Pentagon Instruments

YD2200 Multi-function Power Analyser

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Sales leaflet and Operating Instructions

1 Introduction

YD2200 is a fully programmable Multi-function Power Analyser for single and three phase electrical systems with 3phase balanced and unbalanced loads. The fully automatic electronic processing of data and measurement of electrical parameters, have reduced human error to an absolute minimum.

The individual instantaneous electrical quantities are measured and displayed on a backlit liquid Crystal Display together with Energy measurements for both forward/reverse and active/reactive energy totals. The automatic measurement and data processing make the YD2200 an ideal replacement of individual Electrical Measuring Transducers together with their analogue or digital meters.

The data may also be transmitted, by the optional extra, communications module to a computer or SCADA system using MODBUS-RTU protocol.

YD2200, together with their various control functions, is ideal for use in Industrial, Public Utility, Power Generation/Distribution sectors as well as Railways, Construction, Telecommunication and Building Energy Management projects.

YD2200 Multi-function Power Analyser measures universal electrical quantities in single or three phase electrical networks.

- Measuring 3I, 3U, PF, F, P, Q, S ±∑Wh, ±∑Qh etc.with Digital calibration for high accuracy
- Bright LCD display for monitor and operation
- Plug-in modules for add-on functions of DC4-20mA output, digital output, and energy pulse outputs.
- Standard protocol to allow easy networking: Modbus RTU, compatible with RS-485/RS-232C Interface
- Automatic zero setting and Energy totals may be reset
- Wide dynamic input range and easy to instal

- ✧ Communication Module (Model: YM-485)
  RS485 communication, protocol: MODBUS-RTU
- ✧ Analogue Output Module (Model: YM-A20)
  Setting dc 4-20mA output corresponding to any electric quantity e.g. (I, U, P, F,PF etc.) through keyboard or upper monitor; output load ≤600Ω
- ✧ Digital Output Module (Model: YM-K2)
  Two circuits of input/output; output relay with contact capacitiy of 220V ac @ 5A
- ✧ Energy Pulse Output Module (Model: YM-E2)
  Active/Reactive Energy Pulse Output; pulse value corresponding to kWh/kVArh is optional in 1000-5000 pulse/ kWh(kVArh)

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2 Universal Measurements

- λ Phase Currents; Average of Phase Currents; Neutral Current
- λ Phase (Line) Voltages; Average of Phase (Line) Voltages
- λ System Frequency
- λ Active Power of each phase; Total Active Power
- λ Reactive Power of each phase; Total Reactive Power
- λ Apparent Power of each phase; Total Apparent Power
- λ Power Factor of each phase; Average of Power Factors

Energy

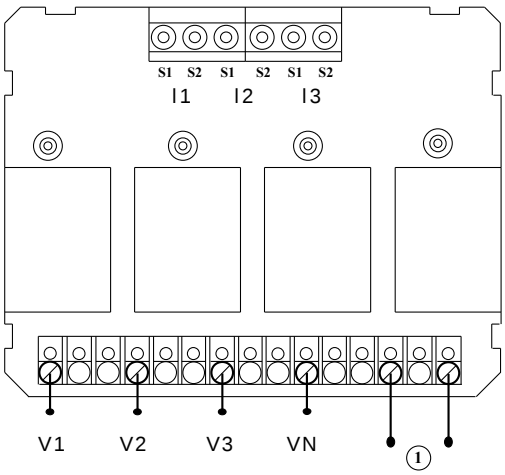
- λ Import (Reverse)/Export (Forward) Active Energy (0-999,999,999kWh*PT*CT)
- λ Import (Reverse)/Export (Forward) Reactive Energy (0-999,999,999kvarh*PT*CT)

3 Installations

Please check the following before the power is switched on:

- λ The connection is made to the wiring diagram.
- λ Power supply to be ac 85-265V or dc 85-330V.
- λ Frequency of the system is between 45-65Hz.
- λ Max. Voltage shall not exceed 600V ac
- λ Max. Current shall not exceed 6A ac

