

# YPP6400

PROPLUS High Voltage & Current Meter



PROPLUS



HIGH VOLTAGE & CURRENT

- (1) High Voltage and (1) High Current Input
- Multiplication for Apparent Power Calculation
- 0-300 VAC or VDC Voltage Input
- 0-5 AAC or ADC Current Input
- NEMA 4X, IP65 Front
- Input Power Options Include 85-265 VAC or 12/24 VDC
- Large Dual-Line 6-Digit Display, 0.60" & 0.46"
- Sunlight Readable Display Models
- Programmable Display & Function Keys
- 2 or 4 Relays + Isolated 4-20 mA Output Options
- External 4-Relay & Digital I/O Expansion Modules
- USB, RS-232, & RS-485 Serial Communication Options
- Modbus® RTU Communication Protocol Standard
- Configure, Monitor, and Datalog from a PC with Free PROPLUS Software

YOKOGAWA   
www.yokogawa-usa.com

# YPP6400 PROPLUS High Voltage & Current Meter



UV Resistant  
Sunlight Readable

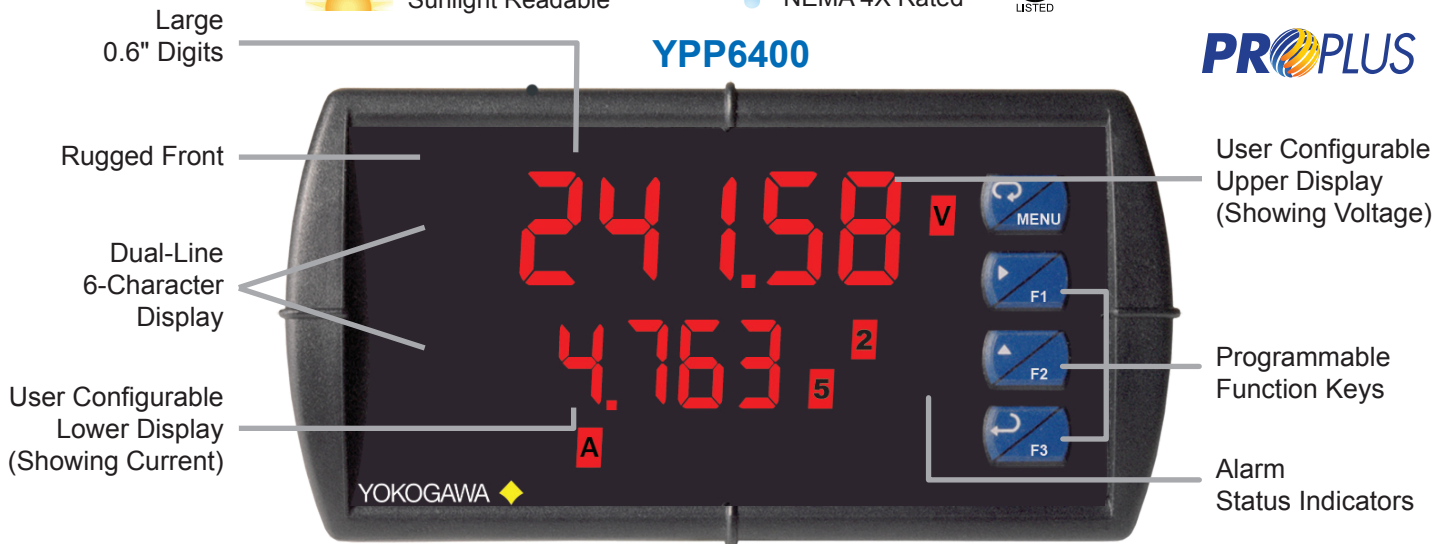


Front Panel  
NEMA 4X Rated



FREE Programming  
Software!

**PROPLUS**



## INTRODUCTION

The PROPLUS® YPP6400 is a multipurpose, easy to use high voltage and current input meter ideal for measuring direct voltage and current or the output from voltage shunts and current transformers. It has one 0-300 VAC or VDC voltage input and one 0-5 AAC or ADC current input. The meter may be used with a single voltage or current input, or to measure both simultaneously. A math channel P calculates apparent power as the product of the voltage and current inputs.

The YPP6400 can display voltage, current, and apparent power. The dual line display can show any two parameters simultaneously, or alternate between any parameters as well as their programmable units and tags.

A fully loaded YPP6400 meter has the following: four SPDT relays, 4-20 mA output, and a 24 VDC power supply. The YPP6400 capabilities may be enhanced by adding the following external expansion modules: four SPST relays; creating an eight-relay meter, two digital I/O modules with four inputs and four outputs each, serial communication adapters for use with PROPLUS or Modbus RTU, and a dual 4-20 mA expansion module; for a total of three 4-20 mA analog outputs.

