### Overview
This panel-mounted power and energy meter with a large, three-row LED display integrates all the measuring functions required for power management in locations such as factories and buildings into a single unit.

With the objective of working toward the preservation of the global environment by saving energy and performing equipment maintenance, the PR300 is designed to display and output the energy of various types of electrical equipment.

### Features
- **Saves on cost, wiring, and space**
  Integrates a wide selection of functions for measuring things like energy (active, regenerative, reactive, and apparent), power (active, regenerative, reactive, and apparent), voltage, current, frequency, and power factor into a single unit.
- **Employ a large, three-row LED display**
  Capable of displaying three-phase current and voltage simultaneously, and the measurement items you assign.
- **Analog output function**
  Equipped with a transducer function for power (active, regenerative, reactive, and apparent), voltage, current, frequency, and power factor (4 to 20 mA DC).
- **Demand measurement**
  Measures the average power and current within a specified period. It also allows you to set up alarm points to output alarms.
- **Equipped with a multitude of functions**
  Enables measurement of the maximum and minimum values of voltage and the maximum value of current, as well as, for example, the use of external digital input to measure energy at arbitrary times.
- **Pulse output**
  Capable of outputting pulses proportional to energy (one measurement item from active, regenerative, reactive, and apparent energy).
- **Converts the phase and wire system of an AC power system and an input voltage circuit to a universal format**
  The PR300 can handle from the single-phase two-wire system and single-phase three-wire system to the three-phase three-wire system and three-phase four-wire system, and also universally cope with input voltage circuits up to 600 V AC.
- **Compatible with ANSI 4-inch round form size and DIN 96-square instrument size**
  The ability to attach and detach JIS/ANSI-mounting kit ensures compatibility with two sizes.

### Model and Suffix Codes

#### Model
- **PR300**
- **Model**
  - **Phase and wire system**
    - 3: Universal three-phase three-wire system (single-phase two-wire, single-phase three-wire, and three-phase three-wire systems)
    - 4: Universal three-phase four-wire system (single-phase two-wire, single-phase three-wire, three-phase three-wire, and three-phase four-wire systems)
    - 5: Three-phase four-wire system (2.5 element)**
- **Input voltage/input current**
  - 1: Universal voltage input** (150 V, 300 V, 600 V) / 1 A AC
  - 2: Universal voltage input* (150 V, 300 V, 600 V) / 5 A AC
- **Additional input and output function**
  - 0: 1 digital input
  - 1: 1 digital input, 1 analog output
  - 2: 1 digital input, 1 pulse output
  - 3: 1 digital input, 1 analog output, 1 pulse output
- **Communication function**
  - 0: RS-485 communication
  - 3: RS-485 communication, Ethernet communication**
- **Optional measuring function**
  - 0: None
  - 3: Demand measurement (1 demand alarm output)
- **Power supply**
  - 6: 100-240 V AC ±10% (50/60 Hz) or 130-300 V DC ±15%
- **Phase indication format**
  - A: A, B, and C indications
  - R: R, S, and T indications
  - **1 In cases where “Three-phase four-wire system (2.5 element)” is specified, the input current specification of 1 A AC is not applicable. (PR300-51xxx-xx-0 cannot be ordered.) Can be used only when the voltage is in a state of equilibrium. The phase and wire system cannot be changed.
  - **2 Set the voltage range (150 V, 300 V, or 600 V) according to the rated input voltage to be measured. (Refer to “Rated Input Voltage” of the Input Specifications on page 6.)
  - **3 For Ethernet communication, the RS-485 communication interface is exclusively for the Ethernet-serial gateway function.

