



# Q-smart Service Training

## Expert Level





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# Laser Safety

- This Class IV laser configures to emit 1064 nm, 532 nm, 355 nm, 266 nm and 213 nm laser radiation.
- Do not allow laser radiation to enter the eye by viewing direct or reflected laser energy.
- Laser radiation may be reflected from various surfaces; care should be taken to avoid inadvertent reflection of laser energy while working with the laser.
- Wear appropriate protective eye-wear when working in an area with an exposed laser beam. Avoid looking directly into the laser output aperture or at reflections of the beam from other surfaces.



## With Q-smart Series

### □ Concentrate on your experiment

- Fast start up
- Easy to use
- Easy to optimize
- Designed to last

### □ Benefit from its versatility:

- Change wavelengths easily with interchangeable Harmonics
- Quick connect cables
- Compact and portable

Q-smart



## 2 models in one laser

### □ Q-smart 850

- 850mJ@1064nm at 10Hz
- 2w, 3w, 4w and 5w

### □ Q-smart 450

- 450mJ@1064nm at 10Hz
- 400mJ @1064nm at 20Hz
- 2w, 3w, 4w and 5w



#### Q-smart 450 Specifications

REPETITION RATE (Hz)	10	20	
PULSED ENERGY (mJ)	1064 nm 450	400	Measured with a calibrated wattmeter
	532 nm 230	230	
	355 nm 60	75/100	
	266 nm 60	50	
	213 nm 10	8	
ENERGY STABILITY (%)	1064 nm ± 2 (0.4)	± 2 (0.4)	
	532 nm ± 1 (0.2)	± 1 (0.2)	
	355 nm ± 6 (2)	± 6 (2)	
	266 nm ± 6 (2.0)	± 6 (2.0)	
	213 nm ± 12 (4)	± 12 (4)	
POWER DRIFT (%)	1064 nm ± 2	± 2	
	532 nm ± 5	± 5	
	355 nm ± 5	± 5	
	266 nm ± 5	± 5	
	213 nm ± 5	± 5	
PULSE DURATION (ns)	1064 nm ≤ 40	≤ 40	FWHM, fast photodiode
	532 nm ≤ 40	≤ 40	and 1 MHz average rate
	355 nm ≤ 40	≤ 40	
	266 nm ≤ 40	≤ 40	
	213 nm ≤ 40	≤ 40	
POINTING STABILITY (μrad)	1064 nm Standard	± 0.5	
	532 nm Standard	± 0.5	
	355 nm Standard	± 0.5	
	266 nm Standard	± 0.5	
	213 nm Standard	± 0.5	
JITTER (ns)	Standard	± 0.5	+/- 1 standard deviation of the jitter
			N = measured at both sides of 500 accumulated shots for 99 % of shots
FOCUSABILITY (Times Diffraction Limit)	1064 nm ≤ 2	≤ 2	All 1/e <sup>2</sup> of the peak; by Spiktron LDA FWHM
LINWIDTH (cm <sup>-1</sup> )	Standard ≤ 0.7	≤ 0.7	FWHM measured by a grating spectrometer with a 0.045 cm <sup>-1</sup> resolution
DIVERGENCE (mrad)	1064 nm ≤ 0.5	≤ 0.5	Full angle, at 1/e <sup>2</sup> of the peak; 85 % of total energy
POLARIZATION RATIO (%)	1064 nm > 90	> 80	
BEAM DIAMETER (mm)	1064 nm 6-7	6-7	At the output of the laser
Spatial Profile (fit to Gaussian)			Least square fit to Gaussian (perfect fit = 1)
NEAR FIELD / FAR FIELD	1064 nm > 0.70	> 0.70	1 m from laser output
	1064 nm > 0.95	> 0.9	1 m focal plane of a 2 m focus lens
POLARIZATION	1064 nm Horizontal	Vertical	
	532 nm Horizontal	Vertical	
	355 nm Horizontal	Vertical	
	266 nm Horizontal	Vertical	
	213 nm Vertical		
TEMPERATURE RANGE			
OPERATING & STORAGE	10-30°C -10-50°C		
FLASHLAMP LIFE TIME	>100 million shots		
SERVICE REQUIREMENTS	100-240 VAC 50-60 Hz Single phase		
CABLE LENGTH	3 m (10 feet)		

