SHAPING LIGHT.

HELPING ENGINEERS AND SCIENTISTS IN ADVANCING HOW THE WORLD COMMUNICATES, SENSES AND CONNECTS

ID ABC – AUTOMATIC BIAS CONTROL

DATA SHEET

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ID ABC – AUTOMATIC BIAS CONTROL FOR MACH ZEHNDER MODULATORS

The ID Photonics Automatic Bias Controller device (ID ABC) is designed to lock the operating point of Mach-Zehnder modulators to ensure stable optimal performance over time and environmental conditions.
It covers a wide variety of applications from single polarization Intensity Modulators to polarization multiplexed IQ Modulators by simple user reconfiguration in software with a single hardware variant.
For IQ modulators, this unique design provides a stable tracking of optimal operating point for arbitrary RF input signals such as QPSK, QAM-xx or Nyquist shaped signals without requiring manual tweaking of parameters. This enables stable operation especially when switching between modulation formats.
A GUI is provided for instant access and a SCPI style command set provides extensive control status information and configurations such as locking status.

ABC-BPC-13

ABC-BPC-14

ABC-BPC-15

KEY FEATURES

- Supporting all higher level modulation formats
- Fast and simple switching between modulation formats
- Software configurable support of single & dual-pol IQ or Intensity Mach Zehnder Modulators
- No dependency on applied modulation format and RF amplitude
- Support of electro-optic and heater based BIAS electrodes for substrates such as LiNbO3, InP, GaAs
- Extremely wide dynamic range of feedback tap
- Installation free WebGUI provided
- USB, Ethernet & UART interface for remote control
- SCPI Style remote control command set, LabView® drivers supplied

TYPICAL APPLICATIONS

- Stabilization and locking of Mach-Zehnder BIAS points for optimal performance
- Generation of advanced modulation formats (QPSK, 8-PSK, 16-QAM, …)
- Single and DualPol support
- Single-Side-Band (SSB) Applications
- On-Off-Keying (OOK) Applications

WHAT DIFFERENTIATES OUR ID AUTOMATIC BIAS CONTROL SOLUTION AND DRIVES SUCCESS

IN-HOUSE DEVELOPED BIAS CONTROL

We are proud to offer a fully in-house developed ID Automatic BIAS Control system, refined over 10 years of development, that sets us apart from the competition.

ZERO NOISE FEATURE

This feature will mute signals used for the ID Automatic BIAS Control and freeze its current status achieving optimum performance for your critical measurements.

ABC IS FLEXIBLE

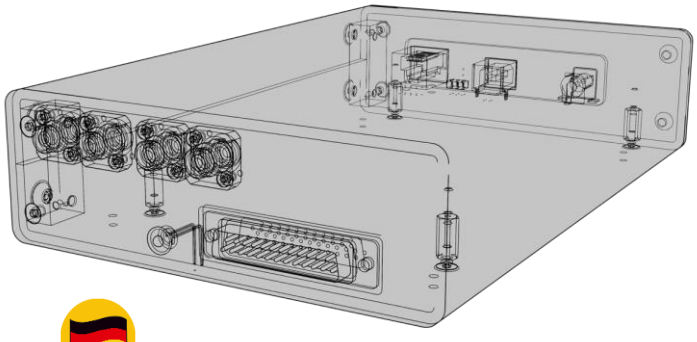
Our ID ABC units offer versatile support for various Mach-Zehnder configurations, including Single and Dual-Polarization, IQ, and Single MZM. These configurations can be easily adjusted using our installation-free Web GUI, all within a single hardware setup.

SIMPLE, INTUITIVE USABILITY

A comprehensive GUI allows setting up, control and monitoring the unit within minutes. Remote control via Ethernet or USB gives a maximum of flexibility connecting to the board.

DESIGNED & MADE IN GERMANY

Blends innovation and precision to ensure success



DESIGNED & MADE
IN GERMANY

German craftsmanship is renowned worldwide for its meticulous attention to detail and use of high-quality materials.

It signifies a commitment to exceptional quality and precision engineering.
At ID Photonics, our entire operations are based in Germany, ensuring top-notch craftsmanship. We handle everything from manufacturing and hardware design to software and circuit design. This comprehensive approach guarantees products that are reliable, durable, and innovative. By choosing ID Photonics, you invest in engineering excellence and timeless design, all crafted with meticulous attention to detail in Germany.

SIMPLE, INTUITIVE CONTROL OF YOUR ID ABC

The ID ABC comes with an intuitive and easy-to-use graphical user interface (GUI) that requires no installation. It's designed to provide a seamless experience, allowing you to control and monitor the laser with ease.