### Ordering Information
Specify the model and suffix codes.

Example: PR300-31000-6A-0
### Measuring Functions

<table>
<thead>
<tr>
<th>Measurement item</th>
<th>Single-phase two-wire system</th>
<th>Single-phase three-wire system</th>
<th>Three-phase three-wire system</th>
<th>Three-phase four-wire system (2.5 element)</th>
<th>Unit and symbol</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active energy (+)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
<td>kWh, MWh</td>
<td></td>
</tr>
<tr>
<td>Active energy (−)</td>
<td>✗</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>−kWh, −MWh</td>
<td>Regenerative energy</td>
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<td>✔</td>
<td>✔</td>
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<td>kvarh, Mvarh</td>
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<td>Reactive energy (−)</td>
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<td>W, kW, MW</td>
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<td>var, kvar, Mvar</td>
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<td>✔</td>
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<td>VA, kVA, MVA</td>
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<td>V, kV</td>
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<td>V, kV</td>
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<td>A, kA</td>
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<td>A, kA</td>
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<td>✗</td>
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<td>LAG: + LEAD: −</td>
</tr>
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<td>Demand</td>
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<td>✔</td>
<td>✔</td>
<td>✗</td>
<td>A, kA</td>
</tr>
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</tr>
<tr>
<td>Demand current-2</td>
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<td>✗</td>
<td>✗</td>
<td>A, kA</td>
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<tr>
<td>Demand current-3</td>
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<td>A, kA</td>
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<tr>
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</tr>
<tr>
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<td>Demand</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>W, kW, MW</td>
</tr>
<tr>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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</tr>
<tr>
<td>Instantaneous</td>
<td>Minimum</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td></td>
</tr>
</tbody>
</table>

*1 Integrated low-cut power can be set for each energy.  
Integrated low-cut power: This is a function for not integrating power less than a set value as energy.  
The setting range of integrated low-cut power is 0.05 to 20.00% of the rated power (initial value: 0.05%).  
*2 Can be used only when the voltage is in a state of equilibrium.  
*3 Can be measured only when the current is in a state of equilibrium.  
*4 Can be used only when the voltage is in a state of equilibrium.  

- **: Effective  
- : Ineffective
● Optional integrating function

Power is integrated while a control signal for optional integration is on. When the control signal is switched from off to on, the optional integrated value indication is reset and integration starts. (The integrated value prior to the reset is held in a register.) The integrated value cannot be guaranteed in the event of a power failure occurring during integration.

● Demand measurement (when demand measurement is specified)

The PR300 measures average power or average current within a set demand period. The maximum demand value for the demand measuring time is held until the power is turned off, remote reset is executed, or the next demand measurement is started.

<table>
<thead>
<tr>
<th>Item Setting Range</th>
<th>Resolution</th>
<th>Initial Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand power/current</td>
<td>Active power, current</td>
<td>–</td>
<td>Active power</td>
</tr>
<tr>
<td>Demand period</td>
<td>1 to 60 minutes (Demand alarm mask time to 60 minutes)</td>
<td>1 minute</td>
<td>30 minutes Demand alarm mask time ≤ Demand period</td>
</tr>
<tr>
<td>Demand alarm mask time</td>
<td>1 minute to length of demand period</td>
<td>1 minute</td>
<td>1 minute</td>
</tr>
<tr>
<td>Demand power alarm point</td>
<td>1 to 1000 kW</td>
<td>1 kW</td>
<td>100 kW When demand power is selected</td>
</tr>
<tr>
<td>Demand current alarm point</td>
<td>1 to 1000 A</td>
<td>1 A</td>
<td>100 A When demand current is selected</td>
</tr>
<tr>
<td>Alarm release function</td>
<td>Automatic release and manual release</td>
<td>–</td>
<td>Automatic release</td>
</tr>
<tr>
<td>Data update interval</td>
<td>10 seconds</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

* This is the time from the start of the demand period to the set time in which no judgment is made for the alarm (alarm masked). During the alarm mask time, no maximum demand value is updated and no alarm is output.

![Diagram](image-url)
Display and Operation Specifications

Measurement Item Display

- **Active energy** [kWh, MWh] *1
- **Reactive energy** [kvarh, Mvarh] *2
- **Apparent energy** [kVAh, MVAh] *1
- **Regenerative energy** [kWh, MWh] *2
- **Optional active energy** [Wh]
- **Active/regenerative power (instantaneous, maximum, and minimum values)** [W, kW, MW] *2, *3
- **Reactive power (instantaneous, maximum, and minimum values)** [var, kvar, Mvar] *2, *3
- **Apparent power (instantaneous, maximum, and minimum values)** [VA, kVA, MVA] *1, *3
- **Voltage (instantaneous, maximum, and minimum values)** [V, kV] *1, *3
- **Current (instantaneous, maximum, and minimum values)** [A, kA] *2, *4
- **Power factor (instantaneous, maximum, and minimum values)** LEAD: d d d d [COSφ] LAG: G G G G [COSφ] *3
- **Frequency (instantaneous, maximum, and minimum values)** [Hz] *3
- **Demand power Maximum demand power** [W, kW, MW] [DEMAND] *4
- **Demand current Maximum demand current** [A, kA] [DEMAND] *4

- *1: Without sign, but with a decimal point
- *2: With a sign and a decimal point (“+” is not indicated). Regenerative power (energy) always shows “−” negative indication. The position of a decimal point differs depending on the primary rated power, VT ratio, and CT ratio.
- *3: “MAX” lights up for the maximum value and “MIN” lights up for the minimum value.
- *4: “MAX” lights up for the maximum value.

