



## Technical Data Sheet

# ALPHA 30A+



**ALPHA 30A+** is a compact multifunction instrument which measures important electrical parameters in 3 phase 4 Wire and 3 phase 3 Wire Network & replaces the multiple analog panel meters.

### Special Features

- MODBUS (RS485) Communication (optional)
- Pulse/Limit Switch output (optional)
- 3 Line 4 Digits ultra bright LED Display (up to 9999)
- On site Programmable CT/PT Ratios
- User selectable CT Secondary 1A/5A
- Measurement & Display of RPM, Run hours, On hours, Number of interruption

## Application

**ALPHA 30A+** measures important electrical parameters like AC Voltage, AC Current, Frequency, Active, Reactive, Apparent Power, Import & Export Energy & many more.

## Product Features

|  |   |   |  |
|--|---|---|--|
| <b>On site programmable PT/CT ratios</b>                     | It is possible to program primary of external potential Transformer (PT), primary of external Current Transformer (CT) on site locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)                        | <b>Total Harmonic Distortion (THD)</b>                            | The instrument can measure per phase THD of voltage and THD of current.  |
| <b>User selectable CT Secondary 5A/1A</b>                    | The secondary of external Current Transformer (CT) can be programmed on site to either 5A or 1A locally via front panel keys by entering into Programming mode or remotely via MODBUS (Rs485)   | <b>Energy Count storage:</b>                                      | In case of power failure, the instrument memorizes the last energy count. Every 40 sec, the instrument updates the energy counter in the nonvolatile memory.   |
| <b>User selectable PT Secondary</b>                          | The secondary of external potential Transformer (PT) can be programmed on locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)   | <b>Programmable Energy format &amp; Energy rollover count</b>     | Customer can assign the format for energy display on MODBUS (RS485) in terms of W, kW or MW. Additional to this, customer can also set a rollover count from 7 to 14 digits (for W), 7 to 12 digits (for kW) & 7 to 9 digits (for MW), after which the energy will roll back to zero. The above settings are applicable for all types of energy. |
| <b>User selectable 3 phase 3W or 4W</b>                      | User can program on site the network connection as either 3 Phase 3 Wire or 4 Wire locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485). For single phase applications, single phase version is available. | <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>Low back depth</b>  | The instrument has very low back depth (behind the panel) of 60 mm.   | <b>Optional MODBUS (RS485) Output</b>                             | The optional ModBus output enables the instrument to transmit all the measured parameters over standard MODBUS (RS485).  |
| <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>User Assignable Registers for MODBUS</b>                       | Customer can assign MODBUS register address as per his need for faster response time.  |
| <b>Phase reversal indication</b>                             | The instrument can detect wrong phase sequence or failure of one of the input voltages and displays "phase" error message.  | <b>Optional Pulse Output (1 or 2 Relay output) / Limit switch</b> | The instrument can be programmed as Pulse output or Limit Switch.  |
| <b>Energy measurement (Import and Export)</b>                | Active energy (kWh), Reactive energy (kVArh), Apparent energy (kVAh) & Ampere Hour (kAh). Any of the parameters can be freely assigned to 2 optional pulse outputs.   | <b>Pulse Output</b>   | The optional pulse output is a potential free, very fast acting relay contact which can be used to drive an external mechanical counter for energy measurement.  |
| <b>True RMS measurement</b>                                  | The instrument measures distorted waveform up to 15th Harmonic.   | <b>Limit switch</b>   | The instrument will trip the one or two relays if the programmed parameter exceeds the programmed High & Low Limits.   |
| <b>High brightness 3 line 4 digits LED display</b>           | Simultaneous display of 3 Parameters  | <b>Configuration of the Instrument via MODBUS</b>                 | The instrument settings can be configured locally via front panel keys by entering into Programming mode or remotely via MODBUS (Rs485).<br><b>Note:</b> The MODBUS communication parameters can only be set locally via front panel keys in the Programming mode.   |
| <b>User selectable Low Current suppression (below 30 mA)</b> | User can suppress the readings below 30 mA in the current measurement by onsite programming if required.  |   |  |