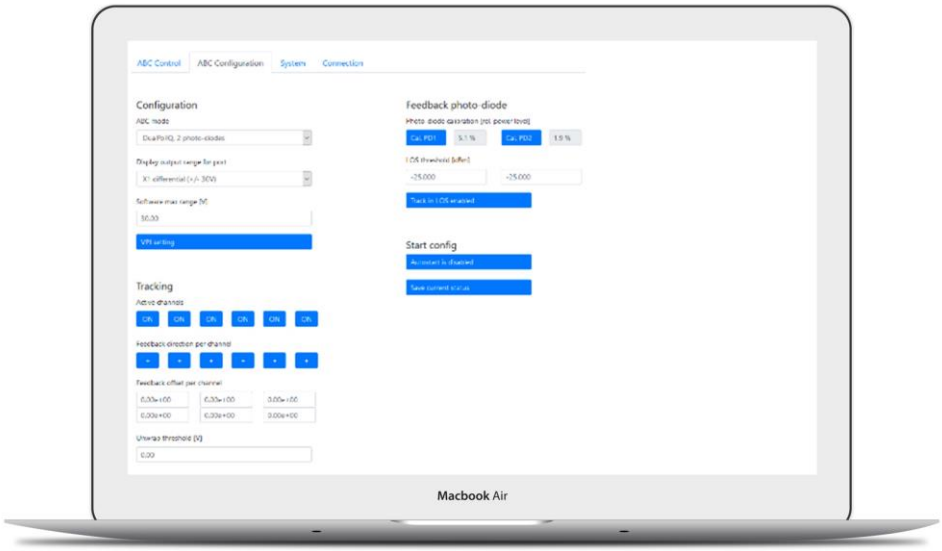
- **Simplicity at Its Best:** Say goodbye to complex installations and hello to instant control. Our ID ABC features an embedded graphical user interface (GUI) that requires no additional software. Just connect, and you're ready to operate
- **Intuitive Design**: Navigate with ease through our clean and modern dashboard. Monitor real-time performance, adjust settings, and reconfigure with just a few clicks
- **Plug-and-Play Convenience:** Start using your ID ABC right out of the box. Connect via USB or Ethernet, open your web browser, and take control through the built-in interface
- **Instant Local Control:** The unit can be operated using the modern touch panel display at the front, eliminating the need for any external devices

1

ID ABC – WEB GUI ON TABLET

2

ID ABC – WEB GUI ON DESKTOP



TRANSMITTER SOLUTIONS

ID ABC – AUTOMATIC MACH-ZEHNDER BIAS CONTROL

The ID ABC is an in-house developed instrument that automatically sets and maintains the optimal operating point for Mach-Zehnder modulators (MZM) by a few simple clicks in our installation free Web GUI.
It supports various MZM types, including single- and dual-polarization intensity modulators and polarization-multiplexed IQ modulators, across materials like Lithium Niobate (LiNbO3) and Silicon Photonics (SiPh).
A simple software reconfiguration allows switching between configurations using the same unit, securing your investment against future upgrades.
For IQ modulators, the ID ABC tracks the optimal operating point regardless of changes in the RF input signals of your MZM, ensuring stable operation across modulation formats.
With these features, the ID ABC is the most capable bias controller available today.

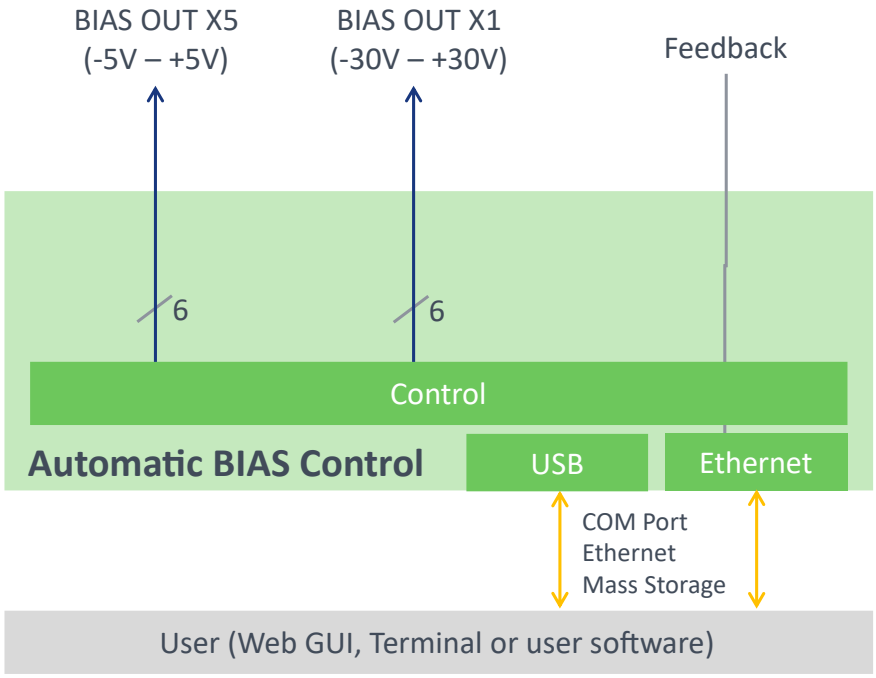
Weight
1 kg / 2.2 lbs.

