Accurate Time & Frequency System

GNSS-Disciplined Rubidium Clock

The **AR71** is a multi-function GNSS Disciplined Rubidium Atomic Clock, which provides accurate time & frequency. The AR71 incorporates numerous features into a single box, including a Rubidium Frequency Standard, an internal C/A code 12 channels GPS receiver and external 1PPS input.

Key Features

- Frequency Accuracy : 1E-12
- 1PPS Accuracy: 20ns RMS
- Holdover: 1µs / 24 hours, 1E-10 / month
- 1PPS input for disciplining
- 12 channels C(A) code GNSS receiver
- Monitor & control: RS232
- Supply Voltage: 11 – 32 VDC

Options

- LAN IPv4 (NTP server V3, Monitor & Control, DHCP)
- SNMP Monitor & Control (Custom MIB)
- IEEE 1588 (PTP): Grandmaster \ Slave
- TOD Format: IRIG-B, NMEA, Have Quick

Description

The AR71 Rubidium Standard functions as a local oscillator and is phase-locked to the GPS or to external input. All outputs are derived from the Rubidium Clock, which maintains accurate time and frequency when the GNSS or other inputs are interrupted.
The unit includes, as an option, LAN interface board, which support UDP / SNMP for management and for NTP (Network Time Protocol). A Precision-Time Protocol (PTP) or TOD in IRIG B format are available instead of the LAN board.

Applications

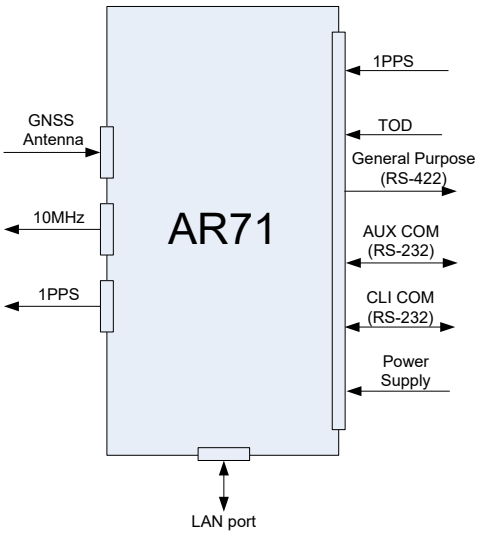
- Test Equipment
- Scientific Equipment
- Telecommunication
- Secure Communication
- Cellular Base Stations
- Mobile Radio Base Stations

All specs are @ 25°C, quiescent conditions and sea level ambient unless otherwise specified

Specifications

		Basic Configuration	Options (*)
Outputs	SMA Connectors	1 x 10MHz Sine Wave (10±2 dBm) 1 x 1PPS (TTL/50Ω)	
	15 pins D Type Connector	1 x 1PPS (RS422) 1 x H/W overall BIT (open collector) 1 x TOD (Have Quick according ICD-GPS-060)	1 x AUX COM (RS232) 1 x TOD (IRIG B 121)
Inputs	SMA Connector	1 x GNSS Antenna (5VDC for Active antenna)	----
	15 pins D Type Connector	1 x 1PPS (TTL/50Ω or ICD-GPS-060) 1 x TOD (Have Quick according ICD-GPS 060)	1 x TOD (IRIG B 121)
LAN	----		• IPV4 • NTP server V3 per RFC1305 ≤ 1ms, each LAN board can support up to 1100 NTP requests per second • DHCP • Control & Monitoring (UDP) • SNMP V3 (Custom MIB)
			• IEEE 1588 / PTP – Grandmaster / slave
CLI	Monitor and control port (RS232 on 15 pins D Type Connector)		

(*) Other options are available upon request.



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Performance

Mode of work		Standard			Improved (option)
Time (1PPS)	1PPS accuracy	Discipline	20ns RMS		Contact factory
		Free running	1 µs / 24 hours (typical) After 24 hours of disciplining		
Frequency	Frequency Accuracy	≤ 1E-12 (Disciplined to GPS or to external 1PPS)			
	Long Term Stability	≤1E-10 / month		Contact factory	
	Short Term Stability (ADEV)	3E-11 @ 1s 5E-12 @ 100s		Contact factory	
	Temperature Stability	±3E-10 over -20°C to +65°C		Contact factory	
	Phase Noise (@ 10MHz)	≤-114dBc/Hz @ 10Hz ≤-140dBc/Hz @ 100Hz ≤-146dBc/Hz @ 1KHz ≤-147dBc/Hz @ 10KHz	Improved	≤-113 dBc/Hz @ 10Hz ≤-141 dBc/Hz @ 100Hz ≤-152 dBc/Hz @ 1KHz ≤-156 dBc/Hz @ 10KHz Integrated phase noise (10Hz to 1MHz): ≤-94dBc	Ultimate Contact factory
	Harmonics	≤ -45 dBc			
	Spurious	≤ -90 dBc @±100KHz			
	Warm-up time	Rubidium Lock < 4 minutes 5E-11 within < 60 minutes 1E-11 within < 4 hrs 1E-12 within < 24 hrs			