**Measured Value Display**

- 5-digit, 3-row, 7-segment LED display
- Display color: red

**Measured Value screen:**

Display pattern: The measurement items you want to display are assigned to each of the upper, middle, and lower displays to provide indications using three display rows as one pattern. Up to eight display patterns can be set. The initial values are as shown in the following table. (Combinations other than those shown in the following table are also available if the parameters are set.)

Number of display patterns: Can be set in the range of 1 to 8. Pressing the SET/ENT key switches the display from “display pattern-1,” “display pattern-2,” and so on in order according to the number of patterns set. The initial value is “1” and only display pattern-1 is displayed when this value is set.

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* The display of current (phase switch indication) is switched between current-1, current-2, and current-3 each time the SEL key is pressed. The display of voltage (phase switch indication) is switched between voltage-1, voltage-2, and voltage-3 each time the SEL key is pressed.
VT ratio/CT ratio:
If the VT ratio and CT ratio are set, input to the PR300 is displayed after converting it to the primary input value before VT or CT. The VT and CT ratios can be set via communication or using the operation keys.
VT ratio setting range: 1 to 6000*
CT ratio setting range: 0.05 to 32000*
* Set the VT ratio and CT ratio so that [secondary rated power] × [VT ratio] × [CT ratio] is smaller than 10 GW.

(2) Unit Lamps
The relevant unit lamp lights up according to a measurement item and measured value.
Display color: red

(3) MAX and MIN Lamps
Either the MAX or MIN lamp lights up when a maximum or minimum measured value is displayed.
Display color: red

(4) Phase Indication Lamps
Indicate the phase to which the measured value corresponds. (The A, B, and C indications or R, S, and T indications should be specified in accordance with the suffix code.)
Display color: red

<table>
<thead>
<tr>
<th>Phase and Wire System</th>
<th>Voltage-1</th>
<th>Voltage-2</th>
<th>Voltage-3</th>
<th>Current-1</th>
<th>Current-2</th>
<th>Current-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-phase two-wire system</td>
<td>A (R)</td>
<td>–</td>
<td>–</td>
<td>A (R)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Single-phase three-wire system</td>
<td>A, B (R, S)</td>
<td>B, C (S, T)</td>
<td>–</td>
<td>A (R)</td>
<td>C (T)</td>
<td>–</td>
</tr>
<tr>
<td>Three-phase three-wire system</td>
<td>A, B (R, S)</td>
<td>–</td>
<td>B, C (S, T)</td>
<td>A (R)</td>
<td>–</td>
<td>C (T)</td>
</tr>
<tr>
<td>Three-phase four-wire system (2.5 element)</td>
<td>A (R)</td>
<td>–</td>
<td>C (T)</td>
<td>A (R)*</td>
<td>–</td>
<td>C (T)*</td>
</tr>
</tbody>
</table>

* Can be measured only when the current is in a state of equilibrium.

(5) Power Lamp
Lights up when power is supplied.
Blinks (4 times/sec) until it returns to normal when the communication error occurs.
Display color: green

(6) Communication Lamp
Blinks during communication (RS-485 or Ethernet).
Display color: green

(7) Pulse Output Lamp
Lights up when output is produced during pulse output, and goes out when no output is produced.
Display color: green

(8) Demand Alarm Lamp
If a demand value exceeds the demand alarm point at a time other than during the alarm mask time, the OVER lamp lights up to indicate the occurrence of an alarm.
Display color: red

(9) Phase and Wire System Lamps
The lamps of the phase and wire system that have been set light up.
Display color: green

(10) Input Range Lamps
The input voltage range (150 V, 300 V, or 600 V) and input current range (1 A or 5 A) that have been set light up.
Display color: green

(11) DEMAND Lamp
Lights up when a demand value is displayed.
Display color: red

(12) Operation Keys

- Used to switch measured value display patterns.
  This key is also used for setting parameters.

- Used to move the display digit during energy indication.
  This key is also used for setting parameters.

- Used to display the maximum or minimum measured value.
  These keys are also used for setting parameters.

