PIB 17-04

Next Generation COMPex Excimer Laser

What´s new?

- ***Higher key specs***
- ***Ultimate Pulse Control (UPC)***
- ***Instant energy control (IEC)***
- ***New interfaces – Ethernet, USB 2.0***
- ***System parameter logging***
- ***Extended gas and optics life time***
- ***HASS tested – 36 months warranty***
- ***Latest safety standards***

Figure 1: New COMPex in Coherent corporate design

Key Content

This PIB announces the launch of the next generation of the market leading, high pulse energy COMPex excimer laser platform - successfully serving pulsed laser deposition (PLD), laser sampling (LA-ICP-MS) and wafer based laser lift-off (LLO) applications.

The new COMPex shares a common form factor with the legacy COMPexPro platform and provides superior optical performance at 193 nm, 248 nm, 308 and 351 nm UV wavelengths. A separate PIB concerning the discontinuation of the legacy COMPexPro platform will be released shortly.

Description

The next generation COMPex lasers come with superior pulse energy (750 mJ at 248 nm) and unrivalled pulse stability (0.75% at 248 nm), ultimate laser pulse control, and unsurpassed safety and supply structure in a standard setting footprint.

Built on the same fundamental architecture as the field-proven legacy model, the COMPex features industrial NovaTube with superior CleanFlow optics protection and MultiColumn twin-type precipitator to deliver market-leading window and gas fill intervals. Additionally, new

control electronics in conjunction with fast-photodiode monitoring of each individual laser pulse, extends the pulse control capabilities way beyond simple energy setting & stabilization statistics. With newly introduced functionalities such as PowerLok, the user gains the ultimate control over time delay and output energy of each and every laser pulse including instant energy level switching.

In order to ensure compatibility and reproducibility of laser ablation and PLD results of the large worldwide customer base, both output beam geometry and temporal pulse shape of the next generation COMPex are identical to the standard setting COMPexPro legacy model, which is the ablation laser benchmark across PLD research groups around the globe. Accessories such as high focusability optics, quick optics exchange set, VCR gas connection kit and high efficiency PLD optics train add customer value just to the point. Flexible interfacing via Ethernet, USB and RS232 connectors facilitates system integration. An extended standard warranty of three years reflects the superior quality & performance of the new COMPex generation – the strongest and best COMPex that has ever entered the market.

Key Specifications

	Wavelength (nm)	COMPex 50 FBG	COMPex 50	COMPex 102	COMPex 110	COMPex 201	COMPex 205
Pulse Energy[1] (mJ)	193	-	100	240	240	400	400
	248	140	150	400	400	750	750
	308	-	-	250	250	500	500
	351	-	-	200	200	300	300
Max. Rep. Rate (Hz)		100	50	20	100	10	50
Average Power[2] (W)	193	-	4	4.8	12	4	15
	248	12	7	8	30	7.5	33
	308	-	-	5	16	3.5	20
	351	-	-	4	12	3	15
Energy Stability[3] (1 sigma)(%)				≤ 0.75			
Pulse Duration (FWHM) (ns)		20	20	20	20	25	25
Beam Dimensions (V x H, FWHM)(mm²)		12 x 4.5	14 x 5	24 x 10	24 x 10	24 x 10	24 x 10
Beam Divergence (V x H, FWHM)(mrad²)		≤ 0.3 x 0.2	≤ 2 x 1	≤ 3 x 1	≤ 3 x 1	≤ 3 x 1	≤ 3 x 1
Beam Pointing Stability[4] (1 sigma) (µrad)				≤ 50			

1 measured at low reprate
2 measured at max. reprate
3 Specified at 248 nm
4 at shutter plane over 2000 pulses

Dimensions – Compatibility to old COMPexPro Lasers

The new COMPex lasers have the same form, fit and function as the legacy models. Integrators can easy implement the new COMPex into their machines without any changes.

	COMPex 50/100	COMPex 200
	1282 x 375 x 793 mm³ (51 x 15 x 31 in.³)	1682 x 375 x 793 mm³ (67 x 15 x 31 in.³)
kg	275 kg (605 lbs.)	350 kg (772 lbs.)

Form, fit and function for integrators maintained

PN´s for ordering the new COMPex Excimer Lasers

All PN´s are available in SFDC with full texts and prices for quotes.