## Product Features

|  |  |   |  |
|--|--|---|--|
| <b>Min Max storage of parameters possible</b>      | The instrument stores minimum and maximum values for System Voltage and System Current. Every 40 sec minimum and maximum readings are updated.   | <b>Optional Analog Outputs (1 or 2 Outputs)</b>     | 1 or 2 Analog outputs can be programmed from a list of input parameters.   |
| <b>Number of parameters measured: more than 46</b> | The instrument measures more than 46 electrical parameters of 3 Phase network.   | <b>Ethernet Interface (Modbus TCP/IP Protocol)</b>  | The optional Ethernet Interface output transmit all the measured parameters on Modbus TCP/IP. Also user can configure their instrument via Ethernet Interface. |
| <b>Parameter Screen recall</b>                     | In case of power failure, the instrument memorizes the last displayed screen. The displayed screen will get memorized only if user keeps this screen for minimum 40 sec duration before power failure for fixed screen mode. | <b>Enclosure Protection for dust and water</b>      | conforms to IP 54, IP 65(optional) (front face) as per IEC60529  |
|  |  | <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   |

## Technical Specifications

| Reference conditions for Accuracy |  | Applicable Standards  |   |
|-----------------------------------|--|-----------------------|---|
| Reference temperature             | 23°C +/- 2°C   | EMC                   | IEC 61326   |
| Input waveform                    | Sinusoidal (distortion factor 0.005)   | Immunity              | IEC 61000-4-3. 10V/m min – Level 3 industrial low level       |
| Input frequency                   | 50 or 60 Hz ±2%  | Safety                | IEC 61010-1-2010 , Permanently connected use                  |
| Auxiliary supply voltage          | Rated Value ±1%  | IP for water & dust   | Front IP 54, Front(Optional) IP65 Back IP 20, as per IEC60529 |
| Auxiliary supply frequency        | Rated Value ±1%  | Pollution degree      | 2   |
| Voltage Range                     | 50... 100% of Nominal Value.<br>60... 100% of Nominal Value for THD.   | Installation category | III   |
| Current Range                     | 10... 100% of Nominal Value.<br>20... 100% of Nominal Value for THD.   | High Voltage Test     | 3.7 kV AC, for 1 minute                                       |
| Power                             | Cos phi / sin phi = 1 for Active/<br>Reactive Power & Energy.<br>10... 100% of Nominal Current &<br>50... 100% of Nominal Voltage. |                       |   |
| Power Factor / Phase Angle        | 40... 100% of Nominal Current &<br>50... 100% of Nominal Voltage.  |                       |   |

### Accuracy

| Parameter                 | Accuracy 1.0 (Standard)  | Accuracy 0.5 (on request) | Accuracy 0.2 (on request) |
|---------------------------|--------------------------|---------------------------|---------------------------|
| Voltage                   | ± 0.5% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Current                   | ± 0.5% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Frequency                 | ± 0.15% of mid frequency | ± 0.15% of mid frequency  | ± 0.15% of mid frequency  |
| Active Power              | ± 0.5% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Re-Active Power           | ± 0.5% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Apparent Power            | ± 0.5% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Active energy (kWh)       | ± 1.0% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Re Active energy (kVAh)   | ± 1.0% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Apparent energy (kVAh)    | ± 1.0% of Nominal value  | ± 0.5% of Nominal value   | ± 0.2% of Nominal value   |
| Accuracy of Analog Output | 1 % of Output end value  | 1 % of Output end value   | 1 % of Output end value   |
| Power Factor              | ±1% of Unity             | ±1% of Unity              | ±1% of Unity              |
| Angle                     | ±1% of range             | ±1% of range              | ±1% of range              |
| Total Harmonic Distortion | ±2%                      | ±2%                       | ±2%                       |
| Neutral current           | ±4% of range             | ±4% of range              | ±4% of range              |

Note- Measurement error is normally much less than the error specified in technical specification. Variation due to influence quantity is less than twice the error allowed for reference condition.

