Model 1205D
GNSS Synchronized Clock

The Arbiter Systems®, Inc. Model 1205D GNSS Synchronized Clock is a multi-satellite system (GPS/GLONASS/Galileo/BeiDou) timing source for precision timing applications. Arbiter's next-generation substation clock provides enhanced performance and security (EPS) along with the wide range of functions you have come to expect from the leader in timing for the power industry. EPS benefits include multi-system timing sources, standard holdover oscillator, multiple levels of security, secure communications, and anti-spoofing technology.

The Model 1205 is available in three versions: the Model 1205B, the Model 1205C and the Model 1205D. The Model 1205B has eight status LEDs, an LCD status back-lit display, and a keyboard. The Model 1205C adds a large (20 mm or 0.8 in) LED time display. The Model 1205D is a DIN rail version with the status LEDs but without the front panel LCD display. All versions have 72 receiver channels, capable of tracking GNSS satellite systems simultaneously, providing optimum performance. Real time continuous estimation of actual holdover errors, oscillator trajectory prediction and high reliability architecture provide exceptional accuracy and stability allowing the Model 1205B/C/D (100 ns worst-case accuracy) to meet the requirements of a broad range of applications from relay synchronization to phasor timing. This accuracy applies to the PTP network timing, the high drive programmable pulse (including IRIG-B) outputs and optional outputs (Models 1205B/C only). The standard holdover oscillator maintains accuracy of 1 ms/24 hours when not tracking satellites. In addition to enhanced performance, Arbiter Systems' new EPS technology includes GNSS anti-spoofing and secure password-protected and encrypted configuration interface providing robust, reliable synchronization to help comply with latest NERC-CIP requirements.

The Model 1205D timing signals are available via the three Ethernet ports and from the thirty-two pin terminal block. The three 10/100 Ethernet ports (copper standard, fiber optional) provide status, configuration as well as network timing supporting the NTP, SNTP, PTP (Power Profile supported), SNMP, ICMP, TCP, SSH, SSL, HTTP, HTTPS and DHCP protocols. The thirty-two pin terminal block provides access to the Model 1205B/C/C standard inputs, outputs and legacy communication ports. Two inputs, an event timer and a frequency monitor, are included along with six Programmable Pulse outputs, a modulated IRIG-B output, a FET output, relay contacts, two RS-232 ports and a RS-422/485 port (transmit only). The event timer, 100 ns resolution, accepts an external 5 V CMOS/TTL signal while the frequency monitor accepts a single phase AC voltage input (50/60 Hz, 300 Vac). The Programmable Pulse high drive outputs (5 Vdc, 125 mA) are user configurable to unmodulated IRIG-B (UTC, Local, C37.118.1) or pulse output (one pulse a second to one pulse a day). The modulated IRIG-B outputs a 4 Vpp (20 ohms source impedance) signal and supports C37.118.1. An SPDT (form C) fail-safe relay is also included and is configurable to Out-of-Lock, Fault, Alarm, Stabilized, or Programmable Pulse. Three legacy serial communications ports (two RS-232 ports and a RS-422/485 port (transmit only) are included for monitoring and status information.

The Model 1205D standard power power options include an 85 Vac to 264 Vac/100 Vdc to 350 Vdc , 22 Vdc to 67 Vdc supplies with secure terminal strip inlets and surge-withstand capability or a direct 13.5 Vdc to 26.4 Vdc supply with secure terminal strip inlet. The surge-withstand network is designed to meet ANSI/IEEE C37.90-1 and IEC 61000-4 specifications. Also included is a built-in lightning arrestor and rear panel ground plate to protect against secondary lightning strikes and other antenna coupled surges.
Model 1205D Specifications

Timing and Receiver Characteristics

Timing Accuracy
Specifications apply at the 1 PPS/IRIG-B/PP/PTP outputs when receiving one satellite in position hold mode, as of date of publication.
UTC/USNO ± 100 ns peak
typical ± 40 ns peak

Holdover Oscillator
Standard OCXO, 1 ms/24 h
Patents High-Reliability Holdover Method and Topologies: No. US 9,326,926 & US 9,979,406 B2

Position Accuracy
2 meters, rms

Satellite Tracking
Seventy-two (72) channel receiver: L1 GPS C/A, L1 GLONASS CT, Galileo, BeiDou.