New Part Number	New COMPex	Old Part Number	Legacy COMPex Pro
1314940	COMPex 50 F	1124409	COMPex Pro 50 F
1314941	COMPex 50 FBG	1213132	BraggStar M
1314942	COMPex 102 F	1113836	COMPex Pro 102 F
1314943	COMPex 102 XeCl	1113837	COMPex Pro 102 XeCl
1314944	COMPex 110 F	1113838	COMPex Pro 110 F
1314945	COMPex 110 XeCl	1113839	COMPex Pro 110 XeCl
1314970	COMPex 201 F	1115129	COMPex Pro 201 F
1314971	COMPex 201 XeCl	1115130	COMPex Pro 201 XeCl
1314972	COMPex 205 F	1115131	COMPex Pro 205 F
1314973	COMPex 205 XeCl	1115132	COMPex Pro 205 XeCl

Accessories

The accessories and PN´s from the previous COMPex Pro still exist, and fit the new version of the COMPex. Special low divergence optics provide highest focusability. With the pre-mounted optics window exchange takes place in a matter of seconds.

Part Number	Description	Part Number	
1323915	Pre-mounted rear mirror COMPex 193 nm	26082610	Low Divergence Optics 193 nm (COMPex Pro 50)
1323916	Pre-mounted rear mirror COMPex 248 nm	1282055	Low Divergence Optics 193 nm (COMPex Pro 100)
1323917	Pre-mounted rear mirror COMPex 308 nm	26082710	Low Divergence Optics 248 nm (COMPex Pro 50 and 100)
1323918	Pre-mounted rear mirror COMPex 351 nm	26082810	Low Divergence Optics 308 nm (COMPex Pro 100)
1323919	Pre-mounted aluminum rear mirror COMPex	26082910	Low Divergence Optics 351 nm (COMPex Pro 100)
1323920	Pre-mounted output coupler COMPex 100/200	26083010	Low Divergence Optics 193 nm (COMPex Pro 200)
1323921	Pre-mounted output coupler COMPex 50 193 nm	26083110	Low Divergence Optics 248 nm (COMPex Pro 200)
1323922	Pre-mounted output coupler COMPex 50 248 nm	26083210	Low Divergence Optics 308 nm (COMPex Pro 200)
		262456	Low Divergence Optics Adapter (COMPex Pro 100 and 200)
1132990	Temperature Stabilization Module	26082610	Low Divergence Optics 193 nm (COMPex Pro 50)
262856	VCR Upgrade Kit	1282055	Low Divergence Optics 193 nm (COMPex Pro 100)

Official Launch Date

The new COMPex will be launched during Photonics West 2017 (January 31st to February 2nd, 2017).

First delivery of new COMPex models is scheduled for early May 2017. New PN´s are available and ready to book.

Lead time beyond May 2017 will be 8 weeks ARO, safe slots can be confirmed for faster delivery.

The legacy COMPexPro models are going to be discontinued in March 2017.

Extended Warranty for New COMPex Lasers

The standard warranty has been increased to **36 months** or 1-billion pulses, whatever comes first. This is an increase of 12 months, versus the previous model.

The extended standard warranty of three years reflects the superior quality & performance of the new COMPex generation; proven to withstand the harshest test conditions in the laser industry (Coherent HASS Test).

Service

With every new COMPex, the customer gets a first installation and operation instruction by Coherent local service team. The COMPex is both serviceable and repairable in the field.

Productivity Plus (P+)

Productivity Plus (P+) is available for all new COMPex models.

Productivity Plus Agreements are limited to a maximum of 24 months coverage at the time of the system purchase (e.g. 36 months original warranty + 24 months Productivity Plus = 60 months total coverage).

PN# 1169717 Productivity Plus for $4,700 per 12 months coverage.

Product Training

Operator training is customer-oriented, and a powerful component of our value proposition. There are different training levels available. The prices and courses are listed below and are valid for groups of up to 4 trainees.

Product Line	Level A 2 Days	Level B 3 Days	Level B 3 Days
COMPex		PN# 1100554	
Price / USD	$4000	$8000	$10000

Level	Content
Level A	Laser operation
Level B	Laser operation and maintenance
Level C	Laser operation, maintenance, trouble shooting, and service procedures

Competition

The main excimer competitor is LightMachinery from Canada with their IPEX 700 series.