## Technical Specifications

| Input Voltage                  |  |
|--------------------------------|--|
| Nominal input voltage (AC RMS) | Phase -Neutral<br>63.5 / 133 / 239.6 / 288.6 VL-N<br>Line-Line<br>110 / 230 / 415 / 500 VL-L |
| System PT primary values       | 100VLL to 692kVLL programmable on site.  |
| Max continuous input voltage   | 120% of rated value  |

| Input Current                |                                      |
|------------------------------|--------------------------------------|
| Nominal input current        | 5A AC RMS.                           |
| System CT secondary values   | 1A & 5A programmable on site.        |
| System CT primary values     | From 1A up to 9999A (for 1 or 5 Amp) |
| Max continuous input current | 120% of rated value                  |

PT Secondary is onsite settable

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

| VA Burden                    |                                       |
|------------------------------|---------------------------------------|
| Nominal input voltage burden | < 0.2 VA approx. per phase            |
| Nominal input current burden | < 0.6 VA approx. per phase            |
| Auxiliary Supply burden      | < 5 VA for AC aux<br>< 4 W for DC aux |

| Overload Withstand |  |
|--------------------|--|
| Voltage            | 2 x rated value for 1 second, repeated 10 times at 10 second intervals |
| Current            | 20 x rated value for 1 second, repeated 5 times at 5 min intervals     |

| Operating Measuring Ranges |                           |
|----------------------------|---------------------------|
| Voltage                    | 10... 120% of rated value |
| Current                    | 5 ... 120% of rated value |
| Frequency                  | 40...70Hz / 400Hz         |
| Power Factor               | 0.5 Lag ... 1... 0.8 Lead |

| Influence of Variations |  |
|-------------------------|--|
| Temperature coefficient | 0.05%/°C for Voltage (50... 120% of rated value)<br>0.05%/°C for Current (10... 120% of rated value) |

| Display update rate         |               |
|-----------------------------|---------------|
| Response time to step input | 1 sec approx. |

## Ampere Hour

|  |   |
|--|---|
| Default pulse rate   | CT secondary = 1A Max pulse rate 3600 pulses/Ah *   |
| divisor  | CT secondary = 5A Max pulse rate 720 pulses/Ah  |
| Other Pulse rate divisors (applicable only when Energy on RS485 is in W):  |   |
| 10   | CT secondary = 1A Max pulse rate 3600 pulses/10Ah *<br>CT secondary = 5A Max pulse rate 720 pulses/10Ah     |
| 100  | CT secondary = 1A Max pulse rate 3600 pulses/100Ah *<br>CT secondary = 5A Max pulse rate 720 pulses/100Ah   |
| 1000   | CT secondary = 1A Max pulse rate 3600 pulses/1000Ah *<br>CT secondary = 5A Max pulse rate 720 pulses/1000Ah |
| Pulse duration   | 60 ms, 100 ms or 200 ms   |
| *No. of Pulses = $\frac{\text{Maximum Pulses}}{\text{CT Ratio}}$<br>Where, CT Ratio = (CT primary/ CT Secondary) |   |

## PT Secondary Ranges for Various Input Voltage

| Input Voltage         | PT Secondary Settable Range   |
|-----------------------|---|
| 110V L-L (63.5V L-N)  | 100V - 120V L-L (57V - 69V L-N)   |
| 230V L-L (133V L-N)   | 121V - 239V L-L (70V - 139V L-N)  |
| 415V L-L (239.6V L-N) | 240V-480V L-L (140V - 288.6V L-N)<br>PT secondary is settable upto 500VL-L by modbus communication. |

## Limit Output Option

|  |                               |
|--|-------------------------------|
| Limit can be assigned to different measured parameters. It can be configured in one of the four modes given below. |                               |
| 1)   | Hi alarm & Energized Relay    |
| 2)   | Hi alarm & De-energized Relay |
| 3)   | Lo alarm & Energized Relay    |
| 4)   | Lo alarm & De-energized Relay |

With user selectable Trip point, Hysteresis, Energizing delay and De-energizing delay.