Size of device
140 x 53 215 mm
5.5 x 2.1 x 8.5 inch

Operating Temperature
10 to 35 °C

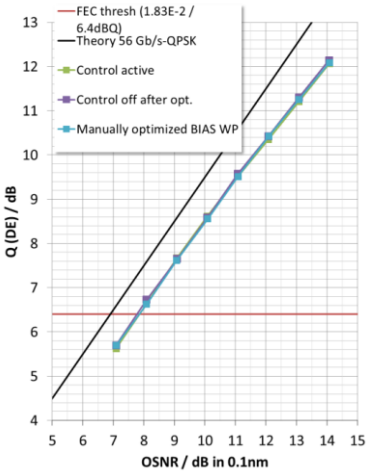
Our standards
RoHS-compliant
CE-conform

BLOCK DIAGRAM

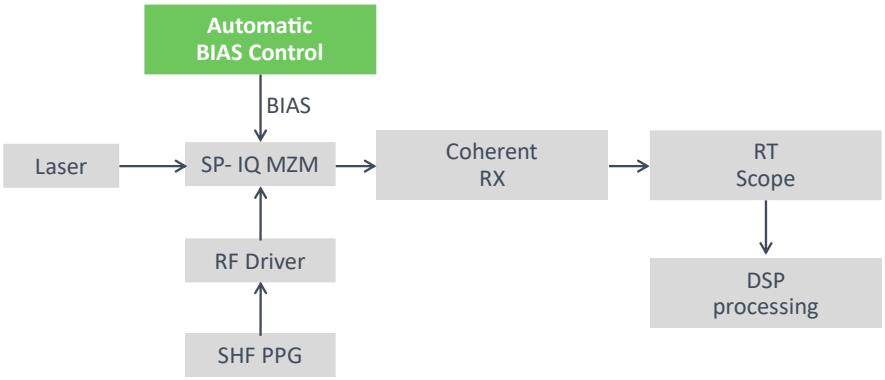


APPLICATION EXAMPLE – 56GB/S SP-QPSK

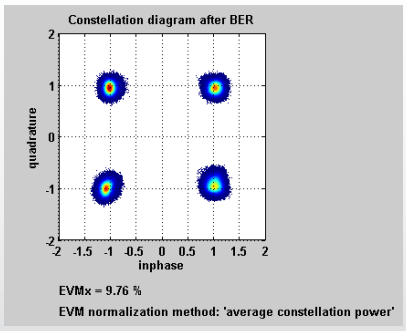
An ID Automated BIAS Control (ID ABC) system performs optimally when it operates seamlessly, matching the performance of a manually tuned setup by an experienced researcher. Minimizing control penalty is a key performance indicator.
This example demonstrates the zero penalty performance of a Single Polarization LiNbO3-based Mach-Zehnder modulator with a QPSK encoded signal. It compares the results of manual optimization, active control by the ID ABC, and the performance when the ID ABC is switched off after optimization.