\*System damped and flushed with EGW



Quantel Q-smart 450  
Compact Q-Switched Nd:YAG laser  
www.quantel-laser.com



# Q-smart 850 specifications

## Q-smart 850 Specifications

		10	10-SLM <sup>1</sup>	'SLM : Single Longitudinal Mode upgradable on site
<b>REPETITION RATE (Hz)</b>				
<b>ENERGY PER PULSE (mJ)</b>	1064 nm 532 nm 355 nm HE 266 nm 213 nm	850 430 230 100 20	700 290 135 60 On request	Measured with a calibrated wattmeter <b>Highest Energy at 532 &amp; 355 nm with a single doubling crystal</b>
<b>ENERGY STABILITY (%)</b>	1064 nm 532 nm 355 nm 266 nm 213 nm	± 2 (0.6) ± 4 (1.3) ± 6 (2) ± 8 (2.6) ± 12 (4)		Peak to peak, 100 % of the shots (RMS)
<b>POWER DRIFT (%)</b>	1064 nm 532 nm 355 nm 266 nm 213 nm	± 3 ± 5 ± 5 ± 10 ± 14		Over 8 hours, without readjustment of phase-matching, 18°C < T < 28°C
<b>PULSE DURATION (ns)</b>	1064 nm 532 nm 355 nm 266 nm 213 nm	~ 6 ~ 5 ~ 5 ~ 5 ~ 5		FWHM, fast photodiode and 1 GHz scope
<b>POINTING STABILITY (μrad)</b>	All wavelengths		< 40	Measured by Spiricon LBA FWB, RMS, on 200 pulses at the focal plane of a 2 m focus lens
<b>JITTER (ns)</b>	1064 nm	± 0.5	± 1	With respect to Q-switch trigger IN, measured at half width of 500 accumulated shots for 99 % of shots
<b>FOCUSABILITY (Times Diffraction Limit)</b>	1064 nm		≤ 2	At 1/e <sup>2</sup> of the peak, by Spiricon LBA FWB
<b>LINewidth (cm<sup>-1</sup>)</b>	1064 nm	≤ 0.7	≤ 0.005	FWHM measured by a grating spectrometer with a 0.045 cm <sup>-1</sup> resolution
<b>DIVERGENCE (mrad)</b>	1064 nm		< 0.5	Full angle, at 1/e <sup>2</sup> of the peak, 85 % of total energy
<b>POLARIZATION RATIO (%)</b>	1064 nm	> 80	> 70	
<b>BEAM DIAMETER (mm)</b>	1064 nm		9	At the output of the laser
<b>SPATIAL PROFILE (fit to gaussian)</b>				Least square fit to Gaussian (perfect fit = 1)
<b>NEAR FIELD: FAR FIELD<sup>2</sup></b>	1064 nm 1064 nm		> 0.70 > 0.90	<sup>2</sup> At 1 m from laser output <sup>3</sup> At focal plane of a 2 m focus lens



