MBC

MBC-AN-LAB

Ditherless Modulator Bias Controller

The Exail MBC-AN-LAB is an automatic bias controller specially designed to lock the operating point of $LiNbO_3$ Mach-Zehnder modulators at the quadrature point and ensure a stable operation over time and environmental conditions.

Unlike classical dither signal based bias controllers, the MBC-AN-LAB does not superimpose any tone signal to the optical modulated signal. It is designed for application where such a tone signal is not desired and typically for analog applications where a high purity carrier is required.

Principle
The Exail MBC-AN-LAB bias controllers is based on the comparison of the optical power before and after the Mach-Zehnder modulator. It uses tap couplers and photodiodes with a proportionnal integrator feed back loop to lock the operating point of the modulator at the Quad+ or Quad- position.

The Exail MBC-AN-LAB is operated from a user supplied PC.

Features

- Designed for Mac-Zehnder modulators
- Quad modes
- High stability and sensitivity

Applications

- RFoF links
- Electronic warfare
- Analog communications

Options

- Internal photodiode and tap coupler

Performance Highlights

Parameter	Min	Typ	Max	Unit
DC bias voltage	-10	-	+10	V
Locking point	QUAD-, QUAD+			-
Optical output power stability	-	± 0.1	-	dB
Control	Remote			-

MBC-AN-LAB

Ditherless Modulator Bias Controller

Bias Control Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
		Timing				
Autotest	Auto	Automatic scan	25	30	40	s
Initialisation	-	After an autoset	-	10	-	s
Start up	-	-	10	-	30	s
		QUAD+, QUAD-				
Optical output power stability	-	Over 2h and modulator temperature controlled	-	± 0.1	-	dB

Electrical Characteristics

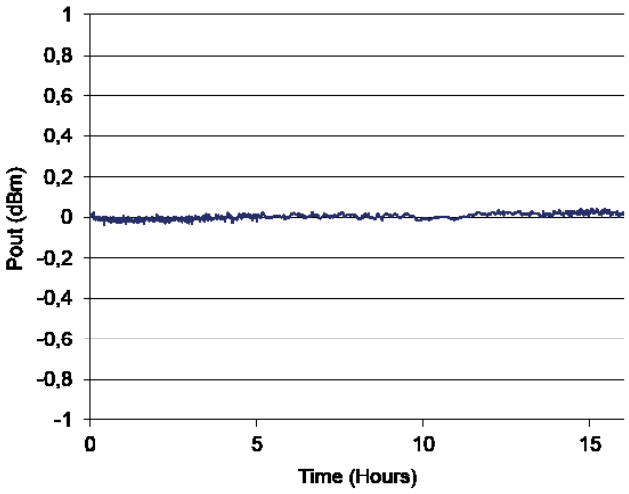
Parameter	Symbol	Condition	Min	Typ	Max	Unit
DC Bias Voltage	V_{bias}	-	-10	-	+10	V
Automatic locking point	-	Customer choice	QUAD- (-50%), QUAD+ (+50%)			-

Absolute Maximum Ratings

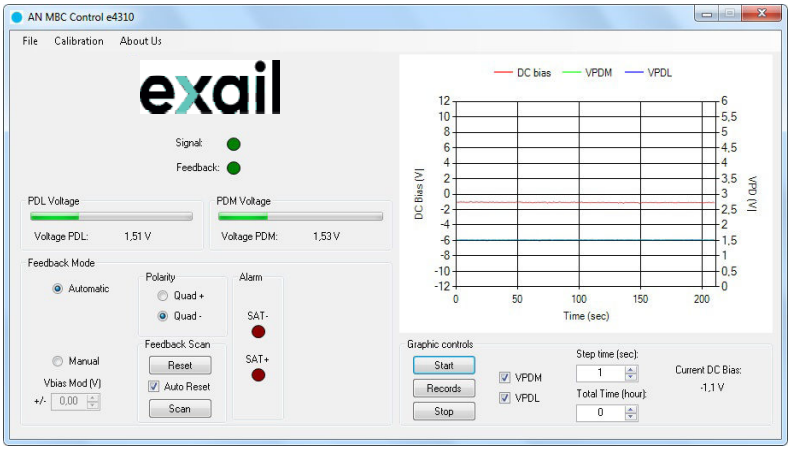
Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Condition	Min	Max	Unit
Operating temperature	-	-	-10	+45	°C
Storage temperature	-	-	-40	+70	°C