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GNSS C(A) Code Receiver	
GNSS Tracking	L1 frequency 1575 MHz C/A code (SPS), 12 parallel tracking channels Options: Glonass, Galileo
Position Accuracy	Latitude, Longitude: < 6m (CEP 50%), Altitude: < 11m (CEP 50%)
GPS signal gain at antenna input (*)	23dB-35dB
GPS Antenna DC Voltage	5VDC (up to 100 mA)

Environmental	
Operating Temperature	-20°C to +65 °C
Storage Temperature	-20°C to +70°C
Humidity	Up to 95% at 35°C, non-condensing

Power Supply	
Power Supply	11 – 32 V DC
Power Consumption	< 25W Warm-up , < 15W Steady state

AUX COM Channel (Option)	
NMEA supported messages	GGA, RMC, ZDA, GSA
Ephemeris & Almanac	Available

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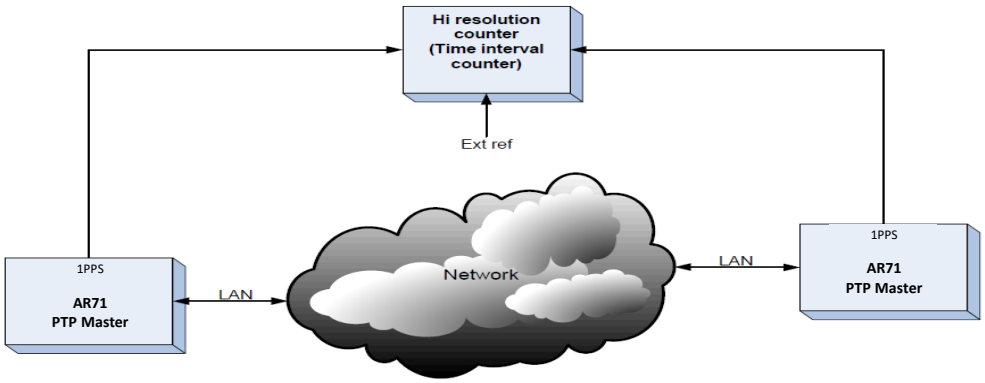
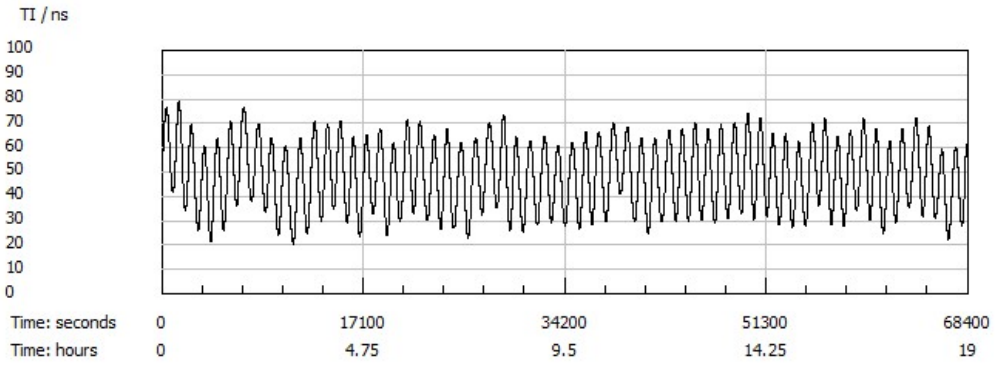
Precision Time Protocol – PTP (option)

- IEEE-1588-2008 V2 PTP Grandmaster/Slave
- Multicast / Unicast modes of operation
- UDP/IPv4 (L2 or L3)
- Design to handle up to 200 slaves simultaneously
- Accuracy: ≤1µs (network dependency)

In the following figure, two AR71 units are interconnected via a network (one as a master and one as a slave). The time interval between the two 1PPS outputs was measured over time and the results are shown in the plot below.