## Technical Specifications

### Environmental

|                       |                                     |
|-----------------------|-------------------------------------|
| Operating temperature | -20 to +70°C                        |
| Storage temperature   | -30 to +80°C                        |
| Relative humidity     | 0... 90% non condensing             |
| Warm up time          | Minimum 3 minute                    |
| Shock                 | 15g in 3 planes                     |
| Vibration             | 10... 55... 10 Hz, 0.15mm amplitude |

### Pulse output

Energy (can be programmed for different energy parameters simultaneously)

|                                       |              |
|---------------------------------------|--------------|
| Relay contact                         | (1NO+1NC)    |
| Switching Voltage & current for Relay | 240 VAC ,5 A |

### Default pulse rate divisor

|                        |                           |                          |
|------------------------|---------------------------|--------------------------|
| 1 per Wh (up to 3600W) | 1 per kWh (up to 3600kWh) | 1 per MWh (above 3600kW) |
|------------------------|---------------------------|--------------------------|

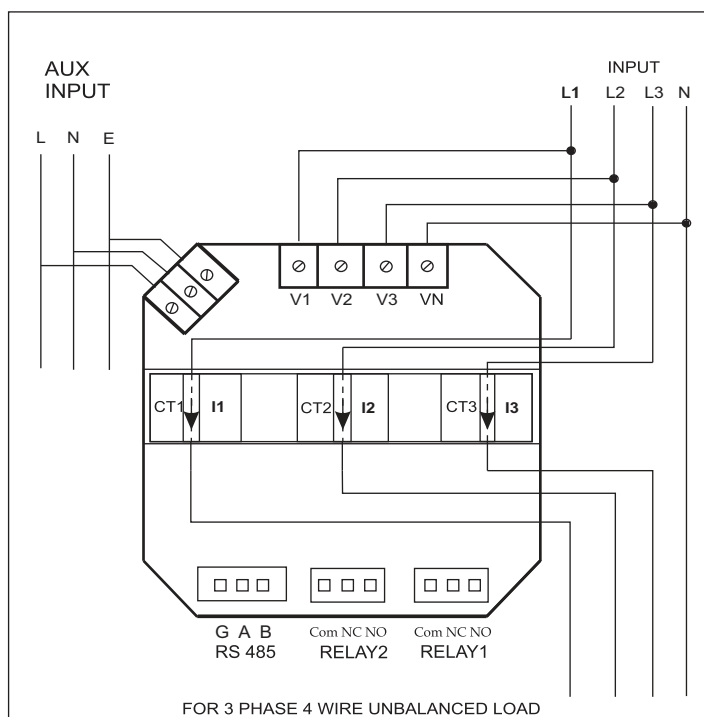
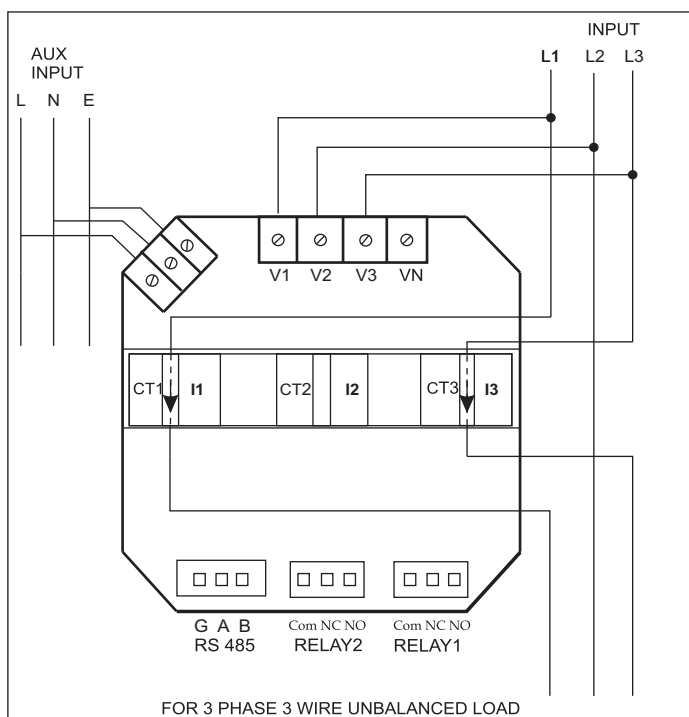
Other Pulse rate divisors (applicable only when Energy on RS485 is in W)

