



Alpha AP1480

Multifunction Meter



Alpha AP1480 measures important electrical parameters in 3 phase 4 wire, 3 phase 3 wire, 1 phase 3 wire, 2 phase 2 wire and 1 phase 2 wire Network. It displays many parameters at a glance. It measures electrical parameters like Active / Reactive / Apparent energy, Reactive quadrant wise energy and all basic parameters. The instrument has two optional digital outputs available as pulse or alarm with programmable pulse duration and width. This instrument also has four optional digital inputs for monitoring the external contact status, pulse counting and/or energy accumulation according to tariff.

Application

- Internal Energy billing/monitoring/auditing
- Genset, Test Benches and Laboratories
- Sub-metering
- Electrical load monitoring

Product Features

• True RMS Measurement

- True RMS measurement with Sampling rate of 128 samples per cycle up to 63rd Harmonic.

• Relay Output (optional)

Potential free, very fast acting relay contact configurable for following:

- **Pulse** output which can be used to drive an external counter for energy measurement.
- **Limit** (alarm) switch. Limit output also configurable for three logical combination of parameters.
- **Timer** output which can be used to operate relay in cyclic manner.
- **Pre-Paid** Cost based energy tripping.
Switch for **unhealthy three-phase load.**
Remote Relay Control using MODBUS.

• Intelligent Load Management

• Pre-Paid Cost Based Energy Tripping

This feature allows to trip the load whose energy has crossed the required threshold configured by user.

• Health Monitoring of Three-Phase Load

- This feature is applicable only for Three-phase load (such as a Three-phase motor) which can be monitored for phase failure, phase reversal, voltage & current unbalance, under frequency, under voltage, over voltage and over current.

• Direct remote access(Optional)

- Remote configuration of the Instrument and access of measured parameter via Modbus RS485.

• High Max System Power Limit

- Up to 9000 MVA (L-N) system power is measurable.

• Multi Tariff Facility

- 8 Tariff based on digital input or RTC or Modbus.
- 6 Energy sources configurable for tariff based energy.

• Energy as per IEC 62053 and IEC 61557-12 (Edition 2.0)

- Active Energy accuracy Class 0.2S as per IEC 62053-22 and Class 0.2 as per IEC 61557-12, Reactive Energy accuracy Class 2 as per IEC 62053-23 and IEC 61557-12 and Apparent Energy accuracy Class 1 as per IEC 61557-12.
Independent Import and Export Energy counter. Active energy (kWh), Reactive energy (kVARh), Apparent energy (kVAh) measurement of system as well as phase-wise.
Measures Reactive quadrant wise energy for system as well as per phase.

• Data logging

Meter has inbuilt 8MB Flash for datalogging.

- **Event Logging** : Previous 5 events of factory default parameters can be logged with Date and time.
- **Time based logging** : User selectable parameters (1 to 30) can be logged at regular intervals(1 to 60min) with Date and Time stamp in internal memory and can be accessed via Modbus or Ethernet or USB.

If 1 Parameter for example energy is selected with logging interval of 15 minutes, log of maximum 948 days are available for user.

If 30 Parameters are selected with logging interval of 60 minutes, log of maximum 355 days are available for user.

• Load Profile logging

Logging of energy consumed and peak Demand(Power and Current) in a day and in month for efficient tracking of load behaviors.

Maximum 1 year daily and 14 years of monthly log is available for user.

• Digital Inputs

- 4 Digital Inputs (Optional) can be configured as:
Status to indicate if the input is present or not.
Pulse Counter for counting pulses from external sources.
Tariff Input to store separate energy counters on the basis of digital inputs present.

Product Features

- **User Assignable Screens**
 - Instrument measures more than 85 parameters and these parameters are displayed through different screens, out of which user can select minimum 1no. and maximum 10 nos. of screens as per application requirement.
- **Current TDD**
 - This instrument measures system current TDD (Total Demand Distortion) as per IEEE-519.
- **Programmable Voltage and power units**
 - This instrument allows user to select the units for voltage (V and KV) and power (W, KW, MV) on MODBUS.
- **THD and Individual Harmonics Measurement**
 - The instrument measures per phase THD and individual harmonic up to 63rd harmonics for voltage & current.
- **Old Values**
 - Old value storage after Reset.
- **Compliance to International Standards**
 - Compliance to International Safety standard IEC 61010-1-2010.
 - EMC Compliance to International standard IEC 61326.