Terminals and Wiring



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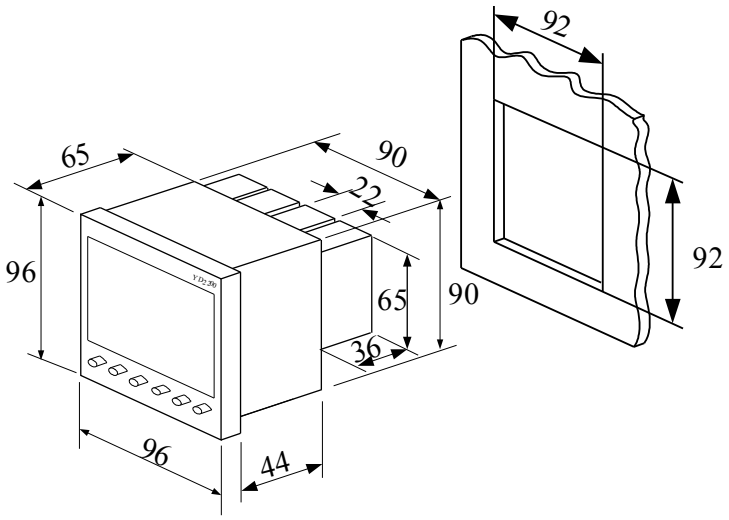
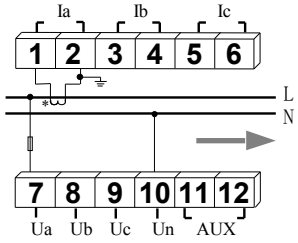
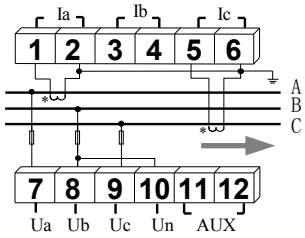
Installation Illustration



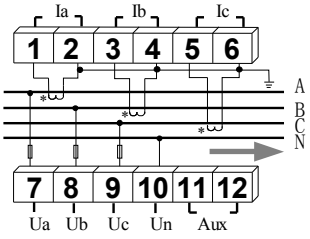
3P4W BAL/1P2W



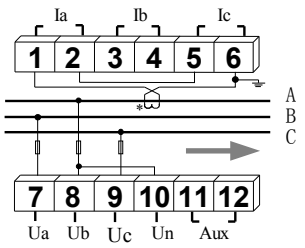
3P3W



3P4W



3P3W BAL



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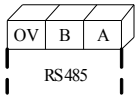
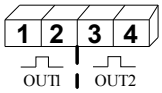
Module Wiring

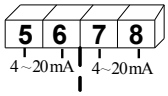
Communication Module



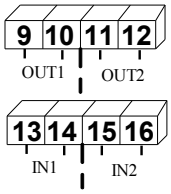
Pulse Module



Analogue Module



Digital Module



4 Operation

Displaying the measured quantities

The following instructions are for viewing data:

- λ Press [I] once to display 3-phase currents and average of the currents.
- λ Press [U F] once to display 3-phase line voltages and system frequency.
- λ Press [U F] twice to display 3-phase line voltages and average of the voltages.
- λ Press [U F] three times to return the display to 3-phase phase voltage and frequency.
- λ Press [P Q S] once to display 3-phase active and total power.
- λ Press [P Q S] twice to display 3-phase reactive and total reactive power.
- λ Press [P Q S] three times to display 3-phase apparent power and total apparent power.
- λ Press [P F] to display each of the phase power factors and 3phase system power factor.
- λ Press [E] for several times to shift data between forward, reverse power and forward, reverse reactive power.
- λ Press [max H] several times to shift data between 3-phase current harmonic distortion, 3-phase phase voltage harmonic distortion, 3-phase maximum current, maximum total active power, maximum total reactive power, and maximum total apparent power.

✧ Note: Max.demand can be measured at the real time menu. For example, user presses [max H] once to get the max. Current. The meter records the value and the data remain while displaying. The recorded max. Current value will not be displayed after quitting the menu, but the machine constantly records the data when running.

Programming

Enter / quit programming mode

λ Press “PROG” for 1/2 second to enter programming mode.

λ Press “PROG” for 1/2 second to quit the mode when finished.

λ Press ▲/▼ several times to select modes [pt], [ct], [Id], [bps], [nEt], and [rst].

Note:	[pt] (voltage transformation ratio)	=	1(default)
	[Ct] (Current transformation ratio)	=	1(default)
	[Id] (Local address)	= 1(default)	
	[bps] (Communication baud ratio)	=	9600(default)
	[nEt] (Network & wire system)	=	4NBL(default)
	[rst] (Accumulative energy reset)	= 0(default)	

The transformation ratio is the ratio of the primary current (voltage) divided by the secondary current (Voltage). For example a CT with a ratio of 300/5A will have a transformation ratio of 300 divided by 5, which is 60 etc.