## KEY FEATURES

### Precise, Accurate, and More Informative

PROPLUS's large 0.6" upper display provides a highly accurate and precise view of the high voltage/high current measurement, while the lower display can also provide a clearly identifiable custom tag. Its 24-bit A/D is accurate to  $\pm 0.03\%$  of calibrated span  $\pm 1$  count. The YPP6400's display also has lead zero blanking capability.

### Configurable

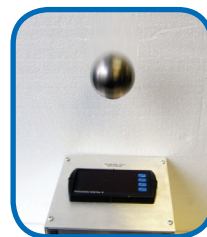
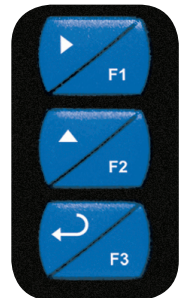
The upper display can be programmed to indicate PV, maximum (peak), minimum (valley), alternating maximum/minimum, one of eight alarm set points, or Modbus input. The lower display can also be configured to display engineering units, set points, user defined legends, or simply turned off.

## Optional SunBright Display Models

PROPLUS's SunBright display models have an extraordinarily bright LED display. They are perfect for applications where the meter is in direct sunlight or in applications where visibility may be impaired by smoke, fog, dust, or distance. Option is available on all PROPLUS models.

## Function Keys

There are three function keys available to the user. These keys can be programmed to trigger certain events (i.e. acknowledge alarms, reset max and/or min, disable/enable output relays, or hold current relay states), provide direct menu access points, and more.



## Rugged & Durable

A unique front panel design makes the PROPLUS nearly impenetrable in typical applications. Here, the PROPLUS easily survives a direct hit on the display from a heavy 2" solid stainless steel ball dropped from a height of eight feet.

## Easy-to-Use

The user friendly dual-line display makes the PROPLUS easy to set up & program. No jumpers to set for input selection. All setup & programming are done via the front panel. Three levels of password protection help maintain the reliability of the programming.

# YPP6400 PROPLUS High Voltage & Current Meter

## Display Single or Dual Input

The PROPLUS YPP6400 has a rather unique display that can represent the measured input in a different form (i.e. Volts & Amps). Please see the examples shown below. Both displays are independently scaled and are based on the 4-20 mA input signal. This function can be used for Value & Volts, Value & Amps, Voltage Value & Current Value, and Volts & Amps.



Value & Volts

Value & Amps



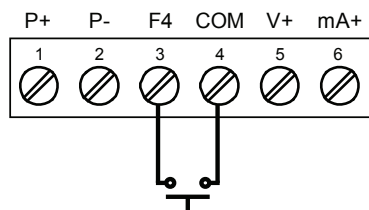
Alternating Input Value and Units

## Advanced Linearization Capability

The PROPLUS includes a 32-point linearizer for non-linear Current or Voltage signals. The meter's factory default setting is for 2-point linearization. Up to 32 linearization points can be user-selected for each channel, Voltage or Current, under the Linear Function. Yokogawa's free PROPLUS PC-based programming software greatly simplifies the construction of the linearization tables. The software enables the user to save this data to the meter and/or PC.

## On-Board Digital Input

The YPP6400 includes a digital input as a standard feature. This digital input can be assigned functionality such as alarm acknowledgement, as well as enable, disable, or force relays on from a signal from a PLC or relay on other equipment, and much more. This is ideal for installations where the meter is inaccessible behind a cover, or where an additional function key is needed for customized operation.



## Max/Min Display

Max/Min (or Peak/Valley) is standard on the PROPLUS YPP6400. Either display can be configured to show either maximum or minimum excursion since last reset. The displays can also be configured to toggle between Max and Min values. Both values can be simply reset from the front panel.

## DIGITAL COMMUNICATIONS

### Modbus® RTU Serial Communications

With the purchase of a serial communication adapter, PROPLUS meters can communicate with any Modbus Master device using the ever-popular Modbus communications protocol that is included in every PROPLUS. This greatly increases the flexibility of the meter. Modbus provides much more capability than reading PV and writing set points. Below are some examples of other things that can be done with PROPLUS's Modbus communications.

- Send a 6-character message to the lower display upon an event
- Convert a digital value to a 4-20 mA signal
- Remote user control (i.e. change set points, acknowledge alarms)
- Input a Modbus digital PV (in place of analog input)
- Remote override of any, or all, relays and analog outputs



Modbus PV Input



Remote Message

### Meter Copy

The Copy feature is used to copy (or clone) all the settings from one PROPLUS to other PROPLUS meters in about 20 seconds! The Copy function is a standard feature on all meters. It does not require a communications adapter, only an optional cable assembly, P/N YPPA1200. See Ordering Information on page 8 for complete details.