Technical Specifications

Input Voltage

Nominal input voltage (Vn)	100VLL to 600 VLL AC RMS
Programmable on site	57.5VLN to 346.42 VLN AC RMS
System PT primary values	100VLL to 1200kVLL programmable on site.
Measuring Range	20%....120% of nominal value
Overload Withstand	2 x Nominal value for 1 second, repeated 10 times at 10 second intervals
Overload Indication	"-OL-" >121% of Nominal value
Nominal input voltage burden	< 0.3VA approx. per phase (at nominal 240V)

Input Current

Nominal input current(In)	1A / 5A programmable on site
System CT primary values	1A to 9999A programmable on site
Measuring Range	1%....200% of nominal value (1%....180% of nominal value for CF = 2)
Overload Withstand	20 x Nominal value for 1 second, repeated 5 times at 5 minute intervals
Overload Indication	"-OL-" >205% of Nominal value
Nominal input current burden	< 0.3VA approx. per phase

Auxiliary Supply

Higher Auxiliary supply range	100-550V AC/DC (230V AC/DC nominal)
As per IEC 61557-12	100-320V AC/DC (230V AC/DC nominal)
Lower Auxiliary supply range	12-60V AC/DC (24 V AC / 48 V DC nominal)
Aux Supply frequency	45 to 66 Hz range
Auxiliary Supply burden (at nominal value)	
With Add-on RS485 card	< 6VA approx.
With Add-on Ethernet card	< 8VA approx.
With Add-on RS485+Ethernet card	< 10VA approx.

Technical Specifications

Operating Measuring Ranges

Current (Energy Measurement)	1....200% of nominal value
Starting current	0.1% of nominal
Voltage	20... 120% of nominal value
Power Factor	0.5 Lag ... 1... 0.8 Lead
Frequency	40Hz to 70Hz

Note : Variation due to frequency other than $\pm 10\%$ of 50/60Hz is less than twice the class index.

Reference Conditions for Accuracy

Reference temperature	23°C +/- 2°C
Input Waveform	Sinusoidal (distortion factor 0.005)
Input frequency	50/60 Hz $\pm 2\%$
Auxiliary supply frequency	50/60 Hz $\pm 1\%$
Total Harmonic distortion	THDv $\leq 50\%$ upto 63 rd Harmonic at Vn THDi $\leq 200\%$ upto 63 rd Harmonic at In THDi $\leq 180\%$ upto 63 rd Harmonic at In CF=2
Voltage range	20%.....120% of nominal value
Current range	10%.....200% of nominal value

Display Specification

Display	4 Line 4 Digit and 1 Line 9 Digit row LCD with Backlit
Response time to step input	1 sec approx.
LED Indications	Integration of Energy (Impulse)
Display scrolling	Automatic/Manual (Programmable)
Push buttons	4 Buttons

Accuracy

Active Energy (Bidirectional)	Class 0.2S as per IEC 62053-22 Class 0.2 as per IEC 61557-12
Apparent Energy	Class 1 as per IEC 61557 - 12
Reactive Energy (Bidirectional)	Class 2 as per IEC 62053 - 23 & IEC 61557 - 12
Voltage	$\pm 0.2\%$ of Nominal value
Current	$\pm 0.2\%$ of Nominal value
Frequency	$\pm 0.1\%$ of mid frequency
Active Power	$\pm 0.2\%$ of Nominal value
Reactive Power	$\pm 0.1\%$ of Nominal value
Apparent Power	$\pm 0.2\%$ of nominal value
Power Factor/ Angle	$\pm 3^\circ$
THD (V/I) w.r.t. fundamental	$\pm 5\%$ (upto 63 rd Harmonics)
Individual Harmonics	$\pm 5\%$ (upto 63 rd Harmonics)

Technical Specifications

Applicable Standards

Electromagnetic Compatibility	IEC 61326 - 1, Table 2
Immunity	IEC 61000-4-2,-3,-4,-5,-6,-8,-11
Emission	CISPR 11
Safety	IEC 61010-1-2010
IP for water & dust	IEC 60529
Pollution degree	2
Installation category	III
High voltage test	
All Circuit Vs Surface	4kV RMS, 50Hz for 1min
Input / Aux Vs Others	3.3kV RMS, 50Hz for 1min
DI/Relay/RS485/USB Vs Others	3.3kV RMS, 50Hz for 1min
DI Vs DI / Relay Vs Relay	2.2kV RMS, 50Hz for 1min