✧ Setting transformation ratio and address [pt] [ct] [Id]
In [pt] mode, press [►]once, and the figure on the left flashes; press [►] one more time, the second figure on the left flashes, and so on. Press [▲]/[▼] to set transformation ratio, and press [Ƴ] to confirm. Setting [ct] and [Id] is the same as above.

✧ Setting communication baud ratio [bps]
In [bps] mode, press [►] once, and the defaulted value of [bps] flashes. Press [▲]/[▼] to select the figures 1200, 2400, 4800, 9600 and 19200. Press [Ƴ] to confirm.

✧ Setting nework & wire system [nEt]
In [nEt] mode, press [►], and the defaulted value of [nEt] flashes. Press [▲]/[▼] to select 4NBL, 2BL, 3BL, 3NBL and 1BL. Press [Ƴ] to confirm.

Note:	4NBL	= 3P4W unbalanced system	4BL	=	3P4W	balanced	system
	2BL	= 1P3W system	3BL	=	3P3W	balanced	system
	3NBL	= 3P3W unbalanced system	1BL	= single-phase system			

✧ Accumulated energy reset [rst]
Resetting all the energy quantities:

1. In [rst] mode, press [►] once, to display [ALL NO] menu.
2. Press [►] one more time, and defaulted [NO] flashes.
3. Select [YES] by pressing [▲], and press [Ƴ] to confirm. All the energy quantities are reset to [0].

Note. It is not possible to reset individual quantities, so this function zero’s: +kWh, -kWh, +kVArh, -kVArh together

Resetting Max. Demand

The max. Demand is reset to [0] automatically. Press [max H] for 5 seconds to reset [0] manually.

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5 Technical Specifications

Dimension

- External 96 mm×96 mm×61mm
- Dimension for the installing hold 92 mm×92 mm
- Module 22 mm×33 mm×65mm
- Display LCD
- Phase/wire connection
  Single-phase network;3P4W;3P3W
  1P3W(balanced & unbalanced loads)

Voltage (RMS)

- Measuring range 30-600V (Line voltage)
  20-400V (Phase voltage)
- PT transformation ratio (programmable 1-10000
- Input power consumption ≤0.25 (220V) ≤0.60VA (600V)
- Continuous overload 800V

Current (RMS)

- Measure range 0 - 6A
- Min. measurable current 5mA
- CT transformation ratio (programmable) 1-10000
- Input power consumption 0.2VA
- Continuous overload 10A
- Short term overload 100A / 1s

Power

- Single-phase power 0-4000W/VAr/VA
- Total power 0-12000W/VAr/VA

Frequency

- Measuring range 50/60Hz

Power factor

- Measuring range -1 to +1

Measurement harmonic

- Voltage THD 0-30%
- Current THD 0-30%
- Auxiliary power ac: 85V-265V dc: 85V-330V
- Power consumption ≤3VA

Measurement accuracy

- Current 0.5% (0.5-6A)
- Phase voltage 0.5% (20-400V)
- Line voltage 1.0% (50-600V)
- Power 1.0%
- Power Factor 0.5%
- Frequency 0.1% (50/60Hz)
- Energy 1.0% (0.5L/0.5C)

Insulation resistance

- Voltage/current/power supply/shell 2.0kV/mim·2mA
- Output/power supply 2.0kV/mim·2mA

Operating conditions

- Operating-temperature range -15 to +55Deg.C
- Storage temperature range -25 to +75Deg.C
- Relative humidity 20-95% (non condensing)

Electromagnetic compatibility

- Immunity to 1.2/50-8/20us Surge
  Power supply: 4kV I/O 2kV
- Immunity to electrical fast transient/burst
  Power supply: 4kV, 2.5kHz I/O 2kV, 5kHz
- Immunity to electrostatic discharge
  Contact discharge: 6kV Air discharge: 8kV
- Immunity to radio frequency electromagnetic field 10V/m (equivalent to a cell phone within a distance of 0.5m -1.4m)

Communication Interface

- Port RS-485
- Address 1-247
- Baud rate 1200/2400/4800/9600/19200
- Parity bit none
- Data bit 8 bits
- Stop bit 1 bits
- Communication protocol Modbus RTU

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