|      |                             |                                |                               |
|------|-----------------------------|--------------------------------|-------------------------------|
| 10   | 1 per 10 Wh (up to 3600W)   | 1 per 10 kWh (up to 3600kWh)   | 1 per 10 MWh (above 3600kW)   |
| 100  | 1 per 100 Wh (up to 3600W)  | 1 per 100 kWh (up to 3600kWh)  | 1 per 100 MWh (above 3600kW)  |
| 1000 | 1 per 1000 Wh (up to 3600W) | 1 per 1000 kWh (up to 3600kWh) | 1 per 1000 MWh (above 3600kW) |

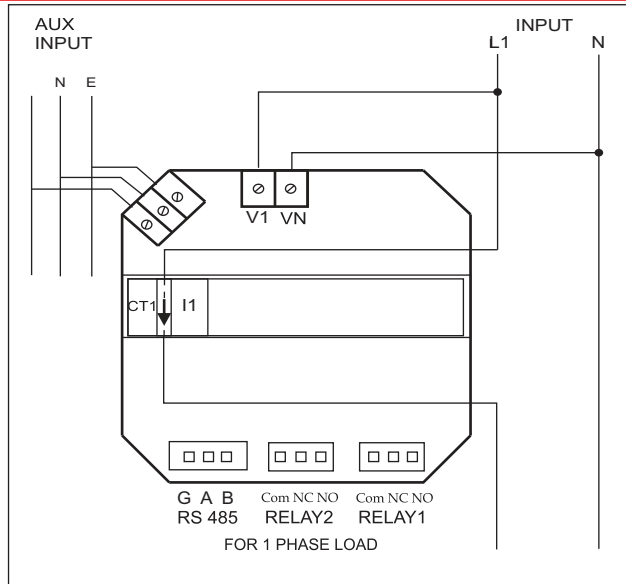
Pulse Duration 60 ms, 100 ms, 200 ms

Above options are also applicable to Apparent and Reactive Energy.