Environmental

Operating temperature	-20 to +70°C
Storage temperature	-40 to +85°C
Relative humidity	0... 95% (non condensing)
Warm up time	Minimum 3 minutes
Shock (As per IEC 60068-2-27)	Half sine wave, Peak acceleration 30gn (300 m/s ²), duration 18ms
Vibration	10... 150...10 Hz, 0.15mm amplitude
Altitude	< 2000 m
Number of Sweep cycles	10 per axis
Enclosure	IP 20 (Terminal side) and IP54 (Front side)
Weight	320 grams approx

Installation

Mechanical Housing	Lexan 940 (polycarbonate), Flammability Class V-0 acc. to UL 94, self extinguishing, non dripping, free of halogen
Mounting Position	Panel Mounted (96X96)
Connection Element	Conventional screw type terminal with indirect wire terminals
Connection Terminal	4 mm ² solid or 2.5 mm ² stranded cable

Interfaces

Impulse Led	For Energy testing
4 Digital Input (Optional)	20... 300 VAC / 10... 60 VDC, Optical couplers, Min pulse width 10ms, Min length between 2 pulses 18ms, VA < 0.25VA at 240 VAC
2 Digital Output (Optional)	Type - Relay, 250 VAC, 5 A AC / 30VDC, 5A DC Programmable Pulse Duration and Pulse Width
Modbus (Optional)	RS485, max.1200m Baud rate : 4.8k, 9.6k,19.2k, 38.4k, 57.6kbps
Ethernet (Optional)	Ethernet access on Modbus TCP/IP Protocol
BACnet (Optional)	BACnet IP with BACnet protocol version 12

Technical Specifications

Measured Parameter System wise:

✓ : Available

✗ : Not Available⁴: L3 Not applicable

Sr No	Parameters	3Phase 4Wire	3Phase 3Wire	1Phase 3Wire	2Phase 2Wire	1Phase 2Wire
1.	System Import Active Energy ¹	✓	✓	✓	✓	✓
2.	L1,L2,L3 Import Active Energy ¹	✓	✗	✓ ⁴	✗	✗
3.	System Export Active Energy ¹	✓	✓	✓	✓	✓
4.	L1,L2,L3 Export Active Energy ¹	✓	✗	✓ ⁴	✗	✗
5.	System Total Active Energy ¹	✓	✓	✓	✓	✓
6.	L1,L2,L3 Total Active Energy ¹	✓	✗	✓ ⁴	✗	✗
7.	System Net Active Total Energy ¹	✓	✓	✓	✓	✓
8.	System Inductive Reactive Energy ¹	✓	✓	✓	✓	✓
9.	L1,L2,L3 Inductive Reactive Energy ¹	✓	✗	✓ ⁴	✗	✗
10.	System Capacitive Reactive Energy ¹	✓	✓	✓	✓	✓
11.	L1,L2,L3 Capacitive Reactive Energy ¹	✓	✗	✓ ⁴	✗	✗
12.	System Total Reactive Energy ¹	✓	✓	✓	✓	✓
13.	L1,L2,L3 Total Reactive Energy ¹	✓	✗	✓ ⁴	✗	✗
14.	System Apparent Energy ¹	✓	✓	✓	✓	✓
15.	System Apparent while Active Import Energy ¹	✓	✓	✓	✓	✓
16.	System Apparent while Active Export Energy ¹	✓	✓	✓	✓	✓
17.	L1,L2,L3 Apparent Energy ¹	✓	✗	✓ ⁴	✗	✗
18.	System Import Inductive Energy ¹	✓	✓	✓	✓	✓
19.	System Export Inductive Energy ¹	✓	✓	✓	✓	✓
20.	System Import Capacitive Energy ¹	✓	✓	✓	✓	✓
21.	System Export Capacitive Energy ¹	✓	✓	✓	✓	✓
22.	System Total Import Reactive Energy ¹	✓	✓	✓	✓	✓
23.	System Total Export Reactive Energy ¹	✓	✓	✓	✓	✓
24.	System Total Inductive Reactive Energy ¹	✓	✓	✓	✓	✓
25.	System Total Capacitive Reactive Energy ¹	✓	✓	✓	✓	✓
26.	L1, L2, L3 Inductive Import Energy ¹	✓	✗	✓ ⁴	✗	✗
27.	L1, L2, L3 Inductive Export Energy ¹	✓	✗	✓ ⁴	✗	✗
28.	L1, L2, L3 Capacitive Import Energy ¹	✓	✗	✓ ⁴	✗	✗
29.	L1, L2, L3 Capacitive Export Energy ¹	✓	✗	✓ ⁴	✗	✗
30.	L1, L2, L3 Total Import Energy ¹	✓	✗	✓ ⁴	✗	✗
31.	L1, L2, L3 Total Export Energy ¹	✓	✗	✓ ⁴	✗	✗
32.	L1, L2, L3 Total Inductive Energy ¹	✓	✗	✓ ⁴	✗	✗
33.	L1, L2, L3 Total Capacitive Energy ¹	✓	✗	✓ ⁴	✗	✗
34.	System Active Power (kW) ³	✓	✓	✓	✓	✓
35.	L1,L2,L3 Active Power (kW) ³	✓	✗	✓ ⁴	✗	✗
36.	System Total Re-active Power ³	✓	✓	✓	✓	✓
37.	L1,L2,L3 Total Re-active Power ³	✓	✗	✓ ⁴	✗	✗
38.	System Fundamental Re-active Power	✓	✓	✓	✓	✓
39.	L1,L2,L3 Fundamental Re-active Power	✓	✗	✓ ⁴	✗	✗
40.	System Distorted Re-active Power	✓	✓	✓	✓	✓
41.	L1,L2,L3 Distorted Re-active Power	✓	✗	✓ ⁴	✗	✗
42.	System Apparent Power ³	✓	✓	✓	✓	✓
43.	L1,L2,L3 Apparent Power ³	✓	✗	✓ ⁴	✗	✗
44.	System Power Factor	✓	✓	✓	✓	✓
45.	L1,L2,L3 Power Factor	✓	✗	✓ ⁴	✗	✗
46.	System Displacement Power Factor	✓	✓	✓	✓	✓
47.	L1,L2,L3 Displacement Power Factor	✓	✗	✓ ⁴	✗	✗
48.	System Reactive Power Factor	✓	✓	✓	✓	✓
49.	L1,L2,L3 Reactive Power Factor	✓	✗	✓ ⁴	✗	✗
50.	System LF Factor SgnQ(1-(P/S))	✓	✓	✓	✓	✓
51.	L1,L2,L3 LF Factor SgnQ(1-(P/S))	✓	✗	✓ ⁴	✗	✗
52.	System Phase Angle ³	✓	✓	✓	✓	✓