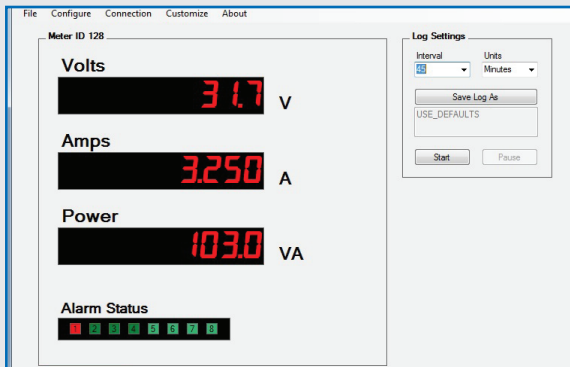


# YPP6400 PROPLUS High Voltage & Current Meter

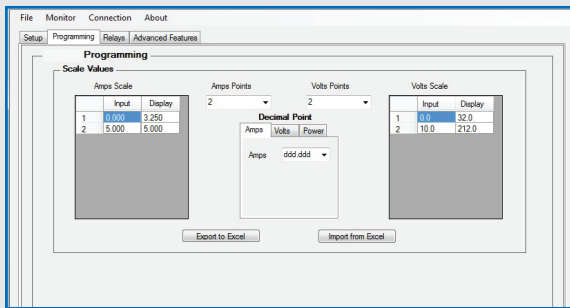
## PROPLUS SOFTWARE

Configure, monitor, and datalog a PROPLUS YPP6400 from a PC using PROPLUS Software (available for download at [www.yokogawa-usa.com](http://www.yokogawa-usa.com)) and a serial adapter.

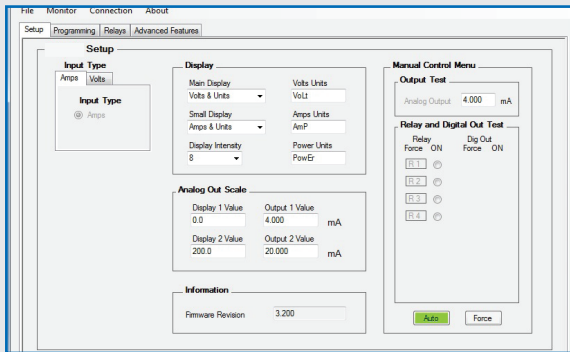
Monitor & Datalog



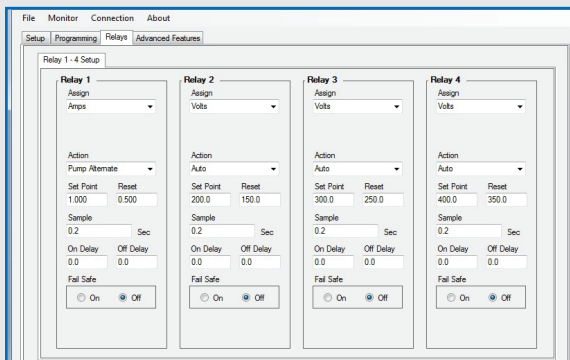
Linearization Feature



Setup

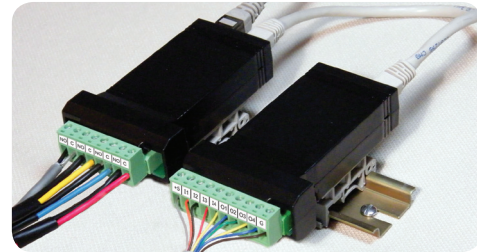


Relays



## FIELD EXPANSION MODULES

Add functionality to the PROPLUS in the field with easy-to-install external expansion modules. Add USB, RS-232, or RS-485 communications, I/O modules (up to 2), and 4-relay expansion module. The menu items for these modules do not appear until the module is connected, simplifying the basic menu. Relay and digital I/O modules are shown below with optional DIN rail mounting kit, P/N YPPA1002.



### YPPA1044 I/O Expansion Module

Four digital inputs and four digital outputs are available per expansion module. The PROPLUS meter will accept two of these modules. External digital inputs can function similarly to the front panel function keys or on-board digital input F4. They can be configured to trigger certain events (i.e. acknowledge/reset alarms, reset max and/or min values, disable/enable all output relays, and hold current relay states), provide direct menu access point, or mimic front panel keys. The I/O module can be used to configure the PROPLUS remotely, in essence giving the user control of the four front panel push buttons. This feature is particularly useful if the meter is mounted inside an explosion-proof enclosure.

