Introducing the ORP/ORM Series Oscillographic Recorders for use in the measurement, recording and analysis of signals from DC to high-speed transient phenomena, with the functions of a pen recorder, electromagnetic oscillograph, memory and X-Y recorders all in one instrument.

The ORP/ORM Series is truly self-contained, the “all-round recorder with the standards of the future” capable of handling a wide variety of applications, from troubleshooting in the field to product evaluation and analysis in laboratories.

We are confident the ORP/ORM Series will always be the right choice for your varying application needs.

The ORP series measures and records multiple events on a max of 32 channels—4, 8, 16 analog-input and 16 logic-input channels—simultaneously. It processes input signals through a high-speed A/D converter with a sampling rate of 100 Ks/s, offering guaranteed high accuracy and wideband features.

Three amplifier levels are available at the input stage depending on the application: high-voltage, universal, and logic (optional) levels. That is, the ORP series can make high-resolution measurements of a direct input signal from a thermocouple, monitor a transmission line, and handle on/off signals from a sequencer.

The ORM Series is our newest advance in fast universal recorder design. Available with 4, 8 or 16 isolated analog channels plus up to 16 additional logic channels. With individual 128k sample memory areas for every channel, linkable up to four per channel for 512k sample capacity on selected channels, augmented by standard-equipment IC card slot and 3.5-inch floppy drive.

Further enhanced by arithmetic and statistical computing functions, and integral graphic display. More than just recorders, these are multifaceted, all-in-one data acquisition and analysis instruments perfect for testing and analysis, as at home in the field as in the lab.
**OSCILLOGRAPHIC RECORDERS**

**ORP1200 / ORP1300 & ORM1200 / ORM1300**

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**FEATURES**

- **Broad Range of Input Choices**
  Universal input models with 14-bit resolution and direct thermocouple input capability, Voltage-input models for direct connection to AC lines up to 240 V rms. All can be supplemented with 8- or 16-channel logic input options. All perform A/D conversions at 100 kS/s for wide bandwidth.

- **For heavy electrical equipment and power line monitoring...**
  - High-voltage input model (4, 8, 16 channels)
    - Direct power line connection up to 240 V rms
    - Wide input ranges (up to ±330 V peak)
    - Designed for safety — each channel fully isolated from all others

- **For automotive and railway equipment testing, mechanical characteristics measurement, and transformer monitoring...**
  - Universal input model (4, 8, 16 channels)
    - 14-bit A/D resolution
    - Direct input from thermocouple types K, E, J, T, R, S, B, L, U, N, and W
    - ±50 mV to ±50 V linear voltage ranges

- **For sequencer ON/OFF signal...**
  - Logic input option (8, 16 channels)
    - 16-channel logic inputs
    - Logic input independent of analog input
    - Trigger setup dependent on logic patterns

- **Individual 128 k sample memory area for every channel (ORM)**

- **Large Memory Capacity**
  With 128 k sample/channel memory capacity and the ability to link up to four channel memory areas for 512 k sample capacity on selected inputs, these recorders really show their worth in long-duration capture of high-speed measurements. And to make this large capacity easy to use, we’ve included built-in graphic displays with zoom and scroll functions to help you find the areas of interest, and digital cursor functions for on-screen readout of voltages and time differences. Additional features, for sampling to memory during real-time recording, and playback recording of sampled data, let you use chart paper and memory together to get maximum benefit from both.

- **3.5-inch floppy drive and IC card slot standard (ORM)**
  Taking PC-friendliness one step farther, standard equipment includes both an IC memory card slot and a 3.5-inch floppy drive.

- **Fast, high-definition recording**
  Special recording techniques result in trace definition four times higher than conventional at the fast, 100 mm/s maximum chart speed.

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**FUNCTIONS**

The ORP/ORM, provided with enhanced memory-recorder functions, enables you to read digital values just by pointing to them with the cursor, expand/contract or scroll the waveform, and measure the time (T) and data difference with the reference cursor. The recorder is fully equipped with the functions needed to take the best advantage of its display features that make measurements more efficient. The ORP/ORM allows accurate and prompt measurements that consume less chart paper, reducing both work hours and running costs at the same time.

