

Specification	AXRB9000	Rev.: 4	Date: 2021-07-22
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Oscillator type: Very High Stability Ultra-Low Noise Rubidium Frequency Reference in 19" rack (2 HU) with integrated distribution amplifiers for 1PPS and 10 MHz

Features:

- Very High Long-term Frequency Stability $<2 \cdot 10^{-10}$ per year
- Short-term Stability (ADEV) typical $1 \cdot 10^{-12}$ @ $\tau = 100$ sec
- Ultra-Low Phase Noise 10 MHz output
- Integrated distribution amplifiers for 1PPS & 10 MHz
- External 1PPS synchronisation
- RS-232 communication interface
- Designed for long life time
- Slim 19" rack with 2 HU

Models:

Item	(D)OCXO	(D)OCXO with integrated Distribution Amplifier	GPS-disciplined OCXO	Rubidium
Model*	AXIOM9000	AXDO9000	AXGPS9000	AXRB9000
Features	DOCXO option Ultra-Low Noise Very High Stability	AXIOM9000 Performance Low Noise High Isolation Frequency Distribution Amplifier with 4 to 16 Outputs	GPS Long-Term Stability $< 1E-13$ Ultra-Low Noise	Excellent Long-Term Stability $1E-12$ Ultra-Low Noise
Optional Distribution Amplifier(s)	AXDA9000	AXDA9000	AXDA9000 AXDA9100	AXDA9000 AXDA9100
Performance	See separate data sheet			See specification

*See also our Cesium Primary Reference Clocks on our website

Parameter	min.	typ.	max.	Unit	Condition
Nominal output frequency RF1	10.000			MHz	
Nominal output frequency RF2	1PPS				
Frequency stability					
Initial tolerance at delivery @ +25°C			±0.05	ppb	
vs. operating temperature range			±0.30	ppb	steady state
Long term (aging) per month			±0.05	ppb	
Long term (aging) per year			±0.30	ppb	
Long term (aging) over 10 years			±1.00	ppb	
Retrace @ +25°C			±0.02	ppb	1 h after 24 hrs OFF
Short-term stability (ADEV)		1·10 ⁻¹¹ 5·10 ⁻¹² 1·10 ⁻¹²	3·10 ⁻¹¹ 1·10 ⁻¹¹ 3·10 ⁻¹²		@ τ = 1 sec @ τ = 10 sec @ τ = 100~100,000 sec
Frequency adjustment range					
Mechanical Frequency Control	±1			ppb	By trimmer access (Note 2, 4)
RF output RF1					
Number of output ports	8				
Signal waveform	Sine wave				
Load R _L	50			Ω	±5%
Output level per port	+12	+14	+16	dBm	
Isolation between ports	100			dB	
Harmonics			-40	dBc	
Spurious			-80	dBc	
Phase noise		-108 -140 -160 -165 -170	-105 -135 -155 -160 -165	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	@ 1 Hz @ 10 Hz @ 100 Hz @ 1 kHz @ ≥10 kHz
Warm-up time @ +25°C			15	min	< ±0.5 ppb
Output level indicator	LED at front panel				
RF output RF2					
Number of output ports	4				
Signal waveform	HCMOS/TTL				
Load R _L	50			Ω	±5%
Output level	3	4		V _{pp}	
Rise & decay time			5	ns	
1PPS indicator	LED at front panel				
External synchronisation input (Note 3)					
Number of input ports	1				
Input frequency	1PPS				
Signal waveform	HCMOS/TTL				
Load R _L	50			Ω	
Input level	2.8			V _{pp}	
Interface					
RX/TX level	RS-232				
Communication	See user manual				
Lock Detect Indicator	LED at front panel				

Parameter	min.	typ.	max.	Unit	Condition
AC Supply voltage V_s	100	230	240	V	IEC 60320-1 / C14
AC Supply input frequency	50		60	Hz	
Power consumption			50	W	
Operating temperature range	+10		+50	°C	
Enclosure (see drawing) (WxDxH)	483x250x88			mm	Color "black"
Drawing number	AXZ10.01097.03				
RF Connectors	BNC female				@ Rear plate
Communication Connector	9-Pin D-Sub male with jack posts				@ Rear plate
Weight			8	kg	
Life time	Designed for >10 years				(Note 4)

Notes:

1. Terminology and test conditions are according to IEC60679-1 and MIL-PRF-55310, unless otherwise stated
2. Trimmer accessible at front plate. Adjustment range sufficient for 10 years operation
3. Synchronization active as soon as 1PPS reference input is present
4. Please consult factory for extended warranty options and calibration service