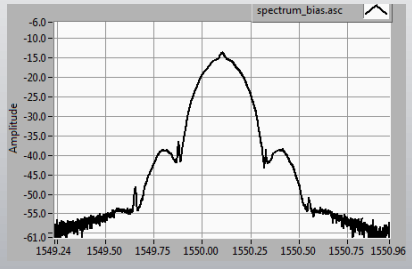


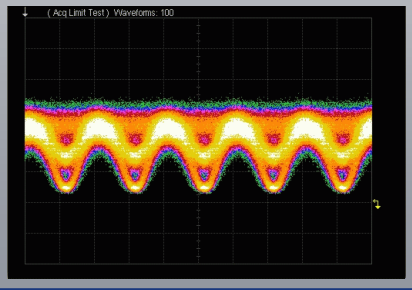
SETUP



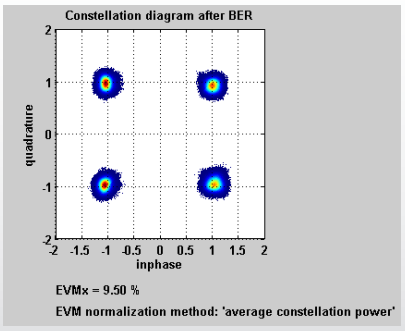
BIAS CONTROL ACTIVE

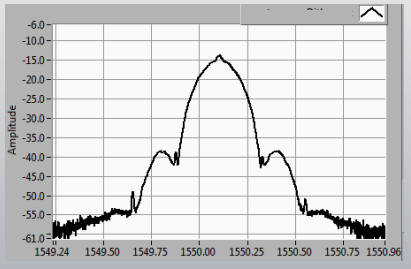


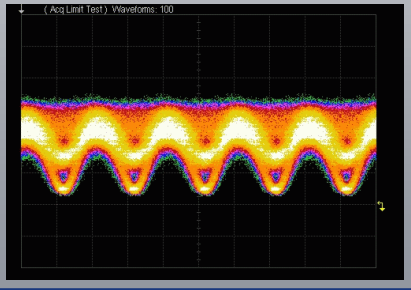




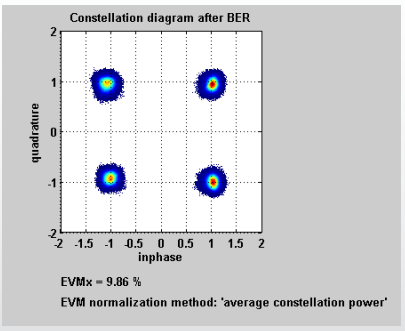
BIAS CONTROL OFF AFTER OPTIMIZATION

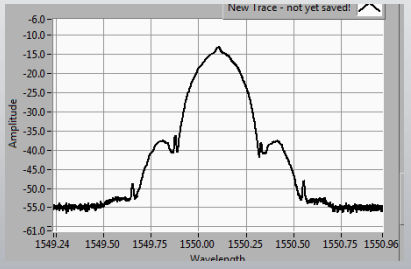


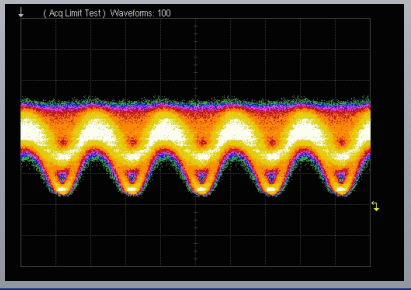




MANUAL OPTIMIZATION



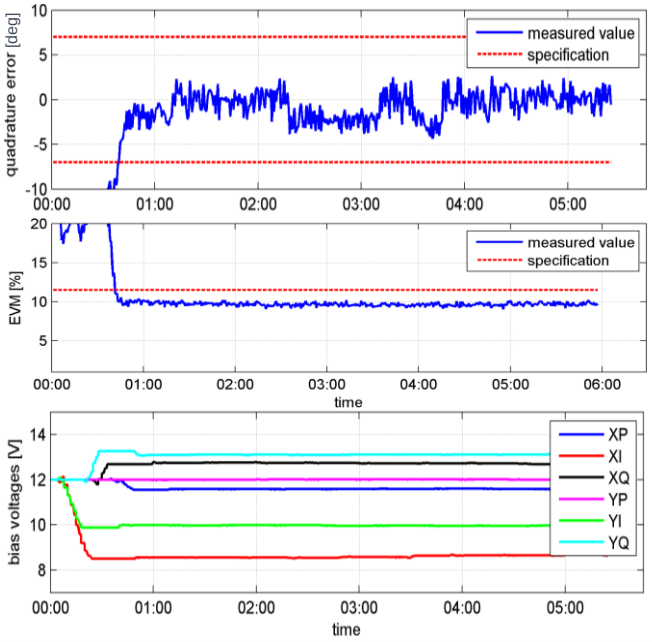




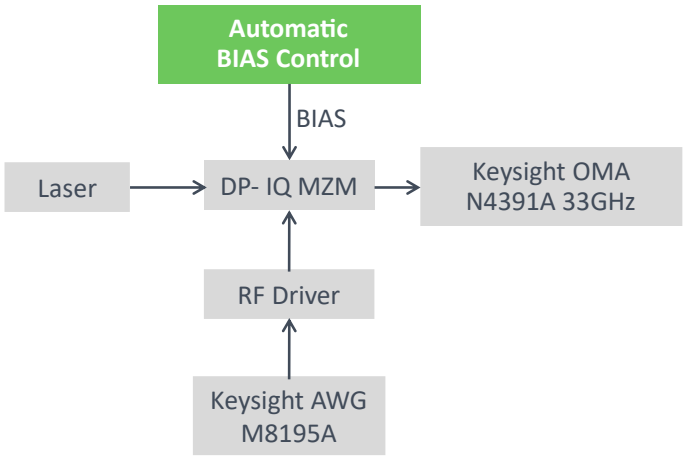
APPLICATION EXAMPLE - 128GB/S DP-QPSK

This example demonstrates the performance optimization of a Dual Polarization LiNbO3-based Mach-Zehnder modulator with a QPSK encoded signal. The traces illustrate the voltages applied to the BIAS electrodes of the MZM, Error-Vector-Magnitude (EVM), and quadrature error of the constellation, analyzed by a Keysight Optical Modulation Analyzer (OMA). The ID ABC system identifies, optimizes, and maintains the optimal operating point within 45 seconds from an arbitrary starting point.

