

User Manual

AP25-3DO

DIN Rail Smart Energy Meter for Single & Three **Phase Electrical Systems**

1 Introduction

This document provides operating, maintenance and installation instructions. This unit measures and displays the characteristics of Single Phase Two Wire (1P2W), Three Phase Three Wire (3P3W) and Three Phase Four Wire (3P4W) networks. The measuring parameters include Voltage (V), Current (A), Frequency (Hz), Power (kW/KVA/KVAr), Power Factor (PF), Imported, Exported and Total Energy (kWh/kVArh). The unit also measures Maximum Demand Current and Power, this is measured over preset periods of up to

It also comes with a complete comms capability with built in Pulse and RS485 Modbus RTU outputs, configuration is password

This unit is 10(100)A direct connected. Configuration is password protected.

1.1 Unit Characteristics

The AP25-3DO can measure and display:

- Phase to Neutral Voltage and THD% (Total Harmonic Distortion) of all Phases
- Current, Maximum Demand Current and Current THD% of all Phases
- Power, Maximum Power Demand and Power Factor • Imported, Exported & Total Active Energy
- Imported, Exported & Total Reactive Energy

The unit has a Password-Protected set up menu for:

- Changing the Password
- System Configuration 1P2W, 3P3W, 3P4W.
- Demand Interval Time
- Reset for Demand Measurements
- Pulsed Output Duration

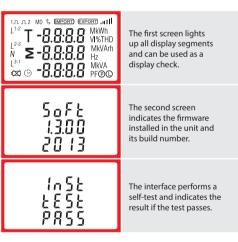
1.2 RS485 Serial – Modbus RTU

RS485 serial port with Modbus RTU protocol to provide a means of $remotely\ monitoring\ and\ controlling\ the\ Unit.$ Set-up screens are provided for setting up the RS485 port. Refers

1.3 Pulse output

Two pulsed outputs that can be set for active(kWh) or reactive (kVArh) energy

2 Start Up Screens



*After a short delay, the screen will display active

3 Measurements

The buttons operate as follows:



V/A

Selects the Voltage and Current display screens. In Set-up Mode, this is the "Left" or "Back" button.



Select the Frequency and Power factor display screens. In Set-up Mode, this is



Select the Power display screens. In Set-up Mode, this is the "Down" button

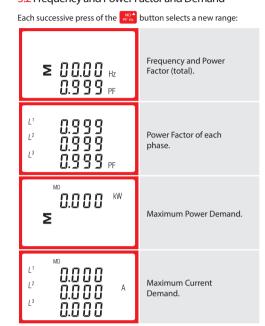


Select the Energy display screens. In Set-up mode, this is the "Enter" or "Right" button.

3.1 Voltage and Current

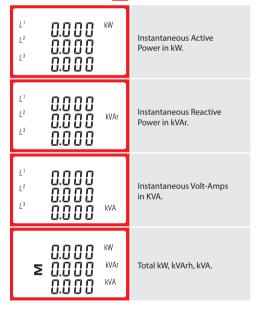
Each successive press of the WA button selects a new parameter: 0 0 0.0 v 000.0 Phase to neutral voltages. 0.00.0 0.000 Current on each phase. 0.000 0.000 00.00 v %THD Phase to neutral voltage 0 0.0 0 THD% 00.00 Current THD% for each L^2 00.00 00.00

3.2 Frequency and Power Factor and Demand



3.3 Power

Each successive press of the Di button select a new range:



3.4 Energy Measurements

Each successive press of the button selects a new range:

0000 ^{kwh} 0.3 14	Imported active energy in kWh.
OOO O kWh	Exported active energy in kWh.
0000 0000 kvarh	Imported reactive energy in kVArh.
OOOO KVArh	Exported reactive energy in kVArh.
0000 [‱] ≥ 03 (.4	Total active energy in kWh.
0000 ≥ 0000 kvarh	Total reactive energy in kVArh.

Please note the register is 9999999.9 display over two lines.

4 Set Up

To enter set-up mode, press the button for 3 seconds, until the password screen appears.