- Used to switch phase indications when the PR300 displays a voltage or current for which phase indication can be changed. (Phase switch indication is not available for single-phase two-wire system.)
  This key is also used for setting parameters.

- Used to start/stop demand measurement.
  The lamp in the key lights up during demand measurement.
  Display color: green

Indicator-out Mode Setting
This function turns off LEDs after a certain time elapses, with the exception of the power lamp (LED).
The ON/OFF setting of the indicator-out mode function and the wait time before entering the indicator-out mode can be set using the operation keys. (Cannot be set via communication.)
Indicator-out mode: ON/OFF (initial value: OFF)
Indicator-out mode wait time: 1 to 60 minutes (resolution: 1 minute) (initial value: 10 minutes)

A/D Sampling Rate, Data Update Interval
A/D sampling rate: 4.8 kHz
Internal measurement data: display/communication data is updated at an interval of 1 second or less.
### Input Specifications

#### Phase and Wire System
- Universal three-phase three-wire system (switching from single-phase two-wire system, single-phase three-wire system, or three-phase three-wire system)
- Universal three-phase four-wire system (switching from single-phase two-wire system, single-phase three-wire system, three-phase three-wire system, or three-phase four-wire system)
- Three-phase four-wire system (2.5 element)

#### Frequency
45 to 65 Hz

#### Rated Input Voltage
<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Range (Variable)</th>
<th>Primary Voltage of VT</th>
<th>Allowable Input Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>150</td>
<td>900 kV</td>
<td>150 V</td>
</tr>
<tr>
<td>240</td>
<td>300</td>
<td>1800 kV</td>
<td>300 V</td>
</tr>
<tr>
<td>480</td>
<td>600</td>
<td>3600 kV</td>
<td>600 V</td>
</tr>
</tbody>
</table>

#### Rated Input Current
<table>
<thead>
<tr>
<th>Current (A)</th>
<th>Rated Current (Fixed)</th>
<th>Primary Current of CT</th>
<th>Allowable Input Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>32 kA</td>
<td>1.2 times the current range (continuous)</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>160 kA</td>
<td>Twice the current range (10 seconds) or 10 times the current range (3 seconds)</td>
</tr>
</tbody>
</table>

#### Rated Input Power and Measuring Range
- Single-phase two-wire system
- Three-phase three-wire system
- Three-phase four-wire system

#### Input Specifications

**Digital Input Specifications**

For digital input, either the optional integration start/stop or the demand alarm release can be used. If demand measurement is specified for an optional measuring function, digital input enters demand alarm release status. In this case, the optional integration start/stop cannot be used.

#### Control signal for optional integration

- **Function**: Starts or stops optional integration.
- **Number of Inputs**: 1
- **Input Signal**: Voltage signal*  
  ON signal: 4.5 to 25 V DC  
  OFF signal: within ±1 V DC
- **Minimum ON time**: 50 ms

* A special order can be placed for no-voltage contact.

#### Demand alarm release (when demand measurement is specified)

- **Function**: Cancels demand alarm.
- **Number of Inputs**: 1
- **Input Signal**: Voltage signal*  
  ON signal: 4.5 to 25 V DC  
  OFF signal: within ±1 V DC
- **Minimum ON time**: 50 ms

* A special order can be placed for no-voltage contact.
### Analog Output Specifications (When Analog Output is Specified)

<table>
<thead>
<tr>
<th>Function</th>
<th>Converts measurement data into DC current for output.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Item for Output</td>
<td>One item selected from active power, reactive power, apparent power, voltage (1 to 3), current (1 to 3), power factor, and frequency</td>
</tr>
<tr>
<td>Output Signal</td>
<td>4 to 20 mA DC</td>
</tr>
<tr>
<td>Output Accuracy</td>
<td>Measurement accuracy of measurement item for output + (±0.5% of F.S.)</td>
</tr>
<tr>
<td>Allowable Load Resistance</td>
<td>0 to 600 ω</td>
</tr>
<tr>
<td>Response speed</td>
<td>2 seconds or less (until ±1% of the final value is reached)</td>
</tr>
</tbody>
</table>

#### Setting Item

- Measurement item for output and the lower and upper limits of scaling:
  - Initial value: active power (W), lower limit of scaling: 50% (0 W), upper limit of scaling: 100% (maximum value of the input measuring range W)

- Scaling setting condition: upper limit of scaling — lower limit of scaling ≥ 50%