Digital outputs can be used to remotely monitor PROPLUS's alarm relay output states, or the states of a variety of actions and functions executed by the meter.

### YPPA1004 Relay Expansion Module

An external module containing four 3 A Form A (SPST) relays can be added to the PROPLUS at anytime. Removable screw terminal blocks accept 12 to 22 AWG wire.



### YPPA1011 Dual Isolated 4-20 mA Expansion Module

Add analog output to the PROPLUS YPP6400 at any time with dual isolated analog output expansion module YPPA1011.

Connect the expansion module to the meter using the M-Link Connector on the YPP6400. Use only cables provided by Yokogawa in order to protect both the meter and the equipment.

### YPPA1232, YPPA1485, & YPPA8008 Communication Modules

Serial communications on the PROPLUS can be added anytime with external YPPA1232 (RS-232), YPPA1485 (RS-485), or YPPA8008 (USB) communication adapters.

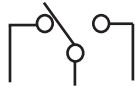
Free Modbus protocol with the purchase of PROPLUS serial communications modules.



# YPP6400 PROPLUS High Voltage & Current Meter

## OUTPUTS

### Relay Outputs



The PROPLUS has up to four 3 A Form C relays (SPDT) with multiple power loss fail-safe options. Relays can be configured for proper protective action upon input loop break. Relay ON and OFF delay times are user adjustable. Up to eight front panel indicators show alarm and/or relay state. All relays can be configured for 0-100% deadband.

### Relay Operation/Configuration

There are powerful relay functions that can be configured in the PROPLUS meter, including:

- Automatic reset only (non-latching)
- Automatic + manual reset at any time (non-latching)
- Latching (manual reset only)
- Latching with clear (manual reset only after alarm condition has cleared)
- Pump alternation control (automatic reset only)
- Sampling (activated for a user-specified time)
- User selectable fail-safe operation
- Relay action for loss (break) of 4-20 mA input signal
- Time delay (on and off), independent for each relay
- Manual control mode
- Interlock relay mode

### Analog Output

The isolated analog retransmission signal can be configured to represent the process variable (PV), maximum (peak) value, minimum (valley) value, the value for any of the eight relay set points, or Modbus input. While the output is nominally 4-20 mA, the signal will accurately accommodate under- and over-ranges from 1 to 23 mA.

### Manual Output Control

Take control of any output with this feature. All relays can be forced ON or OFF, and the 4-20 mA output signal can be set to any value within its range. When the relays and 4-20 mA output are controlled manually, an LED labeled "M" is turned on and the associated Alarm LEDs (1-8) flash every 10 seconds indicating that the meter is in manual control mode.



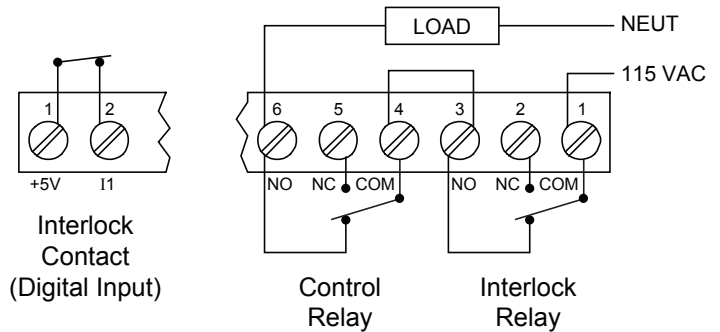
### Isolated Transmitter Power Supplies

A powerful 24 V @ 200 mA power supply is a standard feature on the PROPLUS meter. It can be configured for 5, 10, or 24 V (default) by means of a simple internal jumper (see manual). An additional power supply (24 V @ 40 mA) is standard with the 4-20 mA output option.

### Interlock Relay(s)

This function allows a process to use one or more very low voltage input signals or simple switch contacts to control the state of one or more internal "interlock" relays. A violation (i.e. loss of input, open switch, or open circuit) forces one or more N/O interlock relay contacts to open. One input can be used in series with a number of interlock switches, or up to eight inputs can be required to force-on one (or more) internal interlock relays. Please see *Application Note AN-1008* on our website for more information. Requires YPPA1044 Digital I/O module or use of on-board digital input F4.