## Electrical Connections



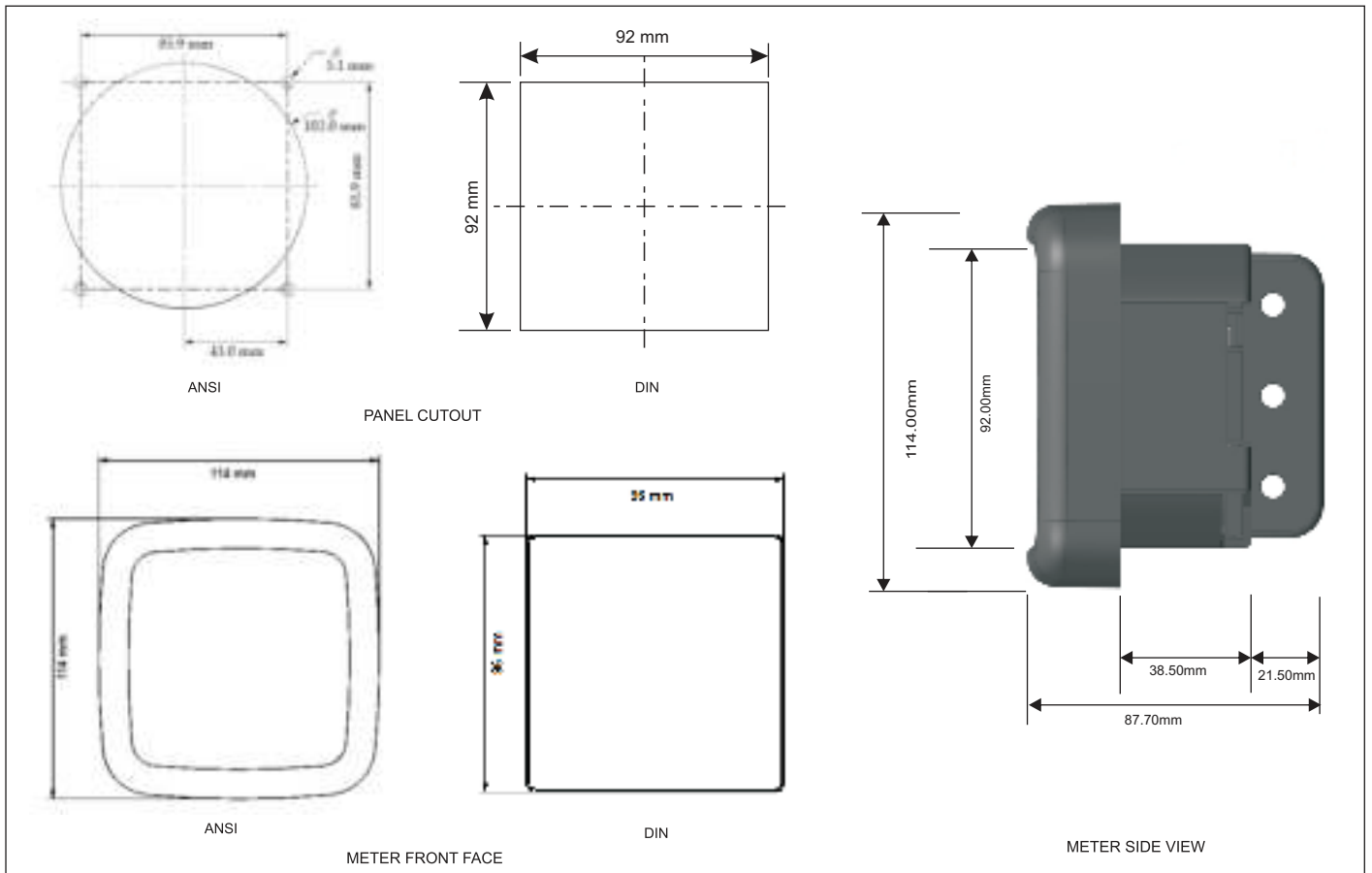
## Electrical Connections



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 3.5 mm.

Permissible cross section of the connection wires:  $\leq 4.0 \text{ mm}^2$  single wire or  $2 \times 2.5 \text{ mm}^2$  fine wire.