Output Power Stability



Graphical User Interface

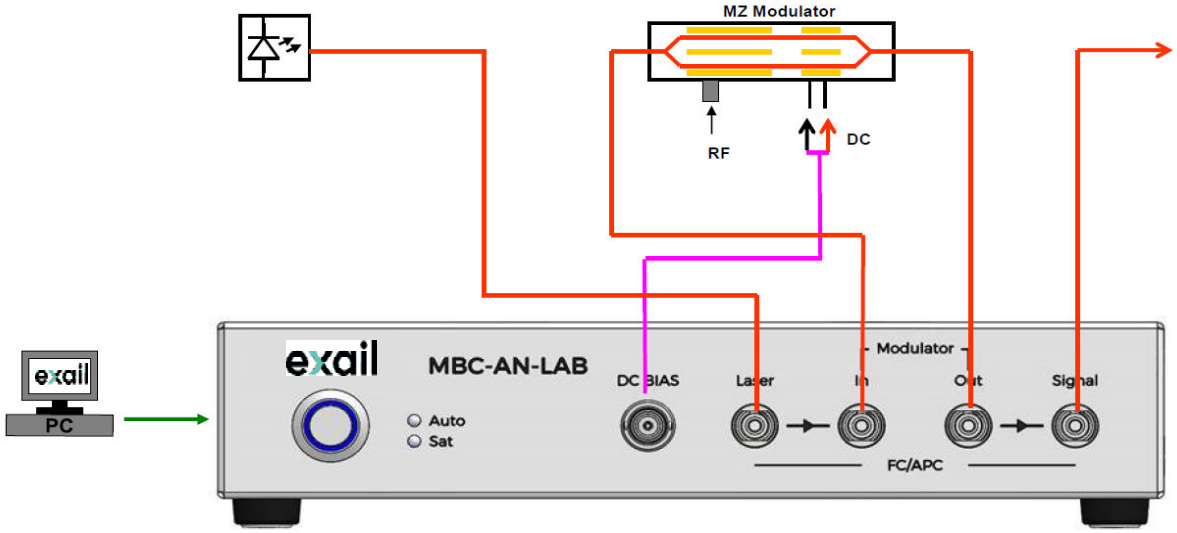


MBC-AN-LAB

Ditherless Modulator Bias Controller

Optical Characteristics - MBC-AN-LAB with embedded tap-couplers

Parameter	Symbol	Condition		Min	Typ	Max	Unit
Optical input power range for MBC-AN-LAB version A_N & B_N, with embedded optical tap couplers We estimate 8 dB of optical insertion loss (5 dB from the modulator and 3 dB from the tap couplers)							
Wavelength	λ	MBC-AN-LAB-A1		1530	1550	1625	nm
		MBC-AN-LAB-A2		1270	1310	1320	nm
		MBC-AN-LAB-A3		980	1060	1150	nm
		MBC-AN-LAB-A1		850	900	980	nm
		MBC-AN-LAB-B1		800	830	850	nm
		MBC-AN-LAB-B1		760	780	800	nm
Input optical power	OP_{IN}	MBC-AN-LAB-A1 @ 1550 nm	Manual-Set	+6.4	-	+26	dBm
			Auto-Set	+6.4	-	+16.4	dBm
		MBC-AN-LAB-A2 @ 1310 nm	Manual-Set	+6.7	-	+25	dBm
			Auto-Set	+6.7	-	+16.7	dBm
		MBC-AN-LAB-A3 @ 1060 nm	Manual-Set	+7.9	-	+23.8	dBm
			Auto-Set	+7.9	-	+17.9	dBm
		MBC-AN-LAB-A4 @ 950 nm	Manual-Set	+5.5	-	+23.6	dBm
			Auto-Set	+8.5	-	+18.5	dBm
		MBC-AN-LAB-B1 @ 850 nm	Manual-Set	+9.2	-	+23.5	dBm
			Auto-Set	+9.2	-	+19.2	dBm
		MBC-AN-LAB-B2 @ 780 nm	Manual-Set	+9.2	-	+23.5	dBm
			Auto-Set	+9.2	-	+19.2	dBm