Setting up is password-PRSS protected so you must enter the correct password (default'1000') before 0000 processing. If an incorrect password P855 is entered, the display will show: Err PASS Err

To exit setting-up mode, press WA repeatedly until the

4.1 Set-up Entry Methods

Some menu items, such as password and CT, require a fourdigit number entry while others, such as supply system, require selection from a number of menu options

4.1.1 Menu Option Selection

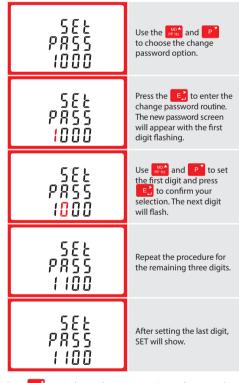
- 1. Use the P buttons to scroll through the different options of the set up menu.
- 2. Press to confirm your selection
- 3. If an item flashes, then it can be adjusted by the PFHZ and P buttons.
- 4. Having selected an option from the current layer, press 🔃 to confirm your selection. The SET indicator will appear
- 5. Having completed a parameter setting, press WA to return to a higher menu level. The SET indicator will be removed and you will be able to use the removed and P buttons for further menu
- 6. On completion of all setting-up, press VA repeatedly until the measurement screen is restored

4.1.2 Number Entry Procedure

When Setting up the unit, some screens require the entering of a number. In particular, on entry to the setting up section, a password must be entered. Digits are set individually, from left to right. The procedure is as follows:

- 1. The current digit to be set flashes and then can be adjusted using the [PT] buttons
- 2. Press to confirm each digit setting. The SET indicator appears after the last digit has been set.
- 3. After setting the last digit, press V/A to exit the number setting routine. The SET indicator will be removed

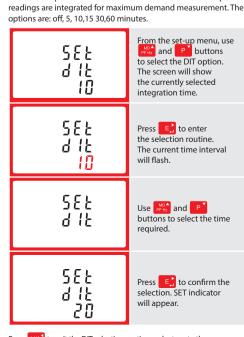
4.2 Change Password



Press Man to exit the number setting routine and return to the Set-up menu. SET will be removed

4.3 DIT Demand Integration Time

This sets the period in minutes over which the current and power options are: off, 5, 10,15 30,60 minutes.



Press V/A to exit the DIT selection routine and return to the menu.

4.4 Supply System

The unit has a default setting of 3Phase 4wire (3P4). Use this section to set the type of electrical system.

5 ¥ 5 3 P 3

From the set-up menu, use

P buttons to

select the system option. The

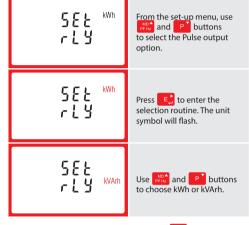
screen will show the currently



Press Man to exit the system selection routine and return to the menu. SET will disappear and you will be returned to the main set-up Menu.

4.5 Pulse Output

This option allows you to configure the pulse output. The output can be set to provide a pulse for a defined amount of energy active or reactive. Use this section to set up the relay pulse output—Units: kWh, kVArh



On completion of the entry procedure, press to confirm the setting and press Arabic to return to the main set up menu.

4.5.1 Pulse rate

You can configure the pulse output to relate to a defined amount of imported or exported energy. This can also be set to use with active energy (kWh) or reactive energy (kVarh).

Please note there are limitations that need to be factored in when setting the pulsed output. This is based upon the relay output only being able to pulse 2 times in one second.

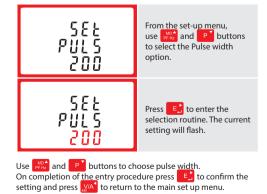
Pulse settings: 1 pulse per 0.01(10W) / 0.1(100W) / 1 (1kWh) / 10(10kWh) / 100(100kWh) / 1000 (1000kWh)



Use and buttons to choose pulse rate. On completion of the entry procedure, press to confirm the setting and press 🚹 to return to the main set up menu.

4.5.2 Pulse Duration

The energy monitored can be active or reactive and the pulse width can be selected as 200, 100 or 60ms.



4.6 Communication

There is a RS485 port can be used for communication using Modbus RTU protocol. For Modbus RTU, parameters are selected

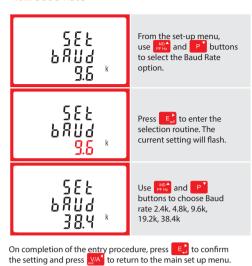
4.6.1 RS485 Address





On completion of the entry procedure, press button to confirm the setting and press hutton to return the main set-up menu.