Technical Specifications

Measured Parameter System wise:

✓ : Available ✕ : Not Available ✓⁴: L3 Not applicable

Sr No	Parameters	3Phase 4Wire	3Phase 3Wire	1Phase 3Wire	2Phase 2Wire	1Phase 2Wire
53.	L1,L2,L3 Phase Angle ³	✓	✕	✓ ⁴	✕	✕
54.	Current Demand	✓	✓	✓	✓	✓
55.	kVA Demand	✓	✓	✓	✓	✓
56.	Import kW Demand	✓	✓	✓	✓	✓
57.	Export kW Demand	✓	✓	✓	✓	✓
58.	Inductive Var Demand	✓	✓	✓	✓	✓
59.	Capacitive Var Demand	✓	✓	✓	✓	✓
60.	Max Current Demand	✓	✓	✓	✓	✓
61.	Max kVA Demand	✓	✓	✓	✓	✓
62.	Max Import kW Demand	✓	✓	✓	✓	✓
63.	Max Export kW Demand	✓	✓	✓	✓	✓
64.	Max Inductive Var Demand	✓	✓	✓	✓	✓
65.	Max Capacitive Var Demand	✓	✓	✓	✓	✓
66.	Run Hour	✓	✓	✓	✓	✓
67.	On Hour	✓	✓	✓	✓	✓
68.	Number of Interruptions	✓	✓	✓	✓	✓
69.	System Voltage ³	✓	✓	✓	✓	✓
70.	L1,L2,L3 Voltage ³	✓	✕	✓ ⁴	✕	✕
71.	L12,L23,L31 Voltage ³	✓	✓	✓ ⁴	✕	✕
72.	System Voltage THD	✓	✓	✓	✓	✓
73.	L1-L2-L3 Voltage THD	✓	✓	✓ ⁴	✕	✕
74.	System Current ³	✓	✓	✓	✓	✓
75.	L1-L2-L3 Current ³	✓	✓	✓ ⁴	✕	✕
76.	System Current THD	✓	✓	✓	✓	✓
77.	L1-L2-L3 Current THD	✓	✓	✓ ⁴	✓	✓
78.	Individual Harmonics VL1(Up to 63rd Harmonics)	✓	✓	✓	✓	✓
79.	Individual Harmonics VL2 (Up to 63rd Harmonics)	✓	✓	✓	✕	✕
80.	Individual Harmonics VL3 (Up to 63rd Harmonics)	✓	✓	✕	✕	✕
81.	Individual Harmonics IL1(Up to 63rd Harmonics)	✓	✓	✓	✓	✓
82.	Individual Harmonics IL2(Up to 63rd Harmonic)	✓	✕	✓	✕	✕
83.	Individual Harmonics IL3(Up to 63rd Harmonics)	✓	✓	✕	✕	✕
84.	Neutral Current (Calculated)	✓	✕	✓	✕	✕
85.	Frequency ³	✓	✓	✓	✓	✓
86.	RPM	✓	✓	✓	✓	✓
87.	Phase Sequence Indication	✓	✓	✕	✕	✕
88.	Current Reversal Indication	✓	✕	✓	✓	✓
89.	Phase (V-I) Absent Indication	✓	✕	✓	✕	✕
90.	Tariff Source 1 Energy Count	✓	✓	✓	✓	✓