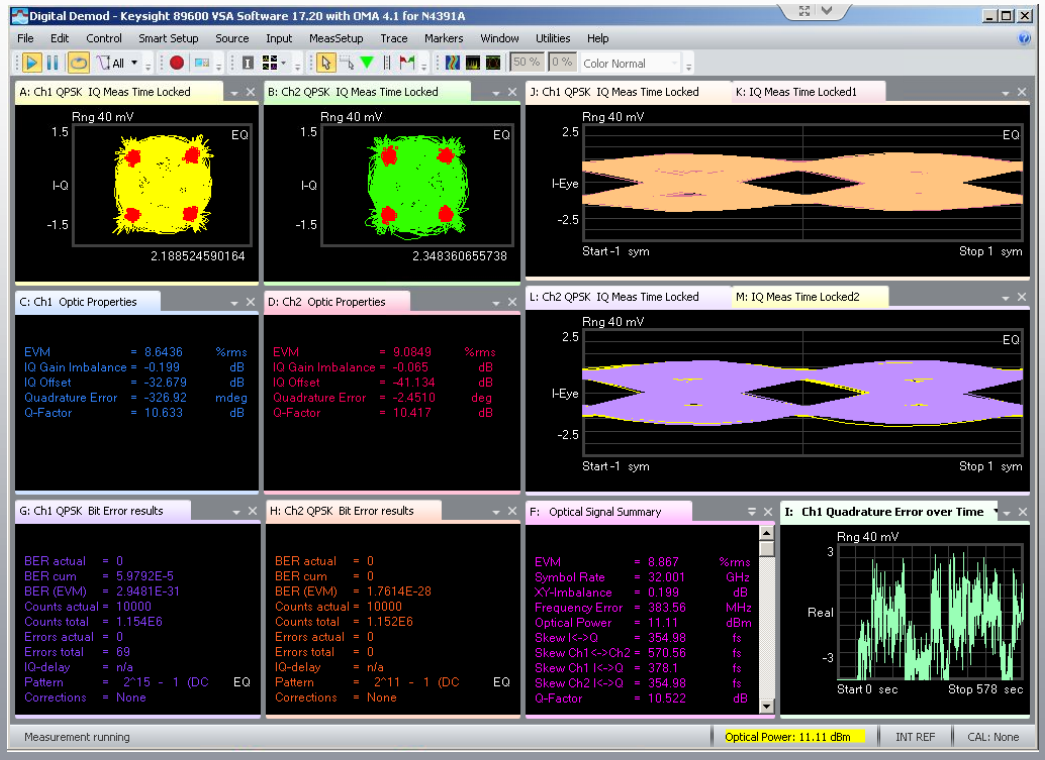
TRACES DURING INITIALIZATION PERIOD



SETUP



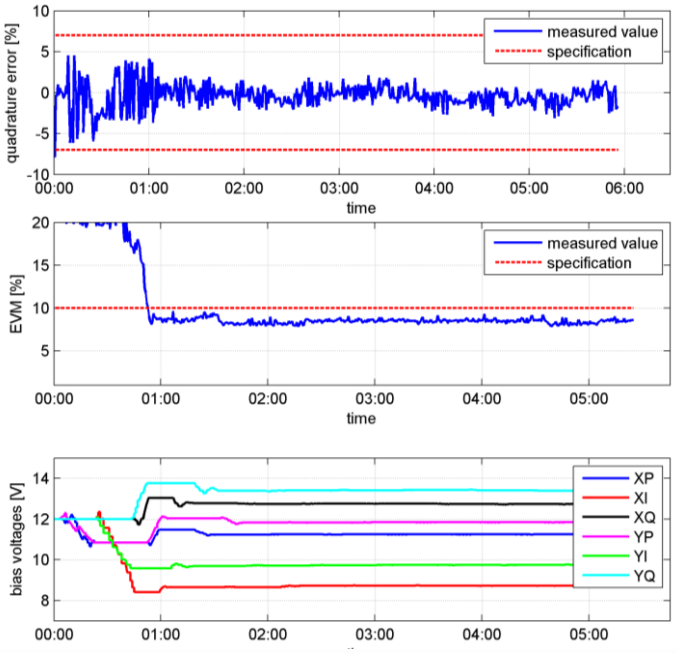
KEYSIGHT OMA SCREEN SHOT AFTER 5 MINUTES



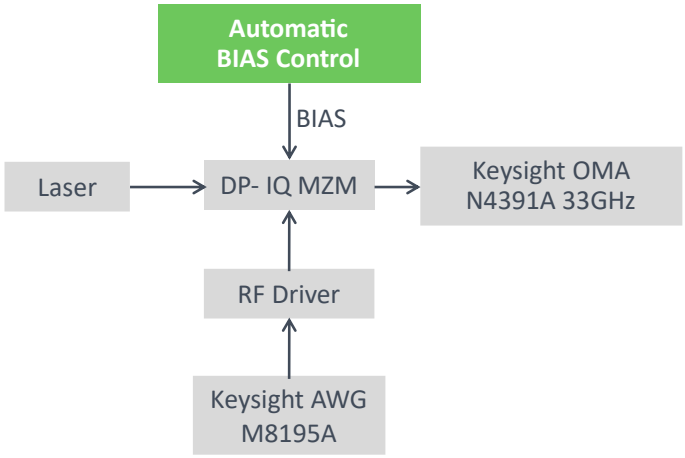
APPLICATION EXAMPLE - 256GBIT/S DP-QAM-16

This example demonstrates the performance optimization of a Dual Polarization LiNbO3-based Mach-Zehnder modulator with a multi-Level QAM-16 encoded signal at 32 Gbaud. The traces illustrate the voltages applied to the BIAS electrodes of the MZM, Error-Vector-Magnitude (EVM), and quadrature error of the constellation, analyzed by a Keysight Optical Modulation Analyzer (OMA). The ID ABC system identifies, optimizes, and maintains the optimal operating point within 1 minute from an arbitrary starting point.