- **MEMORY FUNCTIONS**
  - **Waveform expansion and scrolling**
    You can expand or scroll the waveform with the rotary knob to directly read the time and digital value of the position pointed to by the cursor.

- **Reference cursor**
  You can read the time difference (ΔT) as well as the data difference between the positions pointed to by the reference cursor.

- **Specification of portion for playback recording**
  You can play back a portion of the display on the recording chart by specifying the portion and then setting the playback recording mode.
**OSCILLOGRAPHIC RECORDERS**

**ORP1200 / ORP1300 & ORM1200 / ORM1300**

- **Full- or half-size report printout**
  You can designate a specific portion of the display to be automatically edited for a full- or half-paper size report printout.
  This unique user-friendly function helps create reports and manage your data.

- **Memory Playback Format Editing**
  With the ORM series, you can perform a variety of reformatting operations on data when playing back from memory to chart, using the rotary knob to adjust recording scale and zero position as you view the playback waveform. This lets you obtain a clean, readable final recording even if multiple traces overlapped each other when the data was first captured, or if one or more traces went off the chart — without repeating the measurement.
  In addition, you can even have format-edited waveforms auto-edited for printout in full- or half-page size, so that you can copy them directly into your reports.

You can combine realtime recording with the memory function to run the ORP/ORM.

For example, for normal operation in the unattended continuous monitoring of a power supply, the ORP/ORM records only peak values with an envelope at a slow chart-feed rate. It stores the data immediately before and after a trigger only if the trigger is caused by a sudden event such as noise.

You can utilize the stored data according to your application needs; you can expand the time axis for playback recording of the stored data or analyze the data on the display after you have completed your continuous monitoring.

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Data in block No. 1 (first run)  Data in block No. 2 (second run)

Recording different time series data on same time axis for comparison

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**OSCILLOGRAPHIC RECORDERS**

**ORP1200 / ORP1300 & ORM1200 / ORM1300**

**COMPUTING FUNCTIONS (ORM)**

The ORM lets you process measured data with arithmetic operations and statistical functions. You can exploit this capability in a wide variety of ways, such as to measure temperature differences, or to multiply voltage and current to record and display VA values. The statistical functions let you compute, display and print out the maximum, minimum, mean, and rms values of time-series data for convenient report preparation.

**AUTO-SEQUENCE FUNCTION (ORM)**

The auto-sequence function will automatically play back measured data to the chart, present it on the display, or save it to external media (floppy disk or IC card) upon completion of each memory sampling operation. Moreover, it can be combined with the computing functions to display, print out or save computation results at the end of each measurement cycle.

**ACCUMULATE MODE DISPLAY FUNCTION**

With the auto display function, you can accumulate (cumulatively overwrite) data captured at different times as if on a storage oscilloscope. This is particularly effective for comparing measurements taken at different times, such as in making fail/pass judgements based on data distributions.

**Recording with off-scale and overlapping traces**

Scale too narrow for input signal during data capture and multiple traces are overlapped.

**Format edit**

Change scale and zero position with rotary knob to reformat measured data.

**Change to report format for playback**

Play back format is edited for easily readable presentation.

**Statistical computation result display (any channel can be selected)**

A hard copy of the displayed results can be printed.

**Arithmetic computation examples**

- VA (computed result = CH3 X CH6)
- V (CH8)
- A (CH6)
OSCILLOGRAPHIC RECORDERS
ORP1200 / ORP1300 & ORM1200 / ORM1300

**ENHANCED TRIGGERING FUNCTIONS**
The OR series recorders feature a versatile suite of triggering functions to help you reliably catch the abnormal transients you most want to see. You can select trigger sources from among several types: 4-source analog window trigger, 2-source logic pattern trigger, or level triggering set individually for each channel. In addition, you can freely set up AND and OR combinations of individual sources and select pre- or post-triggering, and can set up for rising-edge, falling-edge, or high or low level triggering. External trigger input and output terminals are provided as standard, enabling synchronized measurement with multiple recorders.

