



sifam tinsley
PRECISION INSTRUMENTATION

MULTIFUNCTION METERS
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DATASHEET

Issue 1



File No. E471457

Multifunction Meters

Transducers & Isolators

Temperature Controllers

Converters & Recorders

Digital Panel Meters

Current Transformers

Analogue Panel Meters

Shunts

Digital Multimeters

Clamp Meters

Insulation Testers

ALPHA 30 MULTIFUNCTION METERS

Product Characteristics

- On site programmable PT/CT ratios
- User selectable CT Secondary 5A/1A
- User selectable PT Secondary
- User selectable 3 phase 3W or 4W
- Low back depth
- Onsite selection of Auto scroll / Fixed Screen
- Phase reversal indication
- Energy measurement (Import and Export)
- True RMS measurement
- High brightness 3 line 4 digits LED display

SUBJECT TO CHANGE WITHOUT NOTICE

This datasheet superseded all previous versions – please keep for future reference

Features

- On site programmable PT/CT ratios
- User selectable CT Secondary 5A/1A
- User selectable PT Secondary
- User selectable 3 phase 3W or 4W
- Low back depth
- Onsite selection of Auto scroll / Fixed Screen
- Phase reversal indication
- Energy measurement (Import and Export)
- True RMS measurement
- High brightness 3 line 4 digits LED display
- User selectable Low Current suppression (below 30 mA)
- Min Max storage of parameters possible
- Number of parameters measured: more than 46
- Parameter Screen recall
- Total Harmonic Distortion (THD)
- Energy Count storage
- Programmable Energy format & Energy rollover count
- Hour Run, ON Hour, Number of Interruptions
- Optional MODBUS (RS485) Output
- User Assignable Registers for MODBUS
- Optional 2 Relay Output (Pulse output / Limit switch)
- Configuration of the Instrument via MODBUS
- Optional Analogue Outputs (2 Outputs)
- Ethernet Interface (Modbus TCP/IP Protocol)
- Enclosure Protection for dust and water
- Compliance to International Safety standards
- EMC Compatibility



Application

Alpha 30 measures important electrical parameters & replaces the multiple Analogue panel meters. It measures electrical parameters like AC current, Voltage, frequency, active energy import & active energy export, Current Demand, kW Demand, kVA Demand and Max Current Demand, Max kW Demand and Max kVA Demand. The instrument has optional output as one pulse output or two pulse output for energy measurement.

Product Features

On site programmable PT/CT ratios:

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).

User selectable CT Secondary 5A/1A

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).

User selectable PT Secondary

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).

User selectable 3 phase 3W or 4W

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).

Low back depth:

The instrument has very low back depth (behind the panel) of less than 80 mm in spite of optional features like pulse output.

Onsite selection of Auto scroll / Fixed Screen

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).

Phase reversal indication

The instrument can detect wrong phase sequence or failure of one of the input voltages and displays "phase" error message.

Energy measurement (Import and Export):

Active energy (kWh), Reactive energy (kVAh), Apparent energy (kVAh) & Ampere Hour (kAh). Any of the parameters can be freely assigned to 2 optional pulse outputs.

True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

High brightness 3 line 4 digits LED display:

Simultaneous display of 3 Parameters.

User selectable Low Current suppression (below 30 mA)

User can suppress the readings below 30 mA in the current measurement by onsite programming if required.

Product Features Continued**Min Max storage of parameters possible**

The instrument stores minimum and maximum values for System Voltage and System Current. Every 40 sec minimum and maximum readings are updated.

Number of parameters measured: more than 46

The instrument measures more than 46 electrical parameters of 3 Phase network.

Parameter Screen recall:

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.

Total Harmonic Distortion (THD):

The instrument can measure per phase THD of voltage and THD of current.

Energy Count storage:

In case of power failure, the instrument memorizes the last energy count.

Programmable Energy format & Energy rollover count:

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.

Hour Run, ON Hour, Number of Interruptions:

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.

Optional MODBUS (RS485) Output

The optional ModBus output enables the instrument to transmit all the measured parameters over standard MODBUS (RS485).

User Assignable Registers for MODBUS:

Customer can assign MODBUS register address as per his need for faster response time.

Optional 2 Relay Output (Pulse output / Limit switch)

The instrument can be programmed as Pulse output or Limit Switch. Pulse Output: 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.

Limit switch: The instrument will trip the one or two relays if the programmed parameter exceeds the programmed High & Low Limits.

Configuration of the Instrument via MODBUS:

The instrument settings can be configured locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Optional Analogue Outputs (2 Outputs):

2 Analogue outputs can be programmed from a list of input parameters.

Ethernet Interface (Modbus TCP/IP Protocol)

The optional Ethernet Interface output transmits all the measured parameters on Modbus TCP/IP. Also user can configure their instrument via Ethernet Interface.

Enclosure Protection for dust and water:

conforms to IP 54 (front face) as per IEC60529.

Compliance to International Safety standards

Compliance to International Safety standard IEC 61010-1- 2001.

EMC Compatibility

Compliance to International standard IEC 61326.