Absolute Maximum Ratings

Parameter	min.	max.	Unit	Condition
AC Supply Voltage V_s	90	260	V	
AC Supply input frequency	47	63	Hz	
AC Supply input current		2	A	Fuse accessible at rear plate
Maximum 1PPS input level	-0.5	+6	V	
Load R_L	25	∞	Ω	No damage
Storage Temperature	-20	+70	°C	

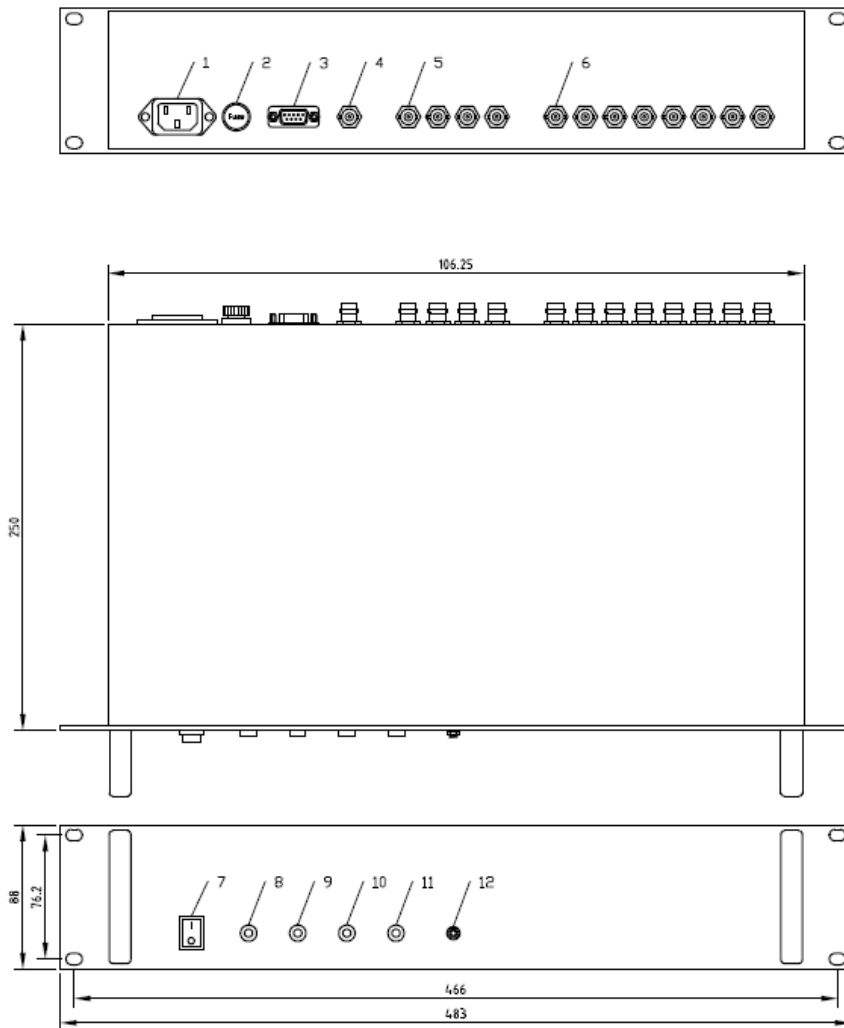
Ordering Code

Model	Revision	Frequency [MHz]
AXRB9000	Rev.4	10.000

Handling & Testing

Parameter	Procedure / Test condition
Sinusoidal vibration	max. 0.15 mm <10 Hz, 1 g at 10~2000 Hz
Random vibration	max. 0.001 g^2/Hz , 10~2000 Hz
Mechanical shock	max. 10 g, 6 ms half sine
Handling and Testing	Careful handling. Avoid excessive air flow, vibration and shock during operation.
VDE 0701-0702 Tested	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
RoHS-Compliant	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Enclosure drawing