- **Repeated triggering and sequential memory (memory partition)**
The OR stores data successively in the partitioned memory blocks whenever it detects a trigger. (You can have up to 16 partitioned memory blocks. You can select one of two modes; either the mode to terminate sampling to be stored in memory when the last block is full or the mode to continue sampling while overwriting blocks starting with the first one.)

- **DISPLAY FUNCTIONS**

- **Fast Real-Time Graphic Display**
The built-in graphic display lets you view the analog and logic signal waveforms in the same formats used for chart recording. A rich variety of displays is available, including X-Y (for memory data) graphs, digital value listings, and scale range setup listings.

**Example of actions:**

- **Triggered printout or change in chart speed**
The OR resumes recording or switches the chart speed each time it detects a trigger.

**Enhanced trigger actions**
Enhanced trigger functions allow you to combine each trigger mode with the operation mode of the recorder to make measurements that meet your application needs.
Analog-like Range and Zero Adjustment
Input range and zero setup are done by turning the rotary knob while viewing the signal on the graphic display, giving the same “feel” as an analog oscillograph. You can also use the rotary knob for quick readjustment while recording is in progress.

Recording and Printing Functions
Using a dot-overlapping technique, the OR records a total of 12 events with quality: data on both the 16 analog channels and the 16 logic channels. It demonstrates its full capabilities especially in simultaneous measurement or recording of multiple events. You’ll enjoy a variety of recording and printing functions, for example, message printing, scale printing and digital recording, as well as continuous analog recording. This enables a quicker, easier, and more accurate readout of data.

Segregated mode (16 analog + 16 logic channels)

Logic waveform recording zones (8 channels/zone) can be placed anywhere on chart.

1. Time and date
2. Chart speed
3. Time/div or Time/cm
4. Message
5. Channel number
**OSCILLOGRAPHIC RECORDERS**

**ORP1200 / ORP1300 & ORM1200 / ORM1300**

- **Full-overlap mode (16 analog + 16 logic channels)**

- **X-Y recording**
   Use any channel for X-axis, with up to four channels on Y-axis

- **Digital data logging**
   Print all channels on one line at rates as fast as a line per second.

- **High-quality, high-speed recording**
   High-speed real-time recording at a rate of up to 100 mm/s. Recording quality is better than 2 to 4 times that of conventional Portable type recorders.

- **Change in chart speed**
   The ORP1200 automatically changes the chart speed when it detects a trigger.

- **Arbitrary recording-zone setup function**
   You can set any portion of the display for recording on each channel at your discretion. In addition, this function can automatically separate the recording area into 2, 4 or 8 zones to store the data.

- **Playback/recording of data in memory**
   You can also get a printout in either a full- or half-size report format.

- **Automatic amplifier error correction**
   This function is useful when an input signal from an external amplifier carries offsets and thus causes the zero point to shift from the base line on the grid.
   The ORP/ORM measures converter error and corrects it automatically.
   This eliminates the need for adjusting the zero point of the amplifier or the need for calibrating the amplifier, allowing you to make accurate measurements that are directly aligned with the recording scale (base line on the grid).

- **Offsets** of zero and full positions

- **Trigger position**

- **Triggered channel**

- **Effective chart speed**

- **Elimination of “offsets” using automatic correction**

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**Figure:**
- Full-overlap mode (16 analog + 16 logic channels)
- X-Y recording
- Digital data logging
- High-quality, high-speed recording
- Change in chart speed
- Arbitrary recording-zone setup function
- Playback/recording of data in memory
- Automatic amplifier error correction
- Offsets of zero and full positions
- Trigger position
- Triggered channel
- Effective chart speed

**Diagram:**
- Chart showing full-overlap mode
- Chart showing X-Y recording
- Chart showing digital data logging
- Chart showing high-quality, high-speed recording
- Chart showing change in chart speed
- Chart showing arbitrary recording-zone setup function
- Chart showing playback/recording of data in memory
- Chart showing automatic amplifier error correction
- Chart showing elimination of “offsets” using automatic correction
**SPECIFICATIONS**