Technical Specifications

| | |
|---|---|
| Input Voltage | |
| Nominal Input Voltage (AC RMS) | Phase –Neutral 57.7 - 346 VL-N Line-Line 100 - 600 VL-L |
| System PT primary values | 100VLL to 692kVLL programmable on site |
| System PT secondary values | 100VLL to 600VLL programmable on site |
| Max continuous input voltage | 120% of rated value |
| Input Current: | |
| Nominal input current | 1A / 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 |
| Auxiliary Supply: | |
| Auxiliary Supply | 60 - 300 V AC DC OR 65 - 300 V AC DC for Ethernet Option OR 12 - 60 V AC DC |
| AC Auxiliary supply frequency range | 45 to 66 Hz |
| VA Burden: | |
| Nominal input voltage burden | < 0.35 VA approx. per phase |
| Nominal input current burden | < 0.3 VA approx. per phase |
| Auxiliary Supply burden | < 5 VA approx OR < 7 VA approx with 4-20mA analogue output or Ethernet Option |
| Overload Withstand: | |
| Voltage | 2 x rated value for 1 second, repeated 10 times at 10 second intervals |
| Current | 20x for 1 second, repeated 5 times at 5 min |
| Operating Measuring Ranges | |
| Voltage | 10... 120% of rated value |
| Current | 5 ... 120% of rated value |
| Frequency | 40...70 Hz |
| Power Factor | 0.5 Lag ... 1... 0.8 Lead |
| Reference conditions for Accuracy: | |
| Reference temperature | 23°C +/- 2°C |
| Input waveform | Sinusoidal (distortion factor 0.005) |
| Input frequency | 50 or 60 Hz ±2% |
| Auxiliary supply voltage | Rated Value ±1% |
| Auxiliary supply frequency | Rated Value ±1% |
| Voltage Range | 50... 100% of Nominal Value 60... 100% of Nominal Value for THD |
| Current Range | 10... 100% of Nominal Value 20... 100% of Nominal Value for THD |
| Power | Cos phi / sin phi = 1 for Active / Reactive Power & Energy 10... 100% of Nominal Current & 50... 100% of Nominal Voltage. |
| Power Factor / Phase Angle | 40... 100% of Nominal Current & 50... 100% of Nominal Voltage. |

Technical Specifications

| Accuracy: | Class 1.0 (Standard) | Class 0.5 (on request) | Class 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 | ± 0.4% 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 | ± 0.5% of Nominal value |
| Apparent energy (kVAh) | ± 1.0% of Nominal value | ± 0.5% of Nominal value | ± 0.2% of Nominal value |
| Accuracy of Analogue Output | 1 % of Output end value | 1 % of Output end value | 1 % of Output end value |
| Power Factor | ±1% of Unity | ±1% of Unity | ±1.0% of Unity |
| Angle | ±1% of range | ±1% of range | ±1% of range |
| Total Harmonic Distortion | ±1% | ±1% | ±1% |

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

| | |
|--|---|
| Influence of Variations: | |
| Temperature coefficient : (for rated value range of use (0...50°C)) | 0.025%/°C for Voltage (50... 120% of rated value) and 0.05%/°C for Current (10... 120% of rated value) |
| Display update rate: | |
| Response time to step input | 1 sec approx. |
| Applicable Standards: | |
| EMC | IEC 61326 |
| Immunity | IEC 61000-4-3. 10V/m min – Level 3 industrial low level |
| Safety | IEC 61010-1-2001, Permanently connected use |
| IP for water & dust | IEC60529 |
| Pollution degree: | 2 |
| Installation category: | III |
| High Voltage Test | 2.2 kV AC, 50Hz for 1 minute between all electrical circuits |
| Environmental | |
| Operating temperature | -10 to +55°C |
| Storage temperature | -20 to +65°C |
| Relative humidity | 0... 90% non condensing |
| Warm up time | Minimum 3 minute |
| Shock | 15g in 3 planes |
| Vibration | 10... 55 Hz, 0.15mm amplitude |

| | | | |
|--|-----------------------------|-------------------------------|-------------------------------|
| Energy (can be programmed for different energy parameters simultaneously): | | | |
| Relay contact | | 1 NO + 1 NC | |
| Switching Voltage & Current for Relay | | 240 VDC ,5 A | |
| Other Pulse rate divisors (applicable only when Energy on RS485 is in W) | | | |
| 10 | 1 per 10 Wh (up to 3600W), | 1 per 10kWh (up to 3600kW), | 1 per 10MWh (above 3600 kW) |
| 100 | 1 per 100Wh (up to 3600W), | 1 per 100kWh (up to 3600kW), | 1 per 100MWh (above 3600 kW) |
| 1000 | 1 per 1000Wh (up to 3600W), | 1 per 1000kWh (up to 3600kW), | 1 per 1000MWh (above 3600 kW) |
| Pulse duration | 60 ms, 100 ms or 200 ms | | |

Above options are also applicable to Apparent & reactive Energy.