## Dimension Details



## Parameter Measurement and Display

| Sr No | Displayed Parameters              | 3 Phase 4Wire | 3Phase 3Wire | Single Phase 2W |
|-------|-----------------------------------|---------------|--------------|-----------------|
| 1.    | System Volts                      | ✓             | ✓            | ✓               |
| 2.    | System Current                    | ✓             | ✓            | ✓               |
| 3.    | Volts L1 - N                      | ✓             | ✗            | ✗               |
| 4.    | Volts L2 - N                      | ✓             | ✗            | ✗               |
| 5.    | Volts L3 - N                      | ✓             | ✗            | ✗               |
| 6.    | Volts L1 - L2                     | ✓             | ✓            | ✗               |
| 7.    | Volts L2 - L3                     | ✓             | ✓            | ✗               |
| 8.    | Volts L3 - L1                     | ✓             | ✓            | ✗               |
| 9.    | Current L1                        | ✓             | ✓            | ✗               |
| 10.   | Current L2                        | ✓             | ✓            | ✗               |
| 11.   | Current L3                        | ✓             | ✓            | ✗               |
| 12.   | Neutral Current                   | ✓             | ✗            | ✗               |
| 13.   | Frequency                         | ✓             | ✓            | ✓               |
| 14.   | System Active Power (kW)          | ✓             | ✓            | ✓               |
| 15.   | Active Power L1 (kW)              | ✓             | ✗            | ✗               |
| 16.   | Active Power L2 (kW)              | ✓             | ✗            | ✗               |
| 17.   | Active Power L3 (kW)              | ✓             | ✗            | ✗               |
| 18.   | System Re-active Power (kVAR)     | ✓             | ✓            | ✓               |
| 19.   | Re-active Power L1 (kVAR)         | ✓             | ✗            | ✗               |
| 20.   | Re-active Power L2 (kVAR)         | ✓             | ✗            | ✗               |
| 21.   | Re-active Power L3 (kVAR)         | ✓             | ✗            | ✗               |
| 22.   | System Apparent Power (kVA)       | ✓             | ✓            | ✓               |
| 23.   | Apparent Power L1 (kVA)           | ✓             | ✗            | ✗               |
| 24.   | Apparent Power L2 (kVA)           | ✓             | ✗            | ✗               |
| 25.   | Apparent Power L3 (kVA)           | ✓             | ✗            | ✗               |
| 26.   | System Power Factor               | ✓             | ✓            | ✓               |
| 27.   | Power Factor L1                   | ✓             | ✗            | ✗               |
| 28.   | Power Factor L2                   | ✓             | ✗            | ✗               |
| 29.   | Power Factor L3                   | ✓             | ✗            | ✗               |
| 30.   | Phase Angle L1                    | ✓             | ✗            | ✓               |
| 31.   | Phase Angle L2                    | ✓             | ✗            | ✗               |
| 32.   | Phase Angle L3                    | ✓             | ✗            | ✗               |
| 33.   | Import kWh (8 digit resolution)   | ✓             | ✓            | ✓               |
| 34.   | Export kWh (8 digit resolution)   | ✓             | ✓            | ✓               |
| 35.   | Import kVARh (8 digit resolution) | ✓             | ✓            | ✓               |
| 36.   | Export kVARh (8 digit resolution) | ✓             | ✓            | ✓               |
| 37.   | kVAh (8 digit resolution)         | ✓             | ✓            | ✓               |
| 38.   | KAh (8 digit resolution)          | ✓             | ✓            | ✓               |
| 39.   | Current Demand                    | ✓             | ✓            | ✓               |
| 40.   | KVA Demand                        | ✓             | ✓            | ✓               |
| 41.   | KW Import Demand                  | ✓             | ✓            | ✓               |
| 42.   | KW Export Demand                  | ✓             | ✓            | ✓               |
| 43.   | Max Current Demand                | ✓             | ✓            | ✓               |
| 44.   | Max KVA Demand                    | ✓             | ✓            | ✓               |
| 45.   | Max KW Import Demand              | ✓             | ✓            | ✓               |
| 46.   | Max KW Export Demand              | ✓             | ✓            | ✓               |
| 47.   | Run Hour                          | ✓             | ✓            | ✓               |
| 48.   | On Hour                           | ✓             | ✓            | ✓               |
| 49.   | Number of Interruptions           | ✓             | ✓            | ✓               |
| 50.   | Phase Reversal Indication         | ✓             | ✓            | ✓               |
| 51.   | THD Volts L1-N                    | ✓             | ✗            | ✗               |
| 52.   | THD Volts L2-N                    | ✓             | ✗            | ✗               |
| 53.   | THD Volts L3-N                    | ✓             | ✗            | ✗               |
| 54.   | THD Volts L1-L2                   | ✗             | ✓            | ✗               |