Acquisition
55 seconds typical, cold start
25 seconds, typical, warm start
3 seconds, typical, hot start

I/O Configuration

Connectors
One 32 pin pluggable terminal strip connector:
Programmable Pulse (six outputs)
IRIG-B-modulated
MOSFET
Analog Input
Event Input
Relay Contacts
RS-232 (2 ports)
RS-485 (transmit only)

Programmable Pulse
Six programmable pulse outputs, high-drive 5 Vdc (125 mA at > 4 V). Available signals:
- IRIG-B unmodulated (UTC/Local, C37.118.1 On/Off)
- Every 1 to 60,000 seconds, starts top of the second
- Hourly at a specified offset
- Daily at a specified time of day
- One shot at a specified time of year
- DCF-77
Pulse polarity and pulse duration are programmable, duration from 0.01 to 600 seconds, except in one-shot mode, where the output is Low prior to the specified time and High thereafter. IRIG-B settings independent from main IRIG-B signal.

IRIG-B Modulated
One IRIG-B modulated output, 4 Vpp, 20 ohms source impedance. Configurable to Local or UTC time with C37.118.1 on or off, settings independent from Programmable Pulse IRIG-B output.

MOSFET
300 volt, 1 watt power dissipation open-drain FET driver with 24 Vdc output.

Analog Input
One single phase AC line voltage (50/60 Hz, 300 Vac) input provides accurate measurements of system frequency, frequency error and time deviation.

Event Input
One event timer channel with 100 ns resolution is standard. This function may be driven by the start bit of a received character on the serial port, or an external 5 V CMOS/TTL signal.

Relay
Form C (SPDT) fail-safe, 8 A at 250 Vac; configurable to Out-of-Lock, Fault, Alarm, Stabilized, or Programmable Pulse
## Interface

### Front Panel
- **Status LEDs**
  - Normal (green)
  - Learn (orange)
  - Unlocked (red)
  - Alarm (red)
  - Operate (green)
  - Fault (red)
- **USB**
  - Micro-USB

### System
- **Network**
  - 3 Ethernet ports; 10/100 BT (standard) or Fiber (optional)
- **Protocols**
  - NTP, SNTP, PTP (Power Profile)
  - SNMP, ICMP, TCP, SSH, SCP, SSL
  - HTTP, HTTPS, DHCP
- **Setup**
  - Web based configuration
- **Serial**
  - 2 RS-232 ports (TXD, RXD, GND)
  - 1 RS-422/485 (TXD+, TXD-)
  - 1200 to 230400 baud; 7 or 8 data bits; 1 or 2 stop bits; even/odd/no parity
  - Has Interrogate (RS-232 only) and six broadcast modes: standard ASCII (IRIG-J), Vorne large-display, status/alarm, extended ASCII, event data, ASCII with time-quality and user configurable serial time code

## Power Requirements

Accommodates one power supply, choices include an universal supply or a low dc supply, both with surge withstand capability.

### Universal
- **Voltage**
  - 100 Vac to 264 Vac, 47 to 440 Hz, 20 VA max.
  - or 100 Vdc to 350 Vdc, 30 W maximum
- **Inlet**
  - Secure Pluggable Terminal Strip

### Low DC
- **Voltage**
  - 22 to 67 Vdc, 30 W maximum
- **Inlet**
  - Secure Pluggable Terminal Strip

### Direct Input
- **Voltage**
  - 13.5 Vdc to 26.4 Vdc, 30 W maximum
- **Inlet**
  - Secure Pluggable Terminal Strip

## General

### Physical
- **Size**
  - 172 mm x 225 mm x 90 mm (6.75 in x 8.75 in x 3.55 in)
- **Weight**
  - 2 kg (4.5 lbs), net
  - 5.5 kg (12 lbs), shipping
- **Ground Block**
  - Antenna protective ground Copper, with M5 (10-32) stud and nut
  - Internal lightning surge suppressor (GDT)
- **Antenna**
  - 3/4” NPT (1 in - 14 marine) thread
  - Cable Connection: F-type
  - Temperature: - 55 °C to + 65 °C
  - Size: 80 mm dia. x 84 mm (3.2 in x 3.3 in)
  - Weight: 170 grams (6.0 oz)
- **Antenna Cable**
  - RG-6 type, 15 m (50 ft) provided
  - Weight: 0.69 kg (1.52 lbs) per 15 m

### Environmental
- **Temperature**
  - Operating: - 40 °C to + 65 °C
  - Nonoperating: - 40 °C to + 75 °C
- **Humidity**
  - Noncondensing
- **EMC**
  - Conducted emissions: power supply complies with FCC 20780, Class A and VDE 0871/6.78 Class A
  - Surge withstand capability (SWC), power inlet: designed to meet ANSI/IEEE C37.90-1 and IEC 61000-4

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Model 1205D Specifications

Options
A power supply, holdover oscillator, network connections, and output connector must be specified.