### Pulse Output Specifications (When Pulse Output is Specified)

<table>
<thead>
<tr>
<th>Function</th>
<th>Outputs pulses proportional to energy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Item for Output</td>
<td>One item selected from active energy, regenerative energy, reactive energy (LEAD, LAG), and apparent energy</td>
</tr>
<tr>
<td>Number of Outputs</td>
<td>1</td>
</tr>
<tr>
<td>Output Signal</td>
<td>Open collector</td>
</tr>
<tr>
<td>Contact Capacity</td>
<td>30 V DC at 200 mA</td>
</tr>
<tr>
<td>Pulse Unit</td>
<td>0.1 to 5000.0 kWh/pulse* (set in 100 Wh increments)</td>
</tr>
</tbody>
</table>

#### Setting Item

- Measurement item for output, pulse unit, and ON pulse width:
  - Initial value: active energy (kWh), pulse unit: 1 kWh/pulse, and ON pulse width: 50 ms

#### ON Pulse Width

- Represents the ON time of pulses to be output. (Set the pulse width so that the maximum ON pulse width obtained by the following equation is not exceeded.)
  - Within the range of 10 to 1270 ms (set in 10 ms increments)
  - Maximum ON pulse width (ms) = \( \frac{\text{Pulse unit [kWh/pulse]} \times 3600 \times 1000^2}{\text{Secondary rated power [W]} \times \text{VT ratio} \times \text{CT ratio} \times 1.2 \times 2} \)

* The units are kvarh/pulse for reactive energy and kVAh/pulse for apparent energy.

### Demand Alarm Output Specifications (When Demand Measurement is Specified)

<table>
<thead>
<tr>
<th>Function</th>
<th>Outputs an alarm if the measured demand value exceeds the set demand alarm point.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Signal</td>
<td>Open collector</td>
</tr>
<tr>
<td>Contact Capacity</td>
<td>30 V DC at 200 mA</td>
</tr>
</tbody>
</table>

#### Alarm Release Function

- Automatic release: Cancels the alarm if demand falls below the demand alarm point when the next measurement is performed.
- Manual release*: Holds the status of an alarm that occurred once. Cancels the alarm by digital input or the operation key, or via communication.

* Refer to “Demand alarm release” of the Digital Input Specifications.
## Communication Specifications

### RS-485 Communication

**Example:**

![Connection Diagram](image)

- **Function:** RS-485 communication enables you to use the command/response method to read a variety of measurements and write various settings.
- **Protocol:** PC link (with checksum, without checksum), Modbus (RTU, ASCII), PR201 original (Note 1)
- **Transmission Distance:** Approx. 1200 m maximum (when 24 AWG twisted-pair cable is used)
- **Connection Method:** Multi-drop connection (a maximum of 32 units [including a higher-level device])
- **Station Number:** 01 to 99 (maximum number of units to be connected: 31 [number of units that can be connected to a PC etc.])
  - (Setting range: 01 to 31 is recommended)
- **Transmission Method:** Half-duplex communication
- **Synchronization Method:** Start-stop synchronization
- **Baud Rate:** 19200, 9600, and 2400 bps
- **Xon/Xoff Control:** None
- **Data Format:**
  - Data length: 8 bits, 7 bits
  - Parity: None, even, odd
  - Stop bit: 1 bit, 2 bits

For details, refer to the user’s manual for communications of each device to be connected.

(Note 1) The settings cannot be written.

### Example of Connection Diagram

![Connection Diagram](image)

- **Notes:**
  - The PR300 employs a two-wire system for RS-485 communication.
  - SG: The SG terminal is connected to match the signal level of the RS-485 communication line.
  - FG: All shielded wires must be connected and then grounded at one place to provide noise protection for RS-485 communication lines.
Ethernet communication (when the Ethernet communication function is specified)

Example:

- PC IP address: 192.168.1.1
- Ethernet
- LAN connection

Station number 01
IP address: 192.168.1.2

Station number 01
IP address: 192.168.1.3

Station number 01
IP address: 192.168.1.4

Station number 01
IP address: 192.168.1.5

Function
Ethernet communication enables you to use the command/response method to read a variety of measurements and write various settings. The PR300 can be connected to IEEE802.3-compliant networks (10BASE-T/100BASE-TX).