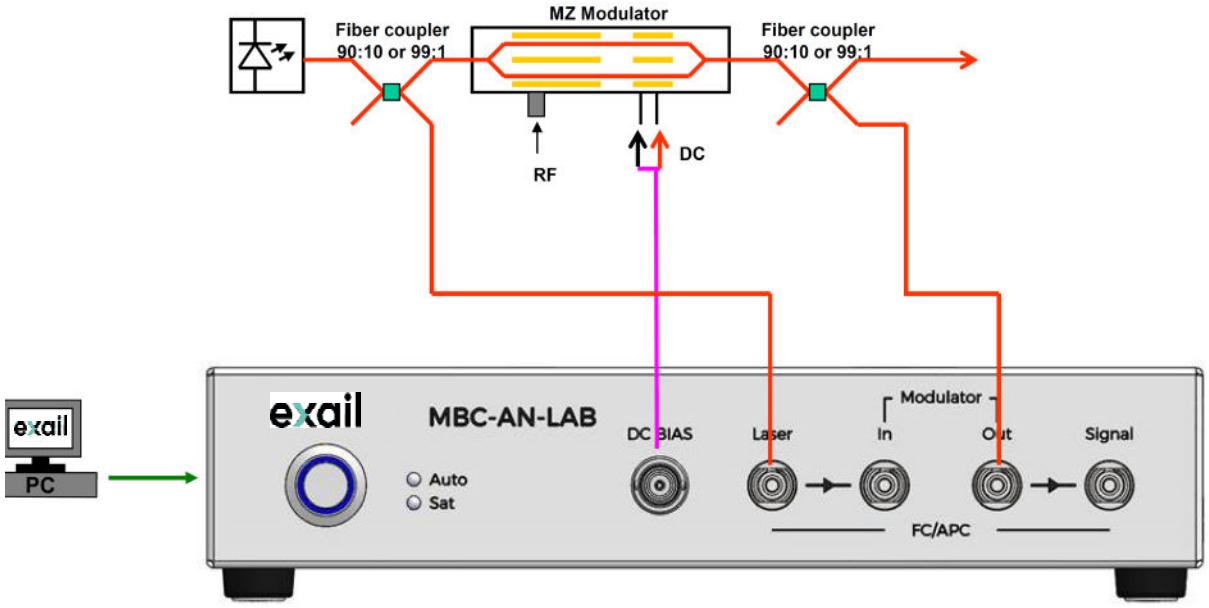


MBC-AN-LAB

Ditherless Modulator Bias Controller

Optical Characteristics - MBC-AN-LAB with no embedded tap-couplers

Parameter	Symbol	Condition		Min	Typ	Max	Unit
At Photodiode input ports (MBC-AN-LAB version A0 & B0, no embedded optical tap couplers Considering 5 dB modulator insertion loss							
Wavelength	λ	MBC-AN-LAB-A0		900	-	1600	nm
		MBC-AN-LAB-B0		600	-	900	nm
Input optical power	OP_{IN}	MBC-AN-LAB-A0 @ 1550 nm	Manual-Set	-15	-	+6	dBm
			Auto-Set	-15	-	-5	dBm
		MBC-AN-LAB-A0 @ 1310 nm	Manual-Set	-14.7	-	+5.3	dBm
			Auto-Set	-14.7	-	-4.7	dBm
		MBC-AN-LAB-A0 @ 1060 nm	Manual-Set	-13.5	-	+3.8	dBm
			Auto-Set	-13.5	-	-3.2	dBm
		MBC-AN-LAB-A0 @ 950 nm	Manual-Set	-12.8	-	+3.6	dBm
			Auto-Set	-12.8	-	-2.8	dBm
		MBC-AN-LAB-B0 @ 850 nm, @ 780 nm	Manual-Set	-12.2	-	+3.5	dBm
			Auto-Set	-12.2	-	-2.2	dBm



MBC-AN-LAB

Ditherless Modulator Bias Controller

Dimensions	
Dimensions (W x H x D)	220 mm x 220 mm x 52 mm
Power supply (rear panel)	100 V - 120 V / 220 V - 240 V automatic switch, 50 Hz - 60 Hz
Interfaces	
Photodiode Input / coupler input	FC/APC connector
Bias output	BNC Female connector
Communication	USB
Remote control	
Minimum computer requirements	Windows XP SP3
Computer configuration	Recommended Windows XP-SP3, W7, W8

Ordering information

MBC-AN-LAB-□

- A0: no coupler, 900 nm to 1600 nm
- B0: no coupler, 600 nm to 900 nm
- A1: integrated coupler, 1530 nm to 1625 nm
- A2: integrated coupler, 1270 nm to 1330 nm
- A3: integrated coupler, 980 nm to 1150 nm
- A4: integrated coupler, 850 nm to 980 nm
- B1: integrated coupler, 800 nm to 850 nm
- B2: integrated coupler, 760 nm to 800 nm

About us

Exail Photonics produces specialty optical fibers and Bragg gratings based fiber optics components and provides optical modulation solutions based on the company lithium niobate ($LiNbO_3$) modulators and RF electronic modules.
Exail Photonics serves a wide range of industries: sensing and instruments, defense, telecommunications, space and fiber lasers as well as research laboratories all over the world.

contact.photonics@exail.com | www.exail.com
Europe +33 1 30 08 87 43 | Americas +1 508 745 3487 | APAC +65 6747 4912

01-2023_ED2 / 0025196