✓ - Available ✗ - Not available

## Parameter Measurement and Display

| Sr No | Displayed Parameters | 3 Phase 4Wire | 3Phase 3Wire | Single Phase 2W |
|-------|----------------------|---------------|--------------|-----------------|
| 55.   | THD Volts L2-L3      | ✘             | ✓            | ✘               |
| 56.   | THD Volts L3-L1      | ✘             | ✓            | ✘               |
| 57.   | THD Current L1       | ✓             | ✓            | ✘               |
| 58.   | THD Current L2       | ✓             | ✓            | ✘               |
| 59.   | THD Current L3       | ✓             | ✓            | ✘               |
| 60.   | THD Voltage Mean     | ✓             | ✓            | ✓               |
| 61.   | THD Current Mean     | ✓             | ✓            | ✓               |

✓ - Available ✘ - Not available



## Ordering information

|                         |                                |   |   |   |   |   |   |   |   |   |       |
|-------------------------|--------------------------------|---|---|---|---|---|---|---|---|---|-------|
| Product Code            | ALPHA 30A+                     | X | X | X | X | X | X | X | X | X | 000AN |
| Accuracy                | Accuracy 1.0%                  | 1 |   |   |   |   |   |   |   |   |       |
|                         | Accuracy 0.5% (on request)     | 5 |   |   |   |   |   |   |   |   |       |
|                         | Accuracy 0.2% (on request)     | 2 |   |   |   |   |   |   |   |   |       |
| System Type             | 3 Phase                        |   | 3 |   |   |   |   |   |   |   |       |
|                         | 1 Phase                        |   | 1 |   |   |   |   |   |   |   |       |
| Input Voltage / Current | 120V L-N 1/5A                  |   |   | J |   |   |   |   |   |   |       |
|                         | 150V L-N 1/5A                  |   |   | O |   |   |   |   |   |   |       |
|                         | 208V L-N 1/5A                  |   |   | P |   |   |   |   |   |   |       |
|                         | 120V L-L 1/5A                  |   |   | N |   |   |   |   |   |   |       |
|                         | 150V L-L 1/5A                  |   |   | K |   |   |   |   |   |   |       |
|                         | 208V L-L 1/5A                  |   |   | 8 |   |   |   |   |   |   |       |
|                         | 277V L-L 1/5A                  |   |   | L |   |   |   |   |   |   |       |
|                         | 400V L-L 1/5A                  |   |   | C |   |   |   |   |   |   |       |
|                         | 415V L-L 1/5A                  |   |   | D |   |   |   |   |   |   |       |
|                         | 440V L-L 1/5A                  |   |   | E |   |   |   |   |   |   |       |
|                         | 480V L-L 1/5A                  |   |   | G |   |   |   |   |   |   |       |
| Power Supply            | 60-300V AC/DC, 45-65Hz         |   |   |   | V |   |   |   |   |   |       |
|                         | 20-40Vac 45- 65 Hz or 20-60Vdc |   |   |   | G |   |   |   |   |   |       |
| RS 485                  | With RS 485                    |   |   |   |   | R |   |   |   |   |       |
|                         | Ethernet                       |   |   |   |   | E |   |   |   |   |       |
|                         | Without RS 485 / Ethernet      |   |   |   |   | Z |   |   |   |   |       |
| Pulse Output            | 1 Pulse output                 |   |   |   |   |   | S |   |   |   |       |
|                         | 2 Pulse output                 |   |   |   |   |   | D |   |   |   |       |
|                         | Pulse O/P not used             |   |   |   |   |   | Z |   |   |   |       |
| Analog Output           | 2 outputs ( 0 - 1mA )          |   |   |   |   |   |   | 1 |   |   |       |
|                         | 2 outputs ( 4 - 20 mA )        |   |   |   |   |   |   | 2 |   |   |       |
|                         | Analog Outputs option not used |   |   |   |   |   |   | Z |   |   |       |
| Input frequency         | 50 or 60 Hz                    |   |   |   |   |   |   |   | 0 |   |       |
|                         | 400 Hz                         |   |   |   |   |   |   |   |   | 4 |       |

Note- 2 Pulse output is not available in case of analog output option