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
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<tbody>
<tr>
<td><strong>Power Supply</strong></td>
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<tr>
<td>Terminal Power Strip, Surge Withstand, 100 Vac to 264 Vac, 100 to 350 Vdc</td>
<td>A01</td>
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<tr>
<td>Terminal Power Strip, Surge Withstand, 22 Vdc to 67 Vdc</td>
<td>A02</td>
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<tr>
<td>Terminal Power Strip, Surge Withstand, 13.5 Vdc to 26.4 Vdc</td>
<td>A03</td>
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<tr>
<td><strong>Holdover Oscillator</strong></td>
<td></td>
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<tr>
<td>Holdover OCXO 1 ms/day</td>
<td>C01</td>
</tr>
<tr>
<td><strong>Network Connections</strong></td>
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<tr>
<td>3 - 10/100 BT</td>
<td>D01</td>
</tr>
<tr>
<td>2 - 10/100 BT, 1 Multimode Fiber</td>
<td>D02</td>
</tr>
<tr>
<td>1 - 10/100 BT, 2 - Multimode Fiber</td>
<td>D03</td>
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<tr>
<td>3 - Multimode Fiber</td>
<td>D04</td>
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<td><strong>32-Pin Output Connector</strong></td>
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<td>None</td>
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<tr>
<td>Screw Terminations</td>
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<tr>
<td>Crimp Terminations</td>
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Accessories

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<td><strong>Included</strong></td>
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<tr>
<td>GNSS Antenna, pipe mountable</td>
<td>AS0099200</td>
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<tr>
<td>15 m (50 ft) RG-6 Antenna Cable¹</td>
<td>CA0021315</td>
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<tr>
<td>Rack Mounts</td>
<td>AS0094800</td>
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<td>Quick Setup Guide</td>
<td>PD0054500</td>
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<td><strong>Available</strong></td>
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<tr>
<td>Operation Manual</td>
<td>AS0109700</td>
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<tr>
<td>Antenna Mounting Kit</td>
<td>AS0044600</td>
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<td>15 m (50 ft) RG-6 Antenna Cable¹</td>
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<tr>
<td>30 m (100 ft) RG-6 Antenna Cable¹</td>
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<tr>
<td>45 m (150 ft) RG-6 Antenna Cable¹</td>
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<td>60 m (200 ft) RG-6 Antenna Cable¹</td>
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<tr>
<td>75 m (250 ft) RG-6 Antenna Cable¹</td>
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<td>21 dB In-Line Preampifier for cable lengths greater than 75 m</td>
<td>AS0044700</td>
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<td>Antenna Surge Protector</td>
<td>AS0094500</td>
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<tr>
<td>Antenna Grounding Block Kit</td>
<td>AS0048900</td>
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<tr>
<td>BNC (Male) Breakout to 100 mm Wires</td>
<td>AP0003400</td>
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<tr>
<td>BNC (Female) Breakout to 100 mm Wires</td>
<td>AP0008900</td>
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¹ RoHS compliant

Order Guide

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<thead>
<tr>
<th>Model</th>
<th>Power Supply A</th>
<th>Power Supply B</th>
<th>Holdover Oscillator</th>
<th>Network Configuration</th>
<th>Option Slot A</th>
<th>Option Slot B</th>
<th>Option Slot C</th>
<th>Output Connector</th>
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<td>1205D</td>
<td>A03*</td>
<td>B00*</td>
<td>C01*</td>
<td>D01</td>
<td>E00*</td>
<td>F00*</td>
<td>G00*</td>
<td>H00</td>
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<td></td>
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<td>D02</td>
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<td>H02</td>
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</table>

x00 Indicates option not installed.
* Indicates default selection.