4.6.2 Baud Rate

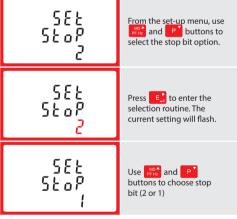


4.6.3 Parity



On completion of the entry procedure, press confirm the setting and press to return to the main set up menu.

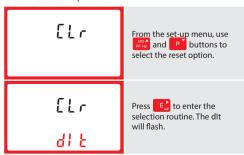
4.6.4 Stop bits



On completion of the entry procedure, press to confirm the setting and press A to return to the main set up menu.

4.7 CLR

The meter provides a function to reset the maximum demand value of current and power.



Press to confirm the setting and press at to return to the main set up menu.

4.8 Backlight Set-up

Our high-definition backlit display can be set to a duration that suits the end-customer best.





Press to enter the selection routine. The dlt will flash. The options are 0/5/10/30/60/120 minutes.

Press to confirm the setting and press with to return to the main set up menu.

5 Specifications

5.1 Measured Parameters

The unit can monitor and display the following parameters of a single phase two wire (1p2w), three phase three wire (3p3w) or three phase four wire (3p4w) system.

· Percentage total voltage harmonic distortion (THD%) for

5.1.1 Voltage and Current

- Phase to neutral voltages 100 to 289V a.c. (not for 3p3w supplies).
- Voltages between phases 173 to 500V a.c.
- (3p supplies only).
- each phase to N (not for 3p3w supplies).

 Percentage voltage THD% between phases
- (three phase supplies only).

 Current THD% for each phase

5.1.2 Power factor and Frequency and Max. Demand

- Frequency in Hz
- Instantaneous power:
- Power 0 to 3600 MW
- Reactive power 0 to 3600 MVAr
- Volt-amps 0 to 3600 MVA
- Maximum demanded power since last Demand reset Power factor
- Maximum neutral demand current, since the last Demand reset (for three phase supplies only)

5.1.3 Energy Measurements

Imported/Exported active energy
 Imported/Exported reactive energy
 Total active energy
 Total reactive energy
 To to 9999999.9 kWh
 Total reactive energy
 To to 9999999.9 kWh

5.2 Measured Inputs

Voltage inputs through 4-way fixed connector with 35mm² stranded wire capacity. Single phase two wire(1p2w), three phase three wire(3p3w) or three phase four wire(3p4w) unbalanced. Line frequency measured from L1 voltage or L3 voltage.

5.3 Accuracy

 Voltage 	0.5% of range maximum
• Current	0.5% of nominal
 Frequency 	0.2% of mid-frequency
 Power factor 	1% of unity (0.01)
 Active power (W) 	±1% of range maximum
 Reactive power (VAr) 	±1% of range maximum
 Apparent power (VA) 	±1% of range maximum
 Active energy (Wh) 	Class 1 IEC 62053-21
 Reactive energy (VARh) 	±1% of range maximum
 Total harmonic distortion 	1% up to 31st harmonic
Response time to step input	1s, typical, to >99% of final reading, at 50 Hz.

5.5 Interfaces for External Monitoring

Three interfaces are provided:

- RS485 communication channel that can be programmed for Modbus RTU protocol
- Relay output indicating real-time measured energy.

 (configurable)
- Pulse output 400imp/kWh (not configurable)

The Modbus configuration (baud rate etc.) and the pulse relay output assignments (kW/kVArh, import/export etc.) are configured through the set-up screens.

5.5.1 Pulse Output

Opto-coupler with potential free SPST-NO Contact (Contact range 5-27VDC / Max current input: Imin 2mA and Imax 27mA DC). The pulse output can be set to generate pulses to represent kWh or kVArh.

Rate can be set to generate 1 pulse per:

0.01 = 10 Wh/VArh 0.1 = 100 Wh/VArh 1 = 1 kWh/kVArh

10 = 10 kWh/kVArh 100 = 100 kWh/kVArh

Pulse width 200/100/60 ms.