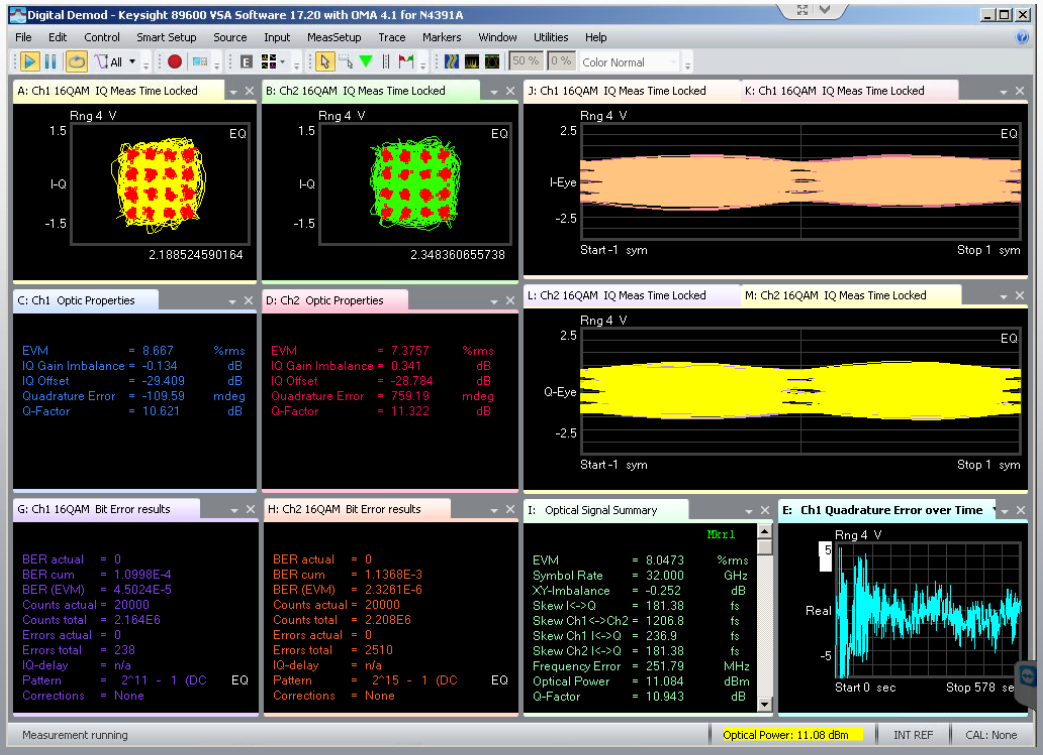
TRACES DURING INITIALIZATION PERIOD



SETUP



KEYSIGHT OMA SCREEN SHOT AFTER 5 MINUTES



SPECIFICATION

DEVICE PARAMETER	SPECIFICATION
SUPPORTED MODULATOR TYPES	(Single & Dual Pol.) - IQ or Intensity Mach Zehnder, see table on next page
MAX. BIAS VOLTAGE, DIFFERENTIAL SYMMETRIC SINGLE ENDED LOW VOLTAGE, HIGH CURRENT OUTPUT	+/- 30V, 330 Ohm impedance +/- 5V, 100 Ohm impedance Software Voltage limit customer settable
NUMBER OF BIAS CONTROL CHANNELS	6
MACH-ZEHNDER MODULATOR CONNECTOR	IQM direct via included adaptor board (V3): to OIF-PMQ-TX-01.1 standard Cable: SUB-D, 25 Pin, Pinning see manual of ID ABC
STARTUP TIME AUTOMATIC BIAS CONTROL UNTIL SETTLED	< 3 Minutes, 45 seconds typical
QUADRATURE ERROR* [DEG], averaged mean 99% confidence in >4hrs	 < +/-0.5 < +/- 3
FEEDBACK DETECTOR TYPE	variants -13/14: 10% optical tap detector built into ID-ABC variants -15: electrical input
FEEDBACK DETECTOR CURRENT RANGE [UA] (ELECTRICAL IN, VARIANT -15) FEEDBACK DETECTOR CURRENT RANGE [UA] (OPTICAL IN AT MAX. TRANSMISSION OF MZM), VARIANTS -13 & -14	1 – 2000 -10 to +4 dBm
FEEDBACK DETECTOR DYNAMIC RANGE [DB]	26
REQUIRED FEEDBACK DETECTOR BANDWIDTH, 3DB [KHZ]	>100
USER INTERFACES	USB, Ethernet
PHYSICAL DEVICE SPECIFICATION	
OPERATING TEMPERATURE STORAGE TEMPERATURE	+10 to +35 °C; non-condensing -20 – 60 °C
SIZE OF DEVICE (H X W X D)	140 x 53 x 215 mm 5.5 x 2.1 x 8.5 inch
WEIGHT	1 kg / 2.2 lbs.
POWER SUPPLY	Primary 12 VDC, 3 A, 20 Watt Included AC Adaptor 100-240 VAC, 0.8 A, 50/60 Hz
CONNECTOR TYPE	FC/APC (optical feedback versions)

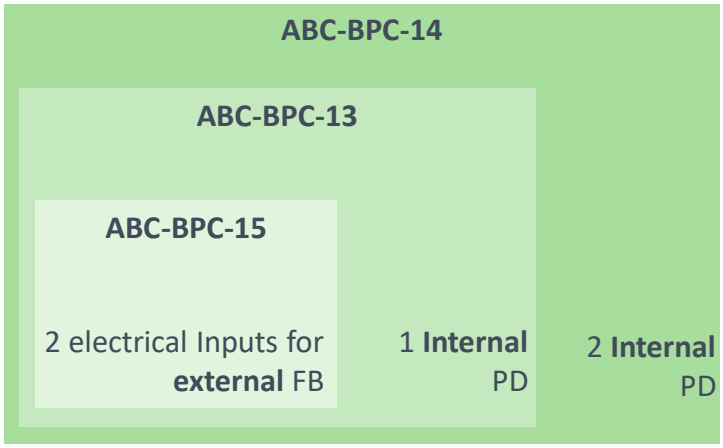
* Applies to IQ Modulators; Characterized using Keysight AWG M8195A AWG signal source; ID Photonics; Keysight OMA N4391A for analysis

SUPPORTED CONFIGURATIONS

MZM TYPE	ABC-BPC-13-X	ABC-BPC-14-X	ABC-BPC-15-X		APPLICATION EXAMPLE
	PHOTODIODES IN ABC DEVICE		EXTERNAL PHOTODIODES		
	1	2	1	2	
SINGLE POLARIZATION IQ MODULATOR*	☑	☑	☑	☐	SP-QPSK, SP-QAM32
DUAL POLARIZATION IQ MODULATOR	☑	☑	☑	☑	DP-QPSK, DP-QAM16
SINGLE POLARIZATION INTENSITY MODULATOR*	☑	☑	☑	☐	SP-OOK, SSB
DUAL POLARIZATION INTENSITY MODULATOR	☐	☑	☑	☑	DP-OOK, DP-Multi-Level

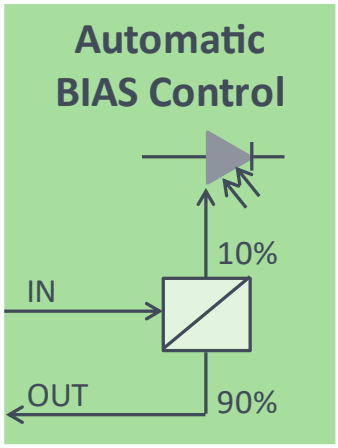
* Up to 2 Modulators can be operated using a single ID ABC device

ID ABC VARIANTS



PD: Feedback Tap – Photodiodes
FB: electrical Feedback Input for external Photodiode