Communication Specifications
Protocol: Modbus/TCP
Access Control: CSMA/CD
Baud Rate: 10 Mbps/100 Mbps
Maximum Segment Length: 100 m (distance between the hub and module)
Maximum Connecting Configuration: Maximum of 4 levels of cascading (for 10BASE-T) or maximum of 2 levels of cascading (for 100BASE-TX)

Overview of Modbus/TCP Protocol
The structure of Modbus/TCP protocol is as follows:

- MBAP Header
- Function code
- Data

PDU

Transaction ID: Set any value for identifying the transaction. The PR300 returns a value received from a higher-level device as a response.

Protocol ID: Specify “0” for the Modbus/TCP protocol.
Number of bytes: Number of bytes after the unit ID (byte number 6)
Unit ID: The PR300 returns a value received from a higher-level device as a response.

For details, refer to the user’s manual for communications of each device to be connected.

Note: If Ethernet communication is used, the RS-485 communication interface is used specifically for the Ethernet-serial gateway function. Therefore, it is not possible for a higher-level device such as a PC to access the PR300 via the RS-485 communication interface.

Ethernet-Serial Gateway Function
The PR300 has an RS-485 communication terminal in addition to an Ethernet communication connector. Modbus/TCP commands received by Ethernet are relayed to the RS-485 terminal. This enables the PR300 to connect to a device with an RS-485 communication function (Modbus/RTU protocol) via a network.

For details, refer to the user’s manual for communications of each device to be connected.
## Standard Performance

### Accuracy Rating
- **Active energy/optional active energy (Wh)**: ±0.5% (EN60687 accuracy; class 0.5 or equivalent)
- **Active power (W)**: ±0.5% of F.S.
- **Voltage (V)**: ±0.25% of F.S. (voltage rms)
- **Current (A)**: ±0.25% of F.S. (current rms)
- **Frequency (Hz)**: ±0.5 Hz
- **Demand**: ±0.5%

### Calculation Accuracy
The value is calculated to an accuracy of ±1 digit from the measured value for reactive energy, apparent energy, reactive power, apparent power, power factor or current*. *Current is only for the 2.5 element measurement.

### Backup upon Power Failure
The last integrated values obtained immediately before the power failure are held for active energy, regenerative energy, reactive energy, and apparent energy.

### Insulation Resistance
- Between each of the voltage input, current input, power, ground, digital input, pulse output, analog output, RS485 communication output, Ethernet communication output, and alarm output terminals: 100 MΩ or more (at 500 V DC)

### Withstand Voltage
- Between each of the voltage input, current input, power, and ground terminals: 2500 V AC for 1 minute
- Between (the voltage input, current input, power and ground terminals) and the digital input, pulse output, analog output, alarm output, RS-485 communication output, and Ethernet communication output terminals: 2500 V AC for 1 minute
- Between each of the digital input, pulse output, analog output, alarm output, and (RS-485 communication output, Ethernet communication output) terminals: 1000 V AC for 1 minute
- Between the RS-485 communication output, and Ethernet communication output terminals: 500 V AC for 1 minute

### Impulse Withstand Voltage
- Between all of the voltage input, current input, and power terminals and the ground terminal: 6 kV (1.2/50 μs), 10 times for positive and negative
- For variations within the power supply operating range (when 0.01 I<sub>n</sub> and power factor = 1): In: rated current, I: present current input
- ±0.25%, Voltage/Current: ±0.125%
- (for variations of 45 to 65 Hz)
- ±0.25%, Voltage/Current: ±0.125%
- ±0.5% (for variation within the power supply operating range (when 0.01 I<sub>n</sub> and power factor = 1)) In: rated current

### Effects of Magnetic Field
400 A/m or less
- Active power: ±0.5% of F.S.
- Voltage/Current: ±0.25% of F.S.

### Effects of Changes in Ambient Temperature
- ±0.03%/°C for a temperature change rate of 10°C/h or less (when 0.05 I<sub>n</sub> ≤ I ≤ I max, power factor = 1)
- ±0.05%/°C for a temperature change rate of 10°C/h or less (when 0.1 I<sub>n</sub> ≤ I ≤ I max, power factor = LAG 0.5)

### Effects of Power Supply Voltage Variations
- Active power: ±0.25%, Voltage/Current: ±0.125%
- (for variations within the power supply operating range when 0.01 I<sub>n</sub> and power factor = 1)