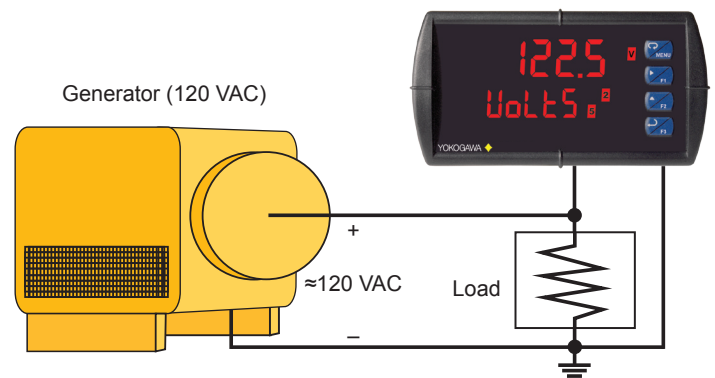
### Interlock Relay Connections



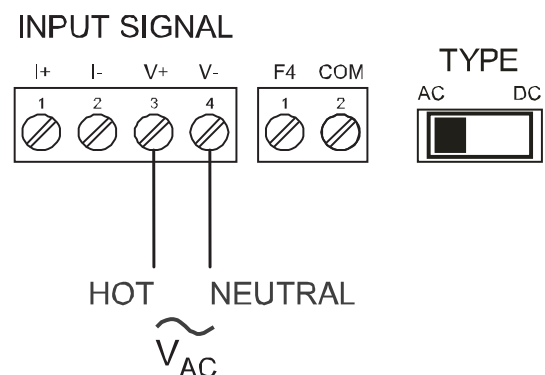
## APPLICATION EXAMPLES

The YPP6400 PROPLUS can be used to display application data for voltage, current, or both. Each Channel, Voltage or Current, can be scaled independently. The following examples show just a few of the YPP6400's application capabilities using generators and transformers. Each example is followed by a wiring diagram that shows proper switch position for the meter.

### Voltage Measurement for a Generator Driving a Load



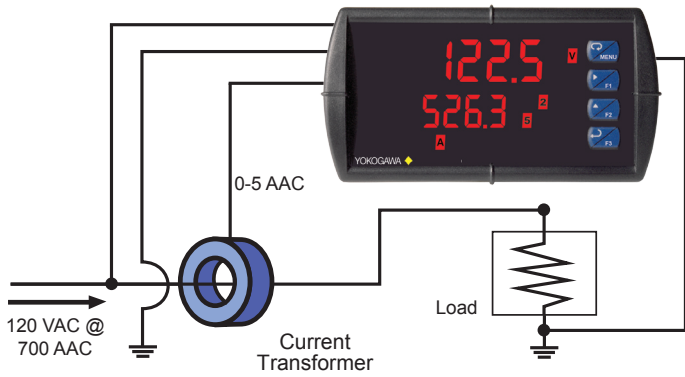
Voltage Input Application Example



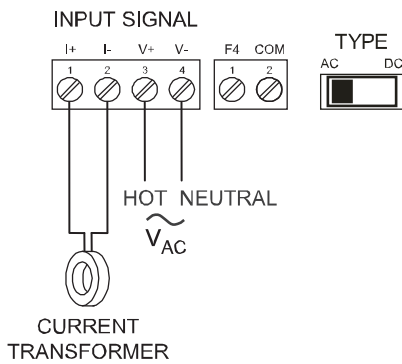
Voltage Input Wiring Example with AC Switch Selected

# YPP6400 PROPLUS High Voltage & Current Meter

## Voltage & Current Measurement for a Transformer Driving a Load



Voltage/Current Input Application Example

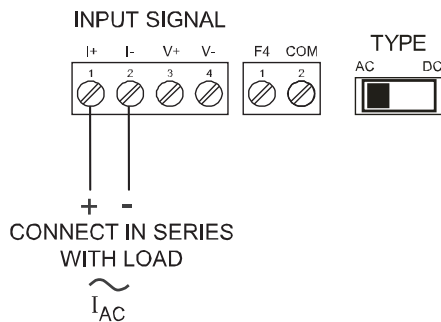


Voltage/Current Input Wiring Example with AC Switch Selected

## Current Measurement for a Lighting System



Current Input Application Example



Current Input Wiring Example with AC Switch Selected

## NEMA 4 & 4X FIELD ENCLOSURES

Thermoplastic and stainless steel NEMA 4X, and painted steel NEMA 4 enclosures for up to two ProPLUS meters are available.