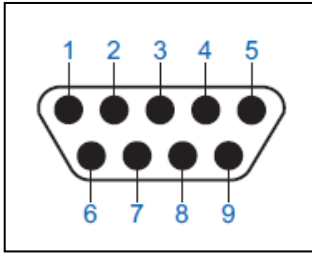


Connections and operation

#	Panel	Symbol	Function
1	Rear	POWER IN	AC Supply Input (IEC 60320-1 / C14)
2		FUSE	2 A Slow 5x20 mm Fuse
3		COMM	Interface for Monitoring (see pin connections below)
4		RF IN	External Synchronization Input 1PPS
5		RF OUT	RF Outputs 1...4 RF2 – 1PPS
6		RF OUT	RF Outputs 1...8* RF1 – 10 MHz
7	Front	POWER SWITCH	Power Switch ON/OFF
8		POWER ON	LED – Power ON Indicator
9		LOCK DETECT	LED – Rubidium Ready Indicator (Locked)
10		OL	LED – Output Level Indicator (Internal Rubidium)
11		PPS	LED – 1PPS Indicator (Internal Rubidium)
12		ADJUST	Frequency adjustment potentiometer

*It is recommended to terminate sine wave RF1 outputs with 50 Ω loads.

Pin connections D-Sub connector



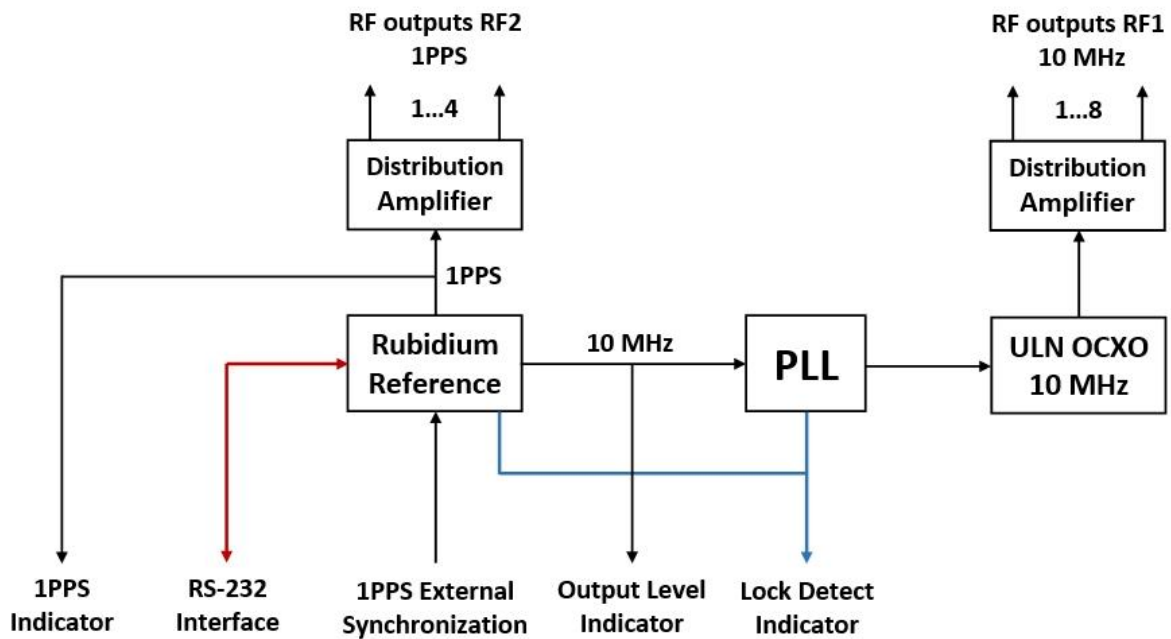
Front View D-Sub connector

Pin connections

#	Symbol	Function	Description
1	N.C.	No Connection	-
2	RX	Receive Data	RS-232 Logic Level
3	TX	Transmit Data	RS-232 Logic Level
4	N.C.	No Connection	-
5	GND	Ground	-
6	N.C.	No Connection	-
7	LD	Lock Detect	5V Logic Level, High = Rubidium & OCXO Locked
8	OL	Output Level	5V Logic Level, High = Output Level Rubidium OK
9	PPS	1PPS	5V Logic Level, 1PPS HCMOS Pulse Rubidium

Note: Please be aware of the different logic levels for the various monitor functions.

Block diagram



Data sheet is for information purposes only and may be subject to modifications or may be discontinued without notice.

Revision History

Rev.	Drawing	Date [dd.mm.yyyy]	Remarks	Author	Checked
1	D0	07.07.2016	First issue	HH	BN
2	D0	18.07.2016	Retrace and PN options added	HH	HH
3	D0	24.07.2018	Major update with Rubidium options	HH	BN
4	D0	22.07.2021	Major update: Fixed High Stability Rubidium with Clean-up ULN OCXO, integrated distribution amplifier for 1PPS & 10 MHz and synchronization input added, additional monitoring functions added, editorial changes	HH	ME