### Power Supply Frequency
- Active power: ±0.25%, Voltage/Current: ±0.125%

### Power Supply
- 100-240 V AC ±10% (50/60 Hz) or 130-300 V DC ±15%

### Power Consumption
- AC drive: 10 VA maximum, DC drive: 5 W maximum

## Safety and EMC Standards

### Safety Standards
Compliant with
- UL61010-1
- CAN/CSA C22.2 No.61010-1-04 (C-UL Listed)

### Measurement category
**600V CAT. III**

<table>
<thead>
<tr>
<th>Measurement Category</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT.I</td>
<td>Circuits not directly connected to main power supply</td>
<td></td>
</tr>
<tr>
<td>CAT.II</td>
<td>Circuits directly connected to low-voltage facility</td>
<td>Home-use equipment, portable tools, etc.</td>
</tr>
<tr>
<td>CAT.III</td>
<td>Circuits in building facilities</td>
<td>Switchboards, circuit breakers, etc.</td>
</tr>
<tr>
<td>CAT.IV</td>
<td>Supply sources to low-voltage facilities</td>
<td>Overhead lines, cable systems, etc.</td>
</tr>
</tbody>
</table>

### Installation category
- **CAT. II**
- Pollution degree: 2

### Rated measurement input
- Voltage input: 600V AC (between terminals)
- Current input: 600V AC (across ground)

### EMC-compliant Standards
- **KC marking**: Electromagnetic wave interference prevention standard, electromagnetic wave protection standard compliance
### Environmental Conditions

**Normal Operating Conditions**

- **Warm-up time**: At least 30 minutes
- **Ambient temperature**: 0 to 50°C (reference temperature: 23 ± 2°C)
- **Temperature change**: 10°C/h or less
- **Ambient humidity**: 20 to 90% RH (no condensation)
- **Magnetic field**: 400 A/m or less
- **Continuous vibration**: 10 to 60 Hz, 0.035 mm, 75 minutes
- **Short-time vibration**: 14.7 m/s² for 15 seconds or less
- **Shock**: 98 m/s² or less (for shock time of 11 ms)
- **Installation**: Indoor installation only
- **Mounting position**: Vertical surface mounting only
- **Installation altitude**: 2000 m or less

**Effects on Operating Conditions**

- **Effects of ambient temperature**: Analog output: ±0.05% of F.S./°C or less
- **Effects on supply voltage variations**: Analog output: ±0.05% of F.S./°C or less

**Transport and Storage Conditions**

- **Temperature**: −20 to 70°C
- **Humidity**: 5 to 95% RH (no condensation)
- **Shock and dropping of package**: 90 cm (provided that an external packing box is used)

### Initial Settings (Time of Shipment)

The PR300 has the following initial settings at the time of shipment. Settings can be modified after delivery.

<table>
<thead>
<tr>
<th>Setting Item</th>
<th>Initial Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input</strong></td>
<td></td>
</tr>
<tr>
<td>Phase and wire system</td>
<td>Three-phase three-wire system (for three-phase three-wire system)</td>
</tr>
<tr>
<td>Voltage range</td>
<td>300 V</td>
</tr>
<tr>
<td>VT ratio</td>
<td>1</td>
</tr>
<tr>
<td>CT ratio</td>
<td>1.00</td>
</tr>
<tr>
<td>Integrated low-cut power</td>
<td>0.05 %</td>
</tr>
<tr>
<td>Station number</td>
<td>01</td>
</tr>
<tr>
<td>Protocol</td>
<td>PC link with checksum</td>
</tr>
<tr>
<td>Baud rate</td>
<td>9600 bps</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop bit</td>
<td>1 bit</td>
</tr>
<tr>
<td>Data length</td>
<td>8 bits</td>
</tr>
<tr>
<td>IP address</td>
<td>192.168.1.1</td>
</tr>
<tr>
<td>Port number</td>
<td>502</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Default gateway</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Measurement item for pulse output</td>
<td>Active energy (kWh)</td>
</tr>
<tr>
<td>Pulse unit</td>
<td>1 kWh/pulse</td>
</tr>
<tr>
<td>ON pulse width</td>
<td>50 ms</td>
</tr>
<tr>
<td>Measurement item for analog output</td>
<td>Active power (W)</td>
</tr>
<tr>
<td>Lower limit of scaling</td>
<td>50% (0 W)</td>
</tr>
<tr>
<td>Upper limit of scaling</td>
<td>100% (maximum value of the input measuring range W)</td>
</tr>
<tr>
<td>Demand power/current</td>
<td>Active power</td>
</tr>
<tr>
<td>Demand period</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Demand alarm mask time</td>
<td>1 minute</td>
</tr>
<tr>
<td>Demand power alarm point</td>
<td>100 kW</td>
</tr>
<tr>
<td>Demand current alarm point</td>
<td>100 A</td>
</tr>
<tr>
<td>Alarm release function</td>
<td>Automatic release</td>
</tr>
<tr>
<td>Indicator-out mode/indicator-out mode wait time</td>
<td>Off/10 minutes</td>
</tr>
</tbody>
</table>