5.5.2 RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the set-up menu:

Baud rate 2400, 4800, 9600, 19200, 38400

Parity none (default) / odd / even Stop bits 1 or 2

RS485 network address nnn – 3-digit number, 1 to 247

Modbus Word order Hi/Lo byte order is set automatically to normal or reverse. It cannot be configured from the

5.6 Reference Conditions of Influence Quantities

Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

23°C ±1°C · Ambient temperature 50 or 60Hz ±2% · Input waveform Sinusoidal (distortion Input waveform factor < 0.005) · Auxiliary supply voltage Nominal ±1% Auxiliary supply frequency Nominal ±1% Auxiliary supply waveform (if AC) Sinusoidal (distortion factor < 0.05) • Magnetic field of external origin Terrestrial flux

5.7 Environment

Operating temperature
 Storage temperature
 Relative humidity
 Altitude
 Warm up time
 Vibration
 Shock
 Storage temperature
 -25°C to +55°C*
 -40°C to +70°C*
 0 to 95%, non-condensing
 Up to 3000m
 T minute
 1 minute
 Vibration
 30068-2-6, 2g
 Shock
 30g in 3 planes

*Maximum operating and storage temperatures are in the context of typical daily and seasonal variation.

5.8 MechanicsDIN rail dimensions

per DIN 43880

Mounting DIN rail (DIN 43880)

Sealing IP51 indoor

Material Self-extinguishing UL 94 V-0

76 x 100 mm (WxH)

5.9 Declaration of Conformity

We, Sifam Tinsley Instrumentation LTD, declare under our sole responsibility as the manufacturer that the poly phase multifunction electrical energy meter "AP25-3DO" correspond to the production model described in the EC-type examination certificate and to the requirements of the Directive 2014/32/EU EC type examination certificate number 0120/SGS0233. Identification number of the NB 0120.

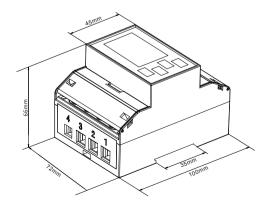
6 AP25-3DO



6.1 Nameplate



7 Dimensions



8 Installation / Maintenance



Read these instructions carefully and look at the equipment to become familiar with the device before trying to install "HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH"

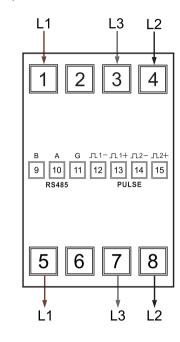
Apply appropriate personal protective equipment and follow safe electrical work practices applicable to local standards. Turn off all power supplying this device and the equipment in which it is installed before working on it. Always use a properly rated voltage sensing device to confirm that all power is off. Do not exceed the device's ratings for maximum limits. Do not use this device for critical control or protection applications where human or equipment safety relies on the operation of the control circuit. Do not allow the total additive current flowing through the device to exceed maximum continuous current rating. Failure to follow these instructions will result in death or serious injury.

8.1 Single phase two wires L1 N 1 2 3 4 B A G J1-J1+J2-J2+ 9 10 11 12 13 14 15 PULSE 5 6 7 8

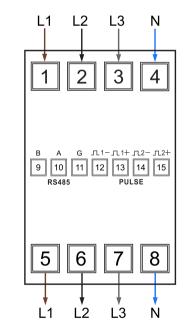
Ν

8.2 Three phase three wires

L1



8.3 Three phase four wires



8.4

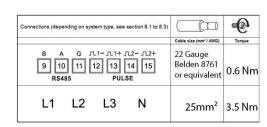
Turn off all power supplying this device and the equipment in which it is installed before working on it. 2. Always use a properly rated voltage sensing device to confirm that all power is off.

8.5 Input Wiring and Fusing

Choose fuses of a type and with a breaking capacity appropriate to the supply and in accordance with local regulations.

A switch or circuit breaker allowing isolation of supplies to the unit must be provided where practical. In primary metering applications, ensure the supply is isolated before any maintenance on the product. Tampering with the product seals may contravene local laws

8.6 Wire Size / Torque



8.7 Maintenance

The front of the case should be wiped with a dry cloth only, using minimal pressure. If necessary wipe the rear case with a dry cloth.

No user serviceable parts