**Measurement Inputs**

**■ Voltage Inputs (7810, 7820)**

- **Number of channels:** 4, 8, 16 channels
- **Input type:** Floating, unbalanced, isolated channels
- **Measurement range & accuracy:** As shown below (filter OFF, DC coupling, at 23 ±5°C)

<table>
<thead>
<tr>
<th>DC Input</th>
<th>Measurement Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>100mV</td>
<td>±10.00mV</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>200mV</td>
<td>±20.00mV</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>500mV</td>
<td>±50.00mV</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>1V</td>
<td>±1.000V</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>2V</td>
<td>±2.000V</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>5V</td>
<td>±5.000V</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>10V</td>
<td>±10.00V</td>
<td>±0.5% of range</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
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<td>100V</td>
<td>±100.00V</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>200V</td>
<td>±200.00V</td>
<td>±0.5% of range</td>
</tr>
</tbody>
</table>

- **Input coupling:** DC or AC
- **Frequency bandwidth (filters OFF):**
  - DC coupling input: DC to 40 kHz (+1 dB, -3 dB, typical)
  - AC coupling input: 1 Hz to 40 kHz (+1 dB, -3 dB, typical)
- **A/D resolution:** 12 bits effective
- **Maximum sampling rate:** 100 kS/s
- **AC coupling input:** (filters OFF) 1 Hz to 40 kHz (+1 dB, -3 dB, typical)

**■ Universal Inputs (7810, 7820)**

- **Number of channels:** 4, 8, 16 channels
- **Input type:** Floating, unbalanced, isolated channels
- **Measurement range & accuracy:** As shown below (filter OFF, DC coupling, at 23 ±5°C)

<table>
<thead>
<tr>
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<th>Measurement Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>50mV</td>
<td>±2.50mV</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>100mV</td>
<td>±5.00mV</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>200mV</td>
<td>±10.00mV</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>500mV</td>
<td>±25.00mV</td>
<td>±0.5% of range</td>
</tr>
<tr>
<td>1V</td>
<td>±1.000V</td>
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  - AC coupling input: 1 Hz to 40 kHz (+1 dB, -3 dB, typical)
- **A/D resolution:** 12 bits effective
- **Sample rate:** 100 kS/s

**Recording**

- **Printer type:** Thermal printer (dot overlap)
- **Recording function:**
  - Real-time recording: T-Y, X-Y, numeric value recording, A4/A5 format printing
  - Captured data recording: Measurement range, recording span, and filter conditions
  - Recording span: Will be printed every 160 mm
  - Channel information: Measurement range, recording span, and filter conditions
- **Grid:**
  - 10 mm Simple, 10 Div Simple, 10 Div Fine (time-base 10 mm Fine)
  - 10 Div Simple (time-base 10 mm Simple), and dark or light selection
- **Scale values:**
  - 60 characters/channel, will be printed every 160 mm
  - Channel numbering: Measurement range, recording span, and filter conditions
  - Channel information: Measurement range, recording span, and filter conditions
- **Channel annotation:** 60 characters/channel, will be printed every 160 mm
- **Grid:**
  - Flexible: Zone width can be set for each channel
- **Effective chart speed:**
  - Calculated the speed equivalent real-time recording by the sampling speed and the playback rate of captured data when printing out captured data and printed
- **Setup list:**
  - A list of setting parameters (setup) will be printed
  - Frequency bandwidth (filters OFF): DC to 40 kHz (+1 dB, -3 dB, typical)
  - AC coupling input: 1 Hz to 40 kHz (+1 dB, -3 dB, typical)
  - A/D resolution: 12 bits effective
  - Maximum sampling rate: 100 kS/s
  - AC coupling input: (filters OFF) 1 Hz to 40 kHz (+1 dB, -3 dB, typical)
  - A/D resolution: 12 bits effective
  - Maximum sampling rate: 100 kS/s

**TC Input**

<table>
<thead>
<tr>
<th>Measurement Range</th>
<th>Actual Measurement Range</th>
<th>Accuracy</th>
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  - AC coupling input: 1 Hz to 40 kHz (+1 dB, -3 dB, typical)
- **A/D resolution:** 12 bits effective
- **Maximum sampling rate:** 100 kS/s
- **AC coupling input:** (filters OFF) 1 Hz to 40 kHz (+1 dB, -3 dB, typical)

