							
		1 Phase	1							
Input Voltage	For 1 phase	64 VL-N (57 V - 72 V L-N)	1							
		110 V L-N (73 V - 144 V L-N)	2							
		240 V L-N (145 V - 277 V L-N)	4							
	For 3 phase									
		110VL-L	6							
		230VL-L	7							
		415VL-L	8							
	Input Current		1A / 5A	5						
Power Supply		60 - 300V AC/DC				U				
		20 - 40V AC/20-60VDC				L				
MODBUS (RS 485)		With MODBUS (RS 485)					R			
		Without MODBUS					Z			
Pulse Output		With 1 Pulse/ Limit output						P		
		Without pulse output						Z		