PTP performance measurement setup





Time accuracy < 50ns RMS

(measured on low traffic, symmetrical path network and low number of users)

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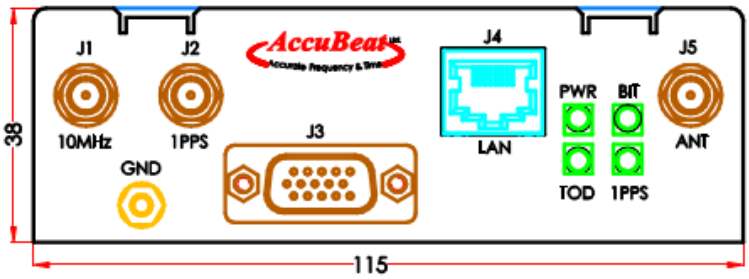
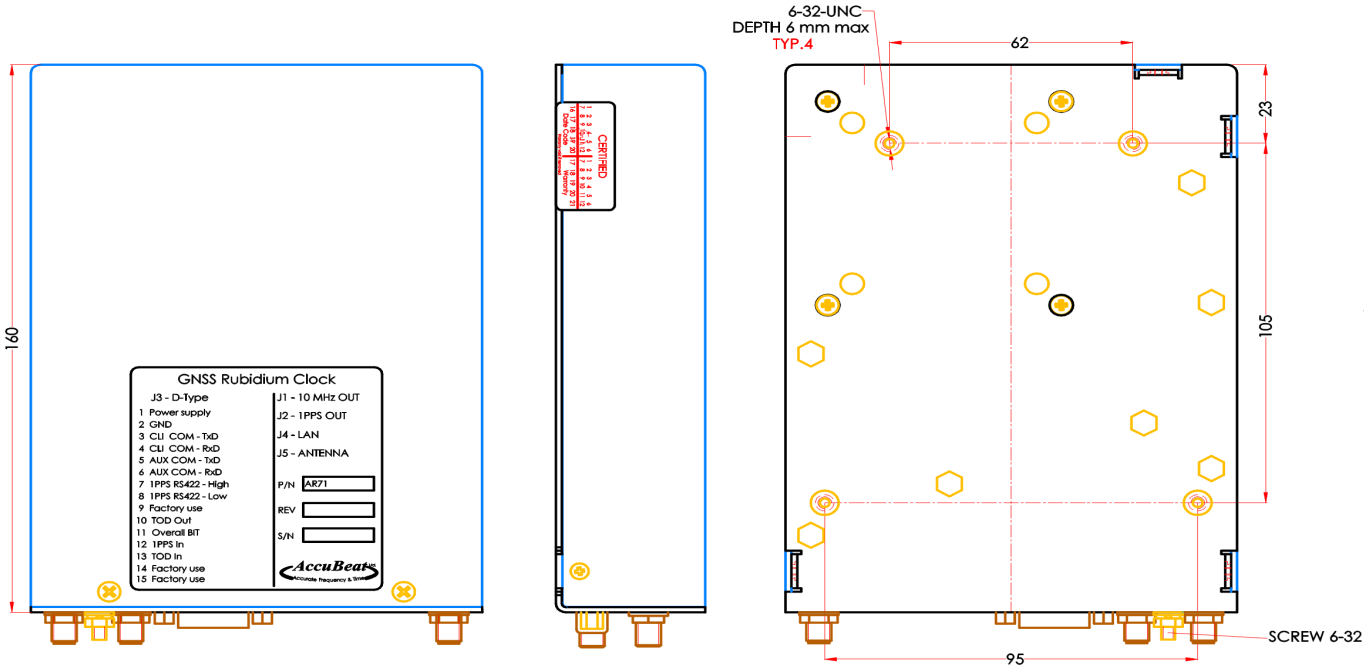
Electrical ICD

Connector number	Description	Connector type
J1	10MHz	SMA
J2	1PPS	SMA
J3	Power supply, communication and signals	D-type 15 pins
J4	LAN	RJ-45
J5	GNSS antenna	SMA

Mechanical ICD





Weight: ≤ 850 g~~TBD~~

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HOW TO ORDER:

AR71R	-	General Purpose RS422 (D type)	Additional Time Code	AUX COM RS232 (D type)	Special Options

General Purpose Output RS422 (on the D type connector)
1 = 1PPS
Additional Time Code
B = Basic (No additional time code)
N = NTP server + UDP + SNMP
P = PTP, SNTP server
I = IRIGB 121 input & output
H = Have Quick, input & output
AUX COM (RS232 on the D type connector)
B = Basic (No AUX COM output)
N = NMEA
E = Ephemeris & Almanac
Special options
B = Basic (No other options)
C = Improved phase noise & 1PPS falling edge
D = Partial AR73A-13/16/18-CLI & IDD
S = Custom (See note below)

Notes:

1. ***"S"*** - Customized special configuration & frequency (the final part number will be define before PO)
   Part number for standard product: AR71R-1BBB

Accessories		
Name	**AccuBeat P/N**	**Description**
GUI	SW50068	AR71 Customer RS232 GUI