**Reference junction compensation accuracy:**

- ±1°C (input terminal temperatures are balanced)
- ±1°C (R, S, B, W)

**Input coupling:**

- DC or AC
- AC coupling input: DC to 40 kHz (+1 dB, -3 dB, typical)

**Noise:**

- 200 µV/Hz (typical) for 50 mV input, short circuit input
- 30 V rms AC or 60 V DC (in accordance with safety standards)

- 250 V rms AC (common mode rejection ratio is satisfied, between input terminals and case and between channels)

**Normal mode rejection ratio:**

- More than 120 dB (50/60 Hz, with 1.5 Hz filter ON)
- Normal mode rejection ratio: 50 dB (50/60 Hz, with 1.5 Hz filter OFF)
- Signal source resistance less than 500 Ω
- Noise: 200 µV/Hz (typical) for 50 mV input, short circuit input
- Maximum floating voltage: 30 V rms AC or 60 V DC (in accordance with safety standards)
- Reference junction compensation accuracy:
  - ±1°C (input terminal temperatures are balanced)
  - ±1°C (R, S, B, W)

**Auto-scaling function**

The ORP/ORM automatically selects the optimum recording scale according to the amplitude of the input waveform.
Oscillographs

Display

Display method: Scrolling from the top to the bottom of the screen
Screen: LCD (5 inches), 320 x 240 dots
Contents of the screen: Measurement data screen (waveform, numeric values), setting screen, span display
(enumerative display of 16 ch maximum)

Display format for measurement data:

T-Y display:
Displays analog input waveforms (maximum of 8 channels)

X-Y display:
Display of a single waveform to a maximum of four waveforms. X-Y waveforms will only be displayed in the case of displaying captured data; in the case of real-time recording, the screen will show the T-Y display.

Numeric value display:
Measured values are displayed as numerals (maximum 16 channels + logic pattern)
Captured data playback screen changes display every 2 channels.

Time-base:
Linking to chart speed

Numeric value monitoring display: Updated every 0.5 sec

External I/O Signals

External trigger I/F:
TTL level (pulse width more than 2 µs)
External clock:
TTL level (up to 1 kHz), pulse width more than 2 µs; in case of real-time recording, max. 50 kHz
Start/Stop:
TTL level (pulse width more than 2 µs)
Real-time recording, data capture start/stop, event message print

General Specifications

Operation conditions:
0 to 40°C, 30 to 80% RH (no condensation)

In FDO action (78200):
5 to 40°C, 30 to 80% RH (no condensation)

Warm-up time:
At least 30 minutes (TC range)

Deterioration rate:
200 V type: 180 to 250 V, 48 to 63 Hz

Power consumption:
Values in parentheses are for ORM-1300.

Insulation source resistance:
Between power supply and case: 1500 V AC for 1 minute
Between input terminals and case: 1500 V AC for 1 minute
Between input terminals:
1500 V AC for 1 minute

Magnetic field strength:
Max. 400 µT
20% of range (at smallest voltage range)

Momentary power loss rating:
Less than 1 cycle (at 100 V AC, 50 Hz)

Position:
Horizontal

Clock accuracy:
±10 ppm (typical)

Battery backup:
For up to 5 setups and clock: Lithium battery with a service life, at room temperature, of 10 years

Rated power supply voltage:
100 to 120 V AC, 50 or 60 Hz or 220 to 240 V AC, 50 or 60 Hz (suffix code specified when ordering)

Permissible power supply voltage:
100 V type: 90 to 132 V, 48 to 63 Hz
200 V type: 180 to 250 V, 48 to 63 Hz

Power consumption:
Values in parentheses are for ORM-1300.

Dimensions:
200 V type: 435 (H) x 435 (D) mm

Standard accessories:
Chart paper (1 roll of 210 mm x 50 m size), Power cord, Installa-
tion manual, Connector for remote operation, Fuse, Measurement input cable (when 7810-172801 specified, required for number of input channels)

3.5-inch FDD (78200)

Number of drives: 1
Usable media: 2HD, 2DD
Capacity: 1.2, 144 MB, 720 kB
Memory data: Any part of the waveform memory data is specified and stored.