### Power Items and Equations

#### Phase and Wire System

- **Single-phase two-wire system**: \( V_{A}= V \times A \) \( Q_{A}= \frac{(V_{A})^{2}}{P_{A}} \) \( \frac{\Sigma P}{\Sigma V} \) (without using reactive power meter method)
- **Single-phase three-wire system**: \( V_{A}= V_{1}+V_{2}+V_{3} \) \( Q_{A}= \frac{(V_{A})^{2}}{P_{A}} \) \( \frac{\Sigma P}{\Sigma V} \) (without using reactive power meter method)
- **Three-phase three-wire system**: \( V_{A}= V_{1}+V_{2}+V_{3} \) \( Q_{A}= \frac{(V_{A})^{2}}{P_{A}} \) \( \frac{\Sigma P}{\Sigma V} \) (without using reactive power meter method)
- **Three-phase four-wire system**: \( V_{A}= V_{1}+V_{2}+V_{3} \) \( Q_{A}= \frac{(V_{A})^{2}}{P_{A}} \) \( \frac{\Sigma P}{\Sigma V} \) (without using reactive power meter method)

#### Mounting and Shape

**Materials**

- Casing: polycarbonate resin (PC), UL94 V-0
- Terminal block: polybutylene terephthalate (PBT), UL94 V-0
- Terminal cover: polyamide resin (PA6), UL94 V-0

**Connection Method**

- M3 screws for terminal connections: digital input, and RS-485 communication
- M4 screws for terminal connections: analog output, pulse output, demand alarm output, DIN-mouting bracket, JIS/ANSI-mounting kit

**Dimensions**

- Panel mounting (refer to Panel Cutout Dimensions)
- External dimensions: 110(H) × 110(W) × 128(D) mm or 96(H) × 96(W) × 126(D) mm
- Weight: Approx. 600 g (when the accessories such as mounting bracket are attached)

**Accessories**

- JIS/ANSI-mounting kit: 1 set
- DIN-mouting bracket: 2
- Dust cover (with a screw): 1
- Terminal cover (with screws): 1
- Shorting bar (for RS-485 communication termination): 1
- Tag number label: 2
Connection Diagrams

A phase and wire system can be selected by specifying the parameters.
If measurement input does not exceed 600 V AC or 5A AC, direct input without using a VT or CT is possible. Do not ground the input circuit when a VT or CT is not used. Perform wiring for the voltage and current in the same circuit.

● Single-phase two-wire system

Power-source side

Load side

CAUTION

Screws marked with ● are an essential part of the structure. For safety reasons, do not touch them.

*1: If Ethernet communication is used, the RS-485 communication interface is used specifically for the Ethernet-serial gateway function.
*2: If demand measurement is specified, the demand alarm release is selected.

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GS 77C01E01-01E 6th Edition July 12, 2013-00
**Single-phase three-wire system**

Power-source side

Load side

**Three-phase three-wire system**

Power-source side

Load side

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*1: If Ethernet communication is used, the RS-485 communication interface is used specifically for the Ethernet-serial gateway function.

*2: If demand measurement is specified, the demand alarm release is selected.
Three-phase four-wire system

Power-source side

Load side

CAUTION
Screws marked with ● are an essential part of the structure. For safety reasons, do not touch them.

*1: If Ethernet communication is used, the RS-485 communication interface is used specifically for the Ethernet-serial gateway function.

*2: If demand measurement is specified, the demand alarm release is selected.

Switching between half duplex and full duplex takes place automatically.
Switching between 10BASE-T and 100BASE-TX takes place automatically.

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### External Dimensions

- **ANSI 4-inch round form size (when a bezel is attached)**

![Diagram of external dimensions](image)

**<Panel Cutout Dimensions>**

**ANSI**

- Normal Allowable Deviation = ±(Value of JIS B 0401-1999 tolerance grade IT18)/2
● DIN 96-square instrument size

- Terminal cover
- Dust cover
- Mounting bracket 2 places

<Panel Cutout Dimensions>

Normal Allowable Deviation = ±(Value of JIS B 0401-1999 tolerance grade IT18)/2