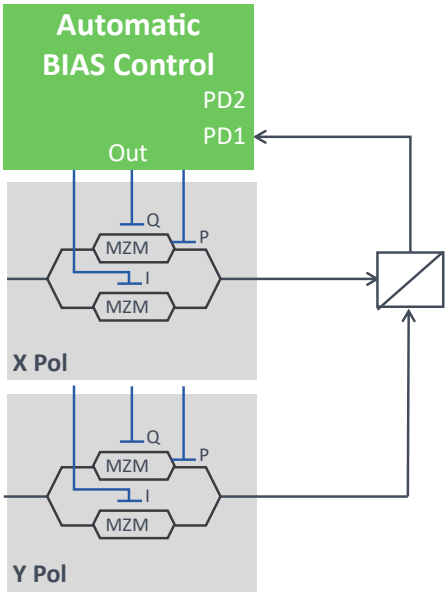
ABC-BPC-13
ABC-BPC-14



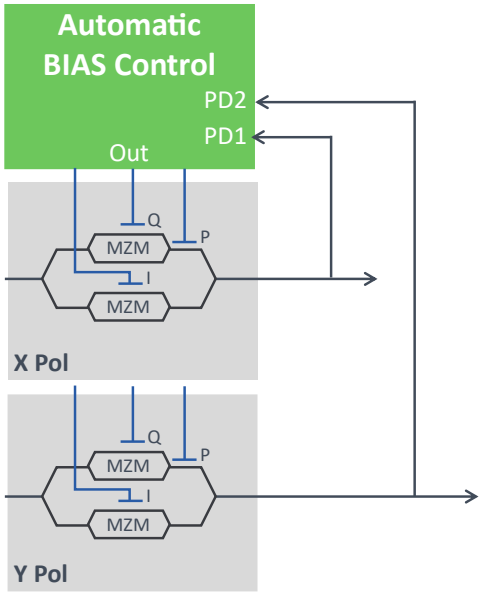
SUPPORTED MACH-ZEHNDER AND FEEDBACK CONFIGURATION, OPTICAL FEEDBACK VARIANTS

A single universal unit supports all setups shown below. Switching between setups is accomplished with a single click in the installation-free, web-based graphical user interface (GUI) or via SCPI-style remote commands. ABC-BPC-13 & ABC-BPC-14 provide built-in optical feedback tap diodes (recommended).