| Ampere Hour: | |
|---|---|
| Default pulse rate divisor | CT secondary = 1A Max pulse rate 3600 pulses/Ah * 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 * CT secondary = 5A Max pulse rate 720 pulses/10Ah |
| 100 | CT secondary = 1A Max pulse rate 3600 pulses/100Ah * CT secondary = 5A Max pulse rate 720 pulses/100Ah |
| 1000 | CT secondary = 1A Max pulse rate 3600 pulses/1000Ah * CT secondary = 5A Max pulse rate 720 pulses/1000Ah |
| Pulse duration | 60 ms, 100 ms or 200 ms |

*No. of Pulses = $\frac{\text{Maximum Pulses}}{\text{CT Ratio}}$

Where, CT Ratio = (CT primary/ CT Secondary)

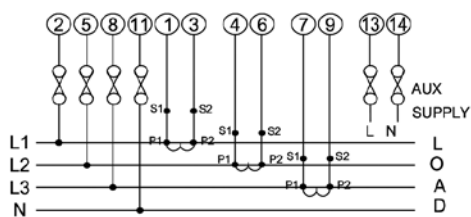
| Limit Output Option: |
|--|
| Limit can be assigned to different measured parameters. It can be configured in one of the four modes given below. |
| 1) Hi alarm & Energized Relay |
| 2) Hi alarm & De-energized Relay |
| 3) Lo alarm & Energized Relay |
| 4) Lo alarm & De-energized Relay |

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

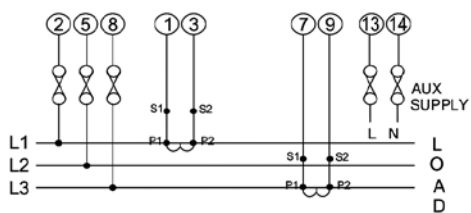
Parameter Measurement and Display

| Sr No | Displayed Parameters | 3Phase 4Wire | 3Phase 3Wire |
|-------|-------------------------------|--------------|--------------|
| 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 | ✓ | ✗ |

Electrical Connections



For 3 Phase 4 Wire Unbalanced Load



For 3 Phase 3 Wire Unbalanced Load

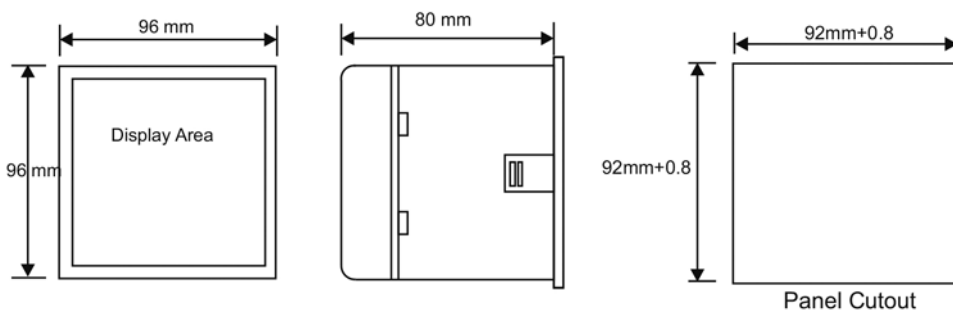
It is recommended that the wires used for connections to the instrument should have lugs soldered at the end. That is, the connections should be made with Lugged wires for secure connections. The Maximum diameter of the lug should be 7.0mm and maximum thickness 3.5mm.

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.

Parameter Measurement and Display

| Sr No | Displayed Parameters | 3Phase 4Wire | 3Phase 3Wire |
|-------|----------------------------------|--------------|--------------|
| 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 kVAh (8 digit resolution) | ✓ | ✓ |
| 36. | Export kVAh (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 | ✗ | ✓ |
| 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 | ✓ | ✓ |

Dimensions



Ordering Codes

| Ordering Codes | | | | | | |
|-------------------------------|---|---|----|---|---|------|
| Product Code: AP3A | 1 | 3 | 8E | H | R | S |
| 1: Accuracy 1.0% (Standard) | | | | | | |
| 5: Accuracy 0.5% (on request) | | | | | | |
| 2: Accuracy 0.2% (on request) | | | | | | |
| 3: 3Ph | | | | | | |
| 1: 1Ph | | | | | | |
| 8: E 600V L-L (346 41V L-N) | | | | | | |
| H... 60-300V ACDC | | | | | | |
| L:12-60V ACDC | | | | | | |
| R: RS485 | | | | | | |
| Z: NoRS485 | | | | | | |
| E: Ethernet | | | | | | |
| S: 1P | | | | | | |
| D: 2P | | | | | | |
| Z: No Pulse | | | | | | |
| 1: 2A (001mA) | | | | | | |
| 2: 2A (4-20mA) | | | | | | |
| Z: No Analogue | | | | | | |
| | | | | | | 1-00 |

Order Code Example:

AP32-218EHRDZ00000

ALPHA 30 3Phase, 60-300 V AC/DC Auxiliary supply, with MODBUS (RS485), with 2 pulse output.

Contact



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