Dump function:
Stores and prints out all data regardless of memory capacity

Data readout function:
Data from the 3.5-inch FDD to waveform memory for display on the screen.

Triggering

Effective trigger type: Window trigger, all channels trigger, external trigger
Effective trigger action: Real-time recording, data capture, chart speed change
Trigger mode:
Single, repeat, free
Trigger delay:
-100 to 1000%
Trigger combination:
AND, OR, OR
Trigger level:
Rise, fall, high, low (100% to 100%)
ORP1200 / ORP1300 & ORM1200 / ORM1300

- Logic input
- Number of channels: 16
- Probe: Dedicated 702911 logic probe (8-ch/probe)
- Input type: Dedicated 702911 logic probe (8-ch/probe)
- Input impedance: More than 10 kΩ
- Input signal: TTL level or contact input (switchover)
- Threshold level: TTL level
- Maximum input voltage range: ±5 V DC
- Trigger: 2 sources (8-ch pattern trigger)
- Input type: Floating channels between probe and case with common level
- Input impedance: More than 10 kΩ
- Trigger: 2 sources (8-ch pattern trigger)
- Dwell: 100 V AC to 120 V AC
- Insulation resistance: 10 MΩ minimum at 500 V DC between probe and case

**ORP1200**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7810</td>
<td>11</td>
<td>4-channel voltage input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>4-channel universal input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>4-channel universal input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>8-channel voltage input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>8-channel universal input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>8-channel voltage input (w/O CE)</td>
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</tbody>
</table>

- Power requirements:...
- Power cord:...
- Optional feature:...

**ORP1300**

<table>
<thead>
<tr>
<th>Model</th>
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<tbody>
<tr>
<td>7810</td>
<td>31</td>
<td>16-channel voltage input (w/O CE)</td>
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<td></td>
<td>32</td>
<td>16-channel universal input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>16-channel universal input (w/O CE)</td>
</tr>
<tr>
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<td>34</td>
<td>16-channel voltage input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>16-channel universal input (w/O CE)</td>
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- Power requirements:...
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**AVAILABLE MODELS**

**ORP1200**

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<th>Suffix Code</th>
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<tr>
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<td>4-channel voltage input (w/O CE)</td>
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<td>12</td>
<td>4-channel universal input (w/O CE)</td>
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<td>13</td>
<td>4-channel universal input (w/O CE)</td>
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<tr>
<td></td>
<td>21</td>
<td>8-channel voltage input (w/O CE)</td>
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<tr>
<td></td>
<td>22</td>
<td>8-channel universal input (w/O CE)</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>8-channel voltage input (w/O CE)</td>
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- Power requirements:...
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**OPTIONAL ACCESSORIES**

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Description</th>
<th>Order Q'ty</th>
</tr>
</thead>
</table>
| Logic probe | 702911 | 8-channel input (w/O CE input) |...
| Power unit | 365961 | 8-channel input (w/O CE input) |...

- Only one either one can be specified.
- Logic probe is not included. Order 702911 separately (8-ch/probe).
- Only for model 782032.
## DIMENSIONS

### < ORP1200 >

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>781011 and Model 781012</td>
<td>320 (12.6) x 435 (17.13) x 158 (6.22) mm</td>
<td>Approx. 7.7 kg</td>
</tr>
<tr>
<td>781021 and Model 781022</td>
<td>320 (12.6) x 435 (17.13) x 192 (7.56) mm</td>
<td>Approx. 8.4 kg</td>
</tr>
<tr>
<td>781023</td>
<td>320 (12.6) x 435 (17.13) x 15.5 (0.61) mm</td>
<td>Approx. 0.3 kg</td>
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If not specified, the tolerance is ±3%. However, in cases of less than 10mm, the tolerance is ±0.3mm.

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<tbody>
<tr>
<td>781031 and Model 781033</td>
<td>320 (12.6) x 435 (17.13) x 185 (7.28) mm</td>
<td>Approx. 11.5 kg</td>
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<td>Approx. 12 kg</td>
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