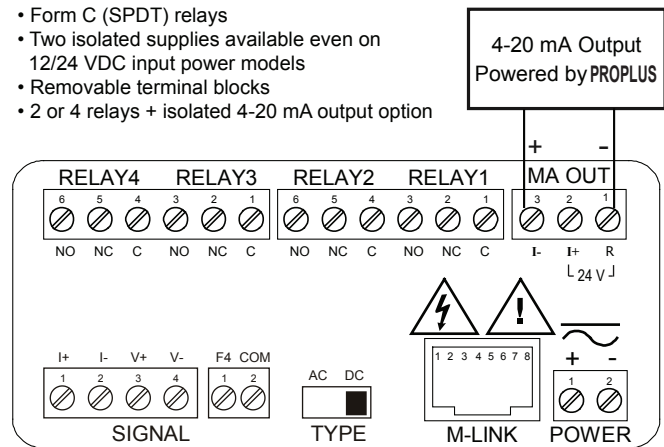
YPPA2811  
Plastic Low-Cost



YPPA2812  
Plastic Low-Cost

## CONNECTIONS

- Form C (SPDT) relays
- Two isolated supplies available even on 12/24 VDC input power models
- Removable terminal blocks
- 2 or 4 relays + isolated 4-20 mA output option



- Input Power Options: 85-265 VAC or 12/24 VDC
- Voltage & current inputs
- No jumpers needed for V/mA input selection
- M-Link for adding expansion modules
- Digital input (F4)

# YPP6400 PROPLUS High Voltage & Current Meter

## SPECIFICATIONS

Except where noted all specifications apply to operation at +25°C.

### General

**Display:** Upper display: 0.60" (15 mm) high. Lower display: 0.46" (12 mm) high. Both are 6 digits (-99999 to 999999), with red LEDs.

**Display Intensity:** Eight user-selectable intensity levels

**Display Update Rate:** 5/second (200 ms)

**Overrange:** Display flashes 999999

**Underrange:** Display flashes -999999

**Display Assignment:** The main (Big) and secondary (Little) displays may be assigned to process values for Channels A (Ch-A, current), V (Ch-V, voltage), or P (Ch-P, apparent power); toggle between (Ch-A & Ch-V, Ch-A & Ch-P, Ch-V & Ch-P, and Ch-A, Ch-V, & Ch-P); relay set points; max and/or min values for CH-A, Ch-V, or Ch-P; CH-A and units; Ch-V and units; Ch-P and units; or Modbus input. The lower display may also be set to show engineering units or be set to off, with no display.

**Front Panel:** NEMA 4X, IP65

**Programming Methods:** Four front panel buttons, digital inputs, PC and PROPLUS software, Modbus registers, or cloning using Copy function.

**F4 Digital Input Contacts:** 3.3 VDC on contact. Connect normally open contacts across F4 to COM.

**F4 Digital Input Logic Levels:** Logic High: 3 to 5 VDC  
Logic Low: 0 to 1.25 VDC

**Noise filter:** Programmable from 2 to 199 (0 will disable filter)

**Filter Bypass:** Programmable from 0.1 to 99.9% of calibrated span

**Recalibration:** Calibrated at the factory. Recalibration is recommended at least every 12 months.

**Max/Min Display:** Max / min readings reached by the process are stored until reset by the user or until power to the meter is cycled.

**Password:** Three programmable passwords restrict modification of programmed settings.

**Non-Volatile Memory:** All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

**Input Power Options:** 85-265 VAC 50/60 Hz, 90-265 VDC, 20 W max, or jumper selectable 12/24 VDC  $\pm 10\%$ , 15 W max.

**Fuse:** Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 meters may share one 5 A fuse.

**Normal Mode Rejection:** Greater than 60 dB at 50/60 Hz

**Isolation:** 500 V AC/DC potential allowed between voltage and current input channels. Channels isolated by 3 M $\Omega$  impedance  
500 V input-to-output or output-to-P+ supply.

**Overvoltage Category:** Installation Overvoltage Category II: Local level with smaller transient overvoltages than Installation Overvoltage Category III.

#### Environmental:

Operating temperature range: -40 to 65°C

Storage temperature range: -40 to 85°C

Relative humidity: 0 to 90% non-condensing

**Connections:** Removable screw terminal blocks accept 16 to 28 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.

**Enclosure:** 1/8 DIN, high impact plastic, UL 94V-0, color: black

**Mounting:** 1/8 DIN panel cutout required: 3.622" x 1.772" (92 mm x 45 mm). Two panel mounting bracket assemblies are provided.