# Q-smart 450 specifications

## Q-smart 450 Specifications

REPETITION RATE (Hz)		10	20	
PULSED ENERGY (mJ)	1064 nm	450	400	Measured with a calibrated wattmeter
	532 nm	220	200	
	355 nm	80/130 <sup>1</sup>	75/120 <sup>1</sup>	<sup>1</sup> Regular/High energy UV option
	266 nm	60	50	
	213 nm	10	8	
ENERGY STABILITY (%)	1064 nm	± 2 (0.6)		
	532 nm	± 4 (1.3)		
	355 nm	± 6 (2)		
	266 nm	± 8 (2.6)		
	213 nm	± 12 (4)		
POWER DRIFT (%)	1064 nm	± 3		Over 8 hours, without readjustment of phase-matching, 18°C < T < 28°C
	532 nm	± 5		
	355 nm	± 5		
	266 nm	± 10		
	213 nm	± 14		
PULSE DURATION (ns)	1064 nm	≤ 6		FWHM, fast photodiode and 1 GHz scope
	532 nm	≤ 5		
	355 nm	≤ 5		
	266 nm	≤ 5		
	213 nm	≤ 5		
POINTING STABILITY (μrad)	All wavelengths		< 40	Measured by Spiricon LBA FWB, RMS, on 200 pulses at the focal plane of a 2 m focus lens
JITTER (ns)	1064 nm		± 0.5	+/- 0.5 ns with respect to Q-switch trigger IN, measured at half width of 500 accumulated shots for 99 % of shots
FOCUSABILITY (Times Diffraction Limit)	1064 nm		≤ 2	At 1/e <sup>2</sup> of the peak, by Spiricon LBA FWB
LINewidth (cm <sup>-1</sup> )	1064 nm		≤ 0.7	FWHM measured by a grating spectrometer with a 0.045 cm <sup>-1</sup> resolution
DIVERGENCE (mrad)	1064 nm		< 0.5	Full angle, at 1/e <sup>2</sup> of the peak, 85 % of total energy
POLARIZATION RATIO (%)	1064 nm	> 90	> 80	
BEAM DIAMETER (mm)	1064 nm		≥ 6.5	At the output of the laser
SPATIAL PROFILE (fit to gaussian)				Least square fit to Gaussian (perfect fit = 1)
NEAR FIELD <sup>2</sup>	1064 nm	> 0.70	> 0.70	<sup>2</sup> At 1 m from laser output
FAR FIELD <sup>3</sup>	1064 nm	> 0.95	> 0.9	<sup>3</sup> At focal plane of a 2 m focus lens.



## Q-smart series: new Features

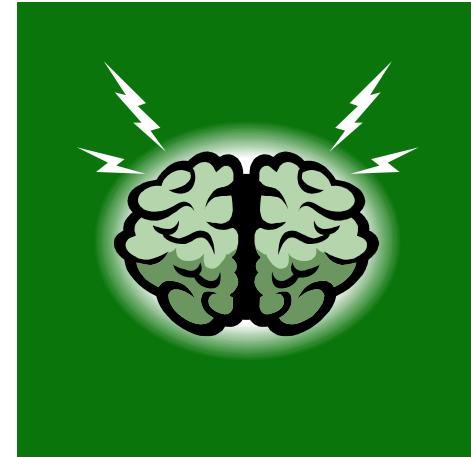
### Laser brain

#### ► Benefits to the customer

- No calibration required. Plug and play heads
- One Power supply for two different heads

#### ► Benefits to you

- Swappable power supplies
- Easier troubleshooting with same power supply for Q-smart 850 and 450



### Automatic Phase-matching

#### ► Benefits to the customer

- No need to be a specialist in optics to use it
- No manual adjustment required on crystal angles
- Optimized energy for any wavelength after one click

#### ► Benefits to you

- Fast service, keep your customers happy
- Opens doors to new category of buyers

Q-smart



## Versatility

- **Small and light power supply : <27kg**
- **Compact laser head : 7kg / 2,1kg per HG**
- **Fully disconnectable laser head and power supply**

### ► Benefits to the customer

- Easier to carry and to move from one lab to another one
- Cheaper (expedition costs)
- No large crate to store

### ► Benefits to you

- Allows for UPS or Fedex shipments
- => Cheap and express deliveries





## Fast start up

- ❑ Quick connect I/O cables and coolant lines
- ❑ Fill cap. No special tools needed
- ❑ Easy view coolant level. Shows correct level
- ❑ Auto priming pump. Allows you to force fill coolant lines
- ❑ Clear coolant lines allow visual proof of clearing of air
- ❑ Easy drain

### ► Benefits to the customer

- Intuitive and quick set-up

### ► Benefits to you

- No irate calls during installation



Q-smart



# Fast start up

**Carrying Handles**

**External synchronisation TTL**

**5 Removable wheels**



**Ethernet control**

**Q-touch : touch screen interface**



**Warning Security interlock**

**Quick connect cables: 3m**



**Easy fill**

**Water level indicator**



# QUICK SETUP GUIDE

## Q-smart 850

Version A | November 28, 2013



Wear eye protection. Take precautions as though the system is capable of lasing at anytime while it is turned on.



1

### Mount the Laser Head



Use the three mounting feet to secure the Laser Head to a flat mounting surface. It is important that the mounting surface be flat, to prevent distortion. Two optional tapped M6 mounting holes are provided on the bottom of the Laser Head.

2

### Connect the Laser I/O Cable.

Connect the Laser I/O from the ICE (Laser Power Supply) to the Laser Head. Rotate the connector to fully tighten it until the red ring disappears.

3

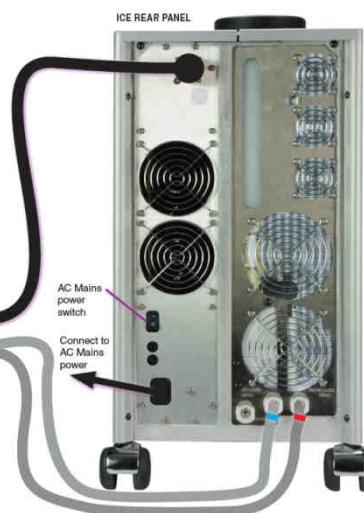
### Connect Coolant Lines.

Connect the two coolant lines between the Las Head and the ICE. Match the connector colors blue to blue and red to red.

4

### Connect the AC Mains Power

Connect the AC Mains Power to 100-240 VAC 50/60 Hz power.



5

### Fill with Coolant

- Remove cap and fill the reservoir with demineralized water until the level reaches the "Max" line on the Coolant Level Window.
- Turn the ICE AC Mains power switch to ON "I".
- Turn the key switch on the front panel to ON "I". The fluid level in the reservoir begins to lower as the coolant lines fill.
- Turn the key switch to OFF "0" and add additional coolant to fill the reservoir to "Max".
- Replace the VERY LARGE reservoir cap.

6

### Thermalization (from storage at <15°C)

Run the system without flashing for 2 hours.

7

### Remote Interface

Turn the key switch to OFF "0" and Connect the Q-touch to the dedicated port located on the ICE front panel.

8

### Read the manual

Connect the USB memory device to a computer system and read the User Manual. Your Q-smart system is now ready to operate.



Read the important safety instructions and details of operation in the User Manual located on the USB

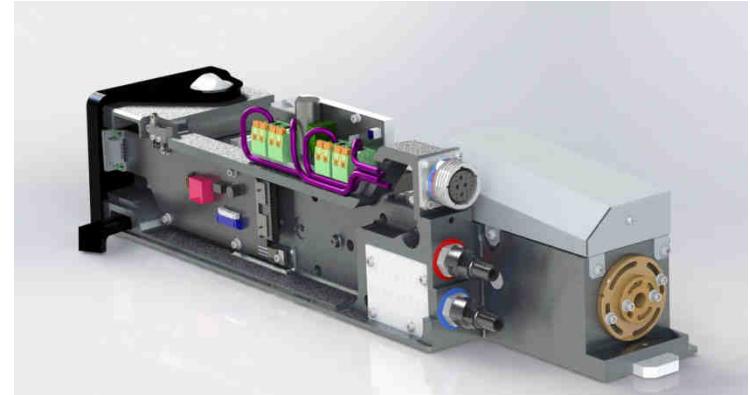


You will need 3 liters of demineralized water.



# High Quality- High efficiency

- ❑ Single thermally stabilized aluminum casting
- ❑ Field proven wedges adjustment
- ❑ High global efficiency thanks to control of electrical discharge
- ❑ Easy FL change



## ► Benefits to the customer