Feature	IPEX-700	New COMPex 205 F
248 nm Specs	700 mJ, no sigma given	750mJ, < 0.75%
Air Cooling	1-25Hz (but only optional)	1-20 Hz standard
Window Cleaning	EasyClean (use GateValves)	**CleanFlow** optics protection -> typ.4 years to first exchange **Quick Exchange Optics** (pre-mounted optics available)
Gas / Window Protection	**ExciPure (2016):** improved materials Dual stage-dust filter Improved stabilization algorithm	Industrial metal/ceramic NovaTube Soft pre-ionization ceramics Magnetic Assist protection CleanFlow optics protection **MultiColumn** twin dust filter
Interface / Control	Tablet	LasCtrl Software, Ethernet, USB **Ultimate Pulse Control** (UPC) - PowerLok Precision, 16-bit EGY monitor **Instant Energy Switching** (IES)
Warranty/Safety Standards	12 months, 24 months optional CE/RoHS unclear, not verified	**36 months** standard warranty CE, RoHS, China RoHS compliant Compliant with EU safety directives

LM offers aggressive pricing for IPEX 700 series. Please contact the PLM when you are in direct competition at your customer.

Challenger Messaging

There are three (3) main points on Challenger messaging:

Message 1: Reliability

Business problem the customer does not realize:

Short and long term reliability is important to an ablation laser-based tool. Unplanned failures that occur in the first 3 years have a dramatic impact on uptimes and hence project costs. Should a laser fail due to a beam parameter issues or shortened lifetime, critical capacity to build product or finalize a research project is lost.

Resolution:

The customer needs a highly reliable product that has been designed with minimum possible failure points due to electronics, shipping, and alignment. The customer needs a laser with adequate uptime to achieve fast and predictable ablation results.

Solution from Coherent:

The new COMPex was designed, built and tested with HASS protocols avoiding infant mortality (OBQ) issues and maximizing system lifetime. Thus ensuring not only the initial quality in the first 36 months, but also maximizing the life of the consumable parts, namely the laser tubes and discharge units. Both are designed to exceed one billion pulses.

The laser cavity features a Multi-Column twin-type precipitator and CleanFlow optics protection for a month-long operation with a single gas fill. Quick exchange optics preserve alignment after optics exchange.

COMPex is the world's first excimer laser with a HASS tested design ensuring reliability and initial quality for the near and long-term.

Challenger Messaging (Continued)

Message 2: CoO and Uptime

Business problem the customer does not realize:

Exchanging the entire gas volume causes unnecessary system downtime due to related purging and evacuation cycles. This may result in a laser tool running at lower capacity and with much accumulated gas consumption. Use of lasers without purges or inferior window protection means more frequent gas fills and increased gas costs.

Resolution:

The customer needs an excimer laser that accommodates largely uninterrupted long-term use, i.e laser features that extend gas and optics exchange intervals without increasing the CoO´s for the added benefit.

Solution from Coherent:

The COMPex Novatube technology incorporates a Multi-Column twin-type gas filter in conjunction with CleanFlow optics protection for stabilized energy laser operation over the course of an entire month. Stabilized energy operation at a preset energy value is standard operation pattern in many applications. Improved gas management reduces time for energy restoration and above all saves up to 60% of the gas costs as compared to prior models.

Challenger Messaging (Continued)

Message 3: Reproducible Results

Business problem the customer does not realize:

Beam properties such as “beam dimensions, divergence, pulse width, and directional beam stability” determine the effective ablation results and quality. Often thin film ablation recipes in PLD are not directly transferrable between research groups due to poor laser quality or mismatch in ablation laser properties despite using the same ablation wavelength. This invokes mostly unsuccessful efforts in aligning and shaping the laser beam to adapt the laser beam to standardly applied beam parameters throughout the majority of PLD labs.

Resolution:

Integration of a laser with standardly applied beam parameters will ensure reproducibility and is a sound basis for generating meaningful ablation results, which can be shared and directly compared with experiments obtained at collaborating research and development locations.

Solution from Coherent:

COMPex has maintained its standard-setting beam dimension and divergence parameters as well as pulse width and directional stability used throughout the UV ablation laser community. Now offering even higher pulse energy and pulse stability for extended fluence ranges, field sizes and superior precision ablation results.

For more information about this PIB, please contact:

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