**Tightening Torque:** Screw terminal connectors: 5 lb-in (0.56 Nm)

**Dimensions:** 4.68" x 2.45" x 5.64" (119 mm x 62 mm x 143 mm) (W x H x D)

**Weight:** 9.5 oz (269 g)

**UL File Number:** UL & C-UL Listed. E348677; 508 Industrial Control Equipment.

**Warranty:** 3 years parts & labor

### Voltage and Current Inputs

**High Voltage Input:** One high voltage input (Channel V) 0-300 VDC or VAC; Switch Selectable, Modbus PV (Slave)

**High Current Input:** One high current input (Channel A) 0-5 AAC or ADC; Switch Selectable, Modbus PV (Slave)

**Channels:** Channel A, Channel V, Channel P (Math Channel for Apparent Power)

**AC/DC Selection:** Switch selectable for AC or DC inputs. Channels A and V share AC/DC selection.

**Apparent Power Math:** Apparent power P calculated as  $P = ((A * V) + C) * F$   
**Programmable Constants:** Constant C (Adder): -99.999 to 999.999, default: 0.000. Constant F (Factor): 0.001 to 999.999, default: 1.000.

**Accuracy:** ADC: 0.03% Full Scale  $\pm 1$  count,

AAC: 0.1% Full Scale  $\pm 1$  count,

VDC: 0.05% Full Scale  $\pm 1$  count,

VAC: 0.15% Full Scale  $\pm 1$  count, square root & programmable exponent accuracy range: 10-100% of calibrated span

**Temperature Drift:** 0.005% of calibrated span/ $^{\circ}$ C max from -40 to 65 $^{\circ}$ C ambient

**Signal Input Conditioning:** Linear, square root, programmable exponent, or round horizontal tank volume calculation.

**Multi-Point Linearization:** 2 to 32 points for Channel A and V

**Low-Flow Cutoff:** 0-999999 (0 disables cutoff function). Independent for Channel A and V.

**Decimal Point:** Up to five decimal places or none: d.ddddd, dd.dddd, ddd.ddd, dddd.dd, ddddd.d, or ddddd.

**Calibration Range:**

Input Channel	Input Range	Minimum Span Input 1 & Input 2
A	+/- 0-5 ADC/0-5 AAC	+/- 0.005 ADC/0.010 AAC
V	+/- 0-300 VDC/0-300 VAC	+/- 0.1 VDC/0.3 VAC

*Note: An error message will appear if the input 1 and input 2 signals are too close together.*

**Input Impedance:** Voltage Input: greater than 3 M $\Omega$ .

Current Input: 50 - 100  $\Omega$ .

**Input Overload:** Voltage input protected up to 500 VDC

Current input protected up to 10 A by a 10A/300V fast acting non-resettable fuse. Fuse is NOT resettable after a fault; unit must be factory reconditioned.

**F4 Digital Input Contacts:** 3.3 VDC on contact. Connect normally open contacts across F4 to COM.

**F4 Digital Input Logic Levels:** Logic High: 3 to 5 VDC  
Logic Low: 0 to 1.25 VDC

### Relays

**Rating:** 2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP ( $\approx$  50 watts) @ 125/250 VAC for inductive loads such as contactors, solenoids, etc.

**Noise Suppression:** Noise suppression is recommended for each relay contact switching inductive loads.

**Relay Assignment:** Each relay independently assigned to Ch-A, Ch-V, CH-P, or Modbus

**Deadband:** 0-100% of span, user programmable

**High or Low Alarm:** User may program any alarm for high or low trip point. Unused alarm LEDs and relays may be disabled (turned off).

**Relay Operation:** automatic (non-latching), latching (requires manual acknowledgement), sampling (based on time), pump alternation control (2 to 8 relays), Off (disable unused relays and enable interlock feature, manual on/off control mode).

**Relay Reset:** User selectable via front panel buttons or digital inputs, or PC.

1. Automatic reset only (non-latching), when input passes the reset point.
2. Automatic + manual reset at any time (non-latching).
3. Manual reset only, at any time (latching).
4. Manual reset only after alarm condition has cleared (latching).

*Note: Front panel button or digital input may be assigned to acknowledge relays programmed for manual reset.*

**Time Delay:** 0 to 999.9 seconds, on & off relay time delays.

Programmable and independent for each relay.

**Fail-Safe Operation:** Programmable and independent for each relay.

*Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.*

**Auto Initialization:** When power is applied to the meter, relays will reflect the state of the input to the meter.

**Break Condition Operation:** Relay condition when sensor break detected. Programmable independently for each relay as On, Off, or Ignore (maintain last condition).