91.	Tariff Source 2 Energy Count	✓	✓	✓	✓	✓
92.	Tariff Source 3 Energy Count	✓	✓	✓	✓	✓
93.	Tariff Source 4 Energy Count	✓	✓	✓	✓	✓
94.	Tariff Source 5 Energy Count	✓	✓	✓	✓	✓
95.	Tariff Source 6 Energy Count	✓	✓	✓	✓	✓
96.	Old Max A Demand ²	✓	✓	✓	✓	✓
97.	Old Max VA Demand ²	✓	✓	✓	✓	✓
98.	Old Max kW Import Demand ²	✓	✓	✓	✓	✓
99.	Old Max kW Export Demand ²	✓	✓	✓	✓	✓
100.	Old Max Var Inductive Demand ²	✓	✓	✓	✓	✓
101.	Old Max Var Capacitive Demand ²	✓	✓	✓	✓	✓
102.	Old System Import Active Energy ²	✓	✓	✓	✓	✓
103.	Old L1-L2-L3 Import Active Energy ²	✓	✕	✓ ⁴	✕	✕
104.	Old System Export Active Energy ²	✓	✓	✓	✓	✓

Technical Specifications

Measured Parameter System wise:

✓ : Available ✗ : Not Available ✓⁴: L3 Not applicable

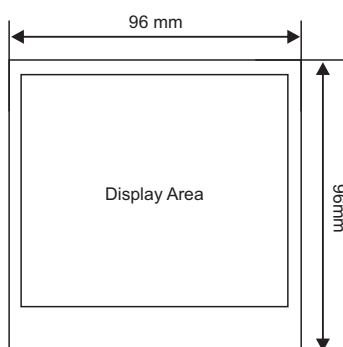
Sr No	Parameters	3Phase 4Wire	3Phase 3Wire	1Phase 3Wire	2Phase 2Wire	1Phase 2Wire
105.	Old L1-L2-L3 Export Active Energy ²	✓	✗	✓ ⁴	✗	✗
106.	Old System Inductive Reactive Energy ²	✓	✓	✓	✓	✓
107.	Old L1-L2-L3 Inductive Reactive Energy ²	✓	✗	✓ ⁴	✗	✗
108.	Old System Capacitive Reactive Energy ²	✓	✓	✓	✓	✓
109.	Old L1-L2-L3 Capacitive Reactive Energy ²	✓	✗	✓ ⁴	✗	✗
110.	Old System Apparent Energy ²	✓	✓	✓	✓	✓
111.	Old L1-L2-L3 Apparent Energy ²	✓	✗	✓ ⁴	✗	✗
112.	Old Run Hour ²	✓	✓	✓	✓	✓
113.	Old On Hour ²	✓	✓	✓	✓	✓
114.	Old Number of Interruptions ²	✓	✓	✓	✓	✓
115.	VLN Unbalance ²	✓	✓	✓	✗	✗
116.	VLL Unbalance ²	✓	✓	✓	✗	✗
117.	Current Unbalance ²	✓	✓	✓	✗	✗

Note:

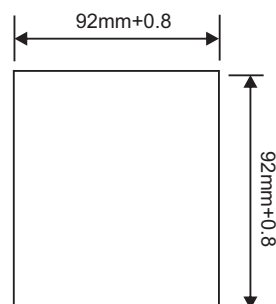
1. Energy on display is autoranging & unit for Energy parameters on modbus are dependent on CT PT ratio or unit selected by user.
2. Parameters are available only on modbus.
3. Min-max parameter are also available.