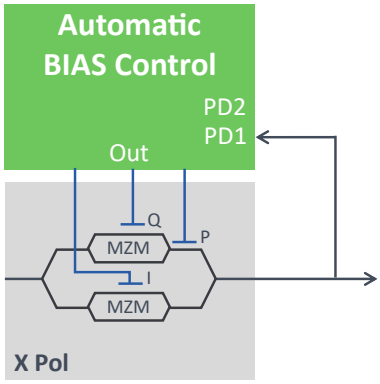
ABC-BPC-13
ABC-BPC-14



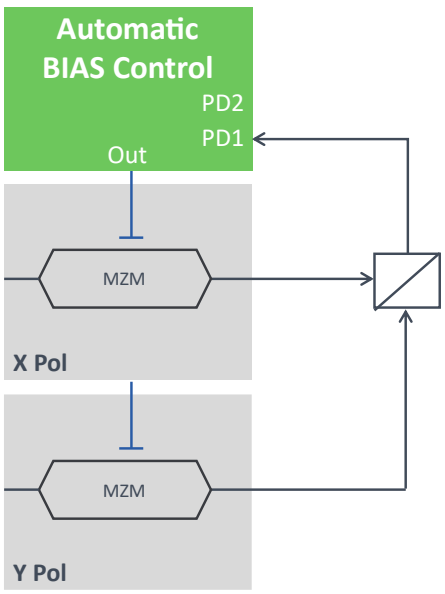
ABC-BPC-14



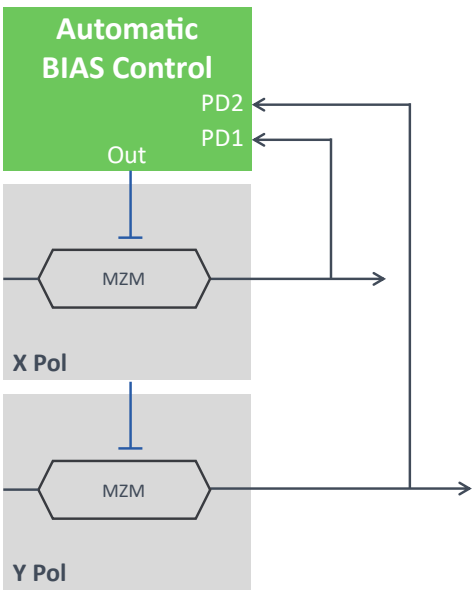
ABC-BPC-13
ABC-BPC-14



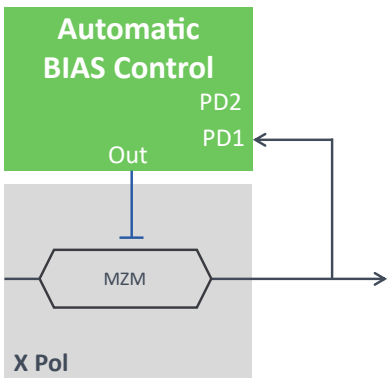
ABC-BPC-13
ABC-BPC-14



ABC-BPC-14

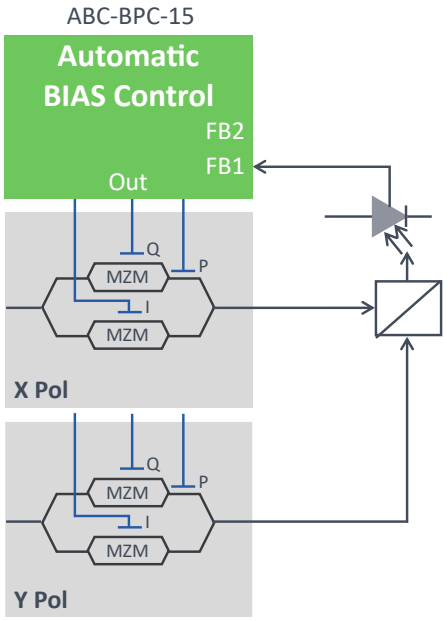


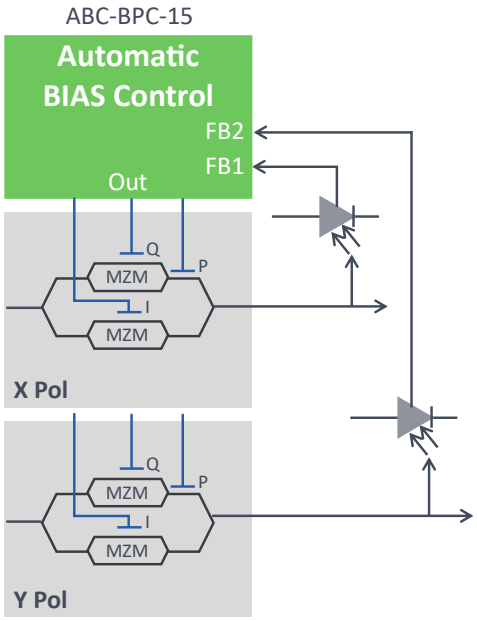
ABC-BPC-13
ABC-BPC-14

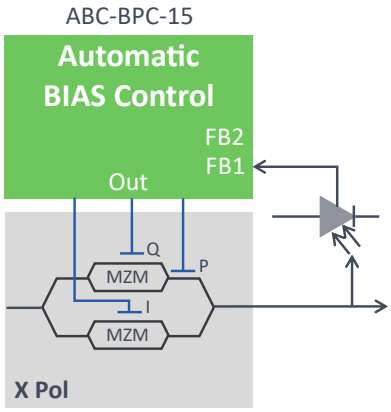


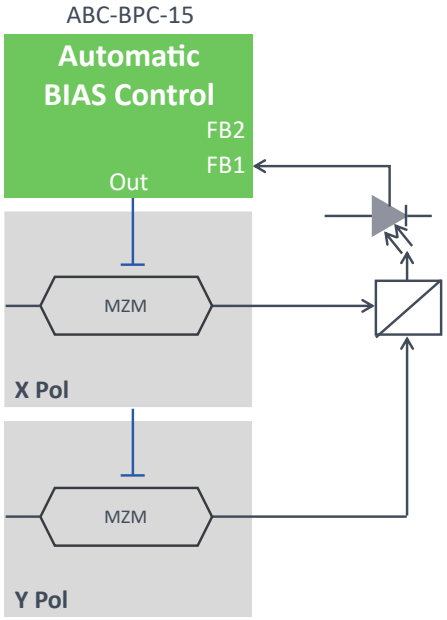
SUPPORTED MACH-ZEHNDER AND FEEDBACK CONFIGURATION, ELECTRICAL FEEDBACK VARIANT

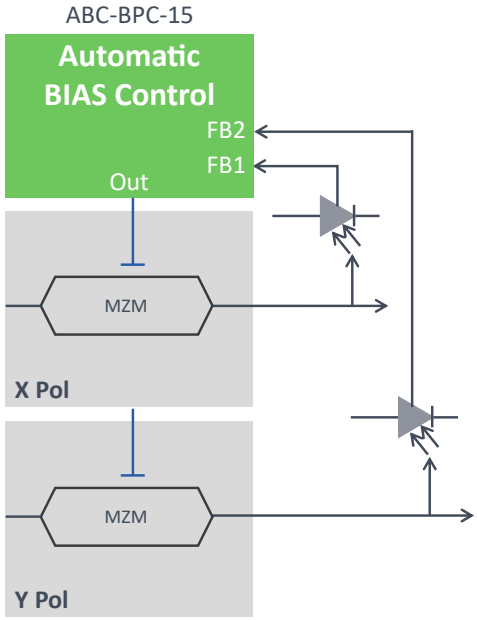
A single universal unit supports all setups shown below. Switching between setups is accomplished with a single click in the installation-free, web-based graphical user interface (GUI) or via SCPI-style remote commands. ABC-BPC-15 provides electrical input for external feedback photodiodes.

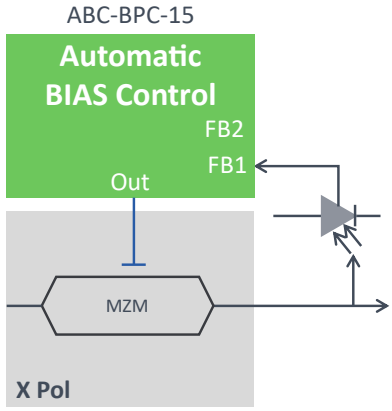












CONFIGURE ID ABC

ABC-BPC-13

ABC-BPC-14

ABC-BPC-15

1

DEVICE

ABC-BPC- ☐ - ☐

PRODUCT:
13: benchtop version, 1 optical feedback channel
14: benchtop version, 2 optical feedback channels
15: benchtop version, 2 electrical feedback channels

AC ADAPTOR CABLE TYPE:
C: Europe
A: US, Asia
D: UK

2

ACCESSORIES

ABC-BPC-ACC-AD- ☐

11: MZM adaptor board for OIF standard compatible MZM, 1 included in ABC set
12: MZM adaptor board SMA connector male output
13: MZM adaptor board to 2x 14 Pin MZMs “Axenic”

CONTACT
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id-photonics.com
Phone: +49-89-201 899 16

FURTHER RESOURCES

DOWNLOAD MANUAL
APPLICATION NOTES
DOWNLOAD CENTER

REQUEST A QUOTATION
Get in touch with us via info@id-photonics.com or send a request via our web form.

SCAN ME

SHAPING LIGHT.

HELPING ENGINEERS AND SCIENTISTS IN ADVANCING HOW THE WORLD COMMUNICATES, SENSES AND CONNECTS

ID PHOTONICS GMBH

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