# YPP6400 PROPLUS High Voltage & Current Meter

## Modbus® RTU Serial Communications

**Meter Address/Slave ID:** 1 - 247

**Baud Rate:** 300 - 19,200 bps

**Transmit Time Delay:** Programmable between 0 and 199 ms

**Data:** 8 bit (1 start bit, 1 or 2 stop bits)

**Parity:** Even, odd, or none with 1 or 2 stop bits

**Byte-to-Byte Timeout:** 0.01 - 2.54 seconds

**Turn Around Delay:** Less than 2 ms (fixed)

*Note: Refer to the PROPLUS® Register Tables for details.*

## Isolated 4-20 mA Transmitter Output

**Output Source:** Process channel A, V, or P, max or min for channel A, V, or highest or lowest max or min of A and V, set points 1-8, Modbus input, or manual control mode

**Scaling Range:** 1.000 to 23.000 mA for any display range

**Calibration:** Factory calibrated: 4.000 to 20.000 = 4-20 mA output

**Analog Output Programming:** 23.000 mA maximum for all parameters:

Overrange, underrange, max, min, and break

**Accuracy:** ± 0.1% of span ± 0.004 mA

**Temperature Drift:** 0.4 µA/°C max from 0 to 65°C ambient,

0.8 µA/°C max from -40 to 0°C ambient

*Note: Analog output drift is separate from input drift.*

**Isolated Transmitter Power Supply:** Terminals I+ & R: 24 VDC ± 10%.

May be used to power the 4-20 mA output or other devices.

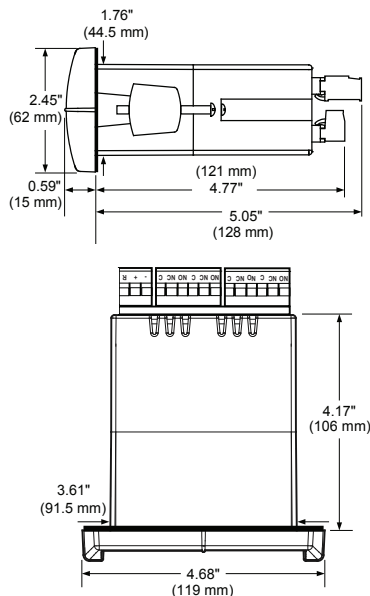
All models rated @ 40 mA max.

**External Loop Power Supply:** 35 VDC maximum

**Output Loop Resistance:**

Power supply	Minimum	Maximum
24 VDC	10 Ω	700 Ω
35 VDC (external)	100 Ω	1200 Ω

## DIMENSIONS



Notes:

1. Panel cutout required: 1.772" x 3.622" (45 mm x 92 mm)
2. Panel thickness: 0.040 - 0.250" (1.0 mm - 6.4 mm)
3. Mounting brackets lock in place for easy mounting
4. Clearance: Allow 6" (152 mm) behind the panel

## ORDERING INFORMATION

PROPLUS® YPP6400 • Standard Models		
85-265 VAC Model	12/24 VDC Model	Options Installed
YPP6400-6R0	YPP6400-7R0	None
YPP6400-6R2	YPP6400-7R2	2 Relays
YPP6400-6R3	YPP6400-7R3	4-20 mA Output
YPP6400-6R4	YPP6400-7R4	4 Relays
YPP6400-6R5	YPP6400-7R5	2 Relays & 4-20 mA Output
YPP6400-6R7	YPP6400-7R7	4 Relays & 4-20 mA Output

Note: 24 V Transmitter power supply standard on all models.

PROPLUS® YPP6400 • SunBright Display Models		
85-265 VAC Model	12/24 VDC Model	Options Installed
YPP6400-6H0	YPP6400-7H0	None
YPP6400-6H2	YPP6400-7H2	2 Relays
YPP6400-6H3	YPP6400-7H3	4-20 mA Output
YPP6400-6H4	YPP6400-7H4	4 Relays
YPP6400-6H5	YPP6400-7H5	2 Relays & 4-20 mA Output
YPP6400-6H7	YPP6400-7H7	4 Relays & 4-20 mA Output

Note: 24 V Transmitter power supply standard on all models.

Accessories	
Model	Description
YPPA1002	DIN Rail Mounting Kit for Two Expansion Modules
YPPA1004	4-Relay Expansion Module
YPPA1011	Dual Isolated 4-20 mA Expansion Module
YPPA1044	4 Digital Inputs & 4 Digital Outputs Module
YPPA1200	Meter Copy Cable
YPPA1232	RS-232 Serial Adapter
YPPA1485	RS-485 Serial Adapter
YPPA7485-I	RS-232 to RS-422/485 Isolated Converter
YPPA7485-N	RS-232 to RS-422/485 Non-Isolated Converter
YPPA8008	USB Serial Adapter
YPPA8232-N	USB to RS-232 Non-Isolated Converter
YPPA8485-I	USB to RS-422/485 Isolated Converter
YPPA8485-N	USB to RS-422/485 Non-Isolated Converter
YPPX6901	Suppressor (snubber): 0.01 µF/470 Ω, 250 VAC

**Your Local Distributor is:**

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LDS6400YK\_B 07/15