Dimensions

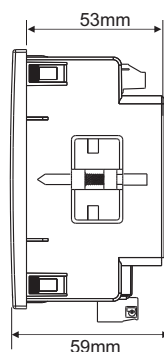
Front View



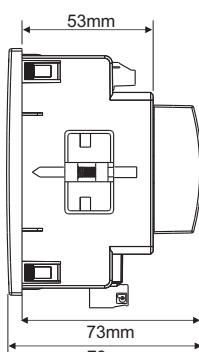
Panel Cutout



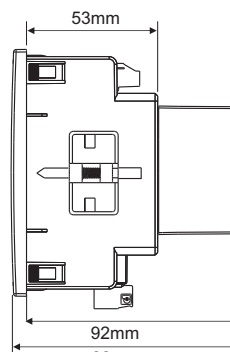
Side View



a) None

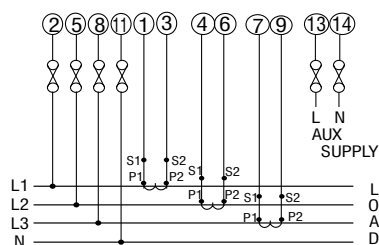


b) RS485 / Ethernet

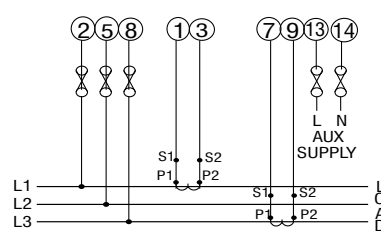


c) RS485 + Ethernet

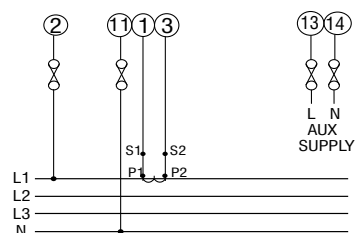
Electrical Connections



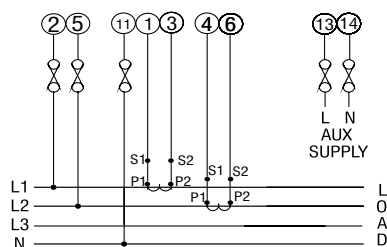
a) 3 Phase 4 Wire



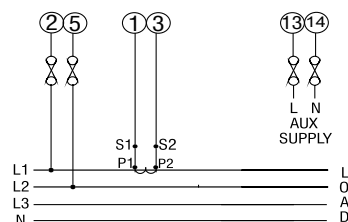
b) 3 Phase 3 Wire



c) Single Phase Load



d) 1 Phase 3 Wire



e) 2 Phase 2 Wire

Wiring Guidelines

Solid with Pin type lugs (sq. mm)	1 to 2.5
Stranded with pin types lugs (sq. mm)	1 to 2.5
Torque value (Nm)	
1. Aux and Voltage terminals	0.5 to 0.6
2. Current Terminals	0.4 to 0.5
3. Rs485 and relay output terminals	0.3 to 0.4
Length available for lug entry in terminal (mm)	9.5

Note:

1. It is recommended that the wires used for connections to the instrument should have lugs soldered at the end i.e., the connections should be made with Lugged wires for secure connections.
2. For MODBUS B refers to positive, A refers to Negative and G refers to ground.

Ordering information

Ordering Information	MA8L -	1	3	01	01	X	X	2	00ST
Meter Interface	RS485					B			
	Ethernet					C			
	RS485 - 4DI - 2DO					D			
	RS485 - ETHERNET - 4DI - 2DO					E			
	Ethernet - 4DI - 2DO					F			
	BACnet IP (Factory Settable)					G			
Auxiliary Supply	Lower Aux.						L		
	Higher Aux.						H		

Order Code Example

MA8L-130101EH200ST

ALPHA AP1480 with Ethernet, RS485, USB, 4 Digital Input, 2 Relay Output and Auxiliary Voltage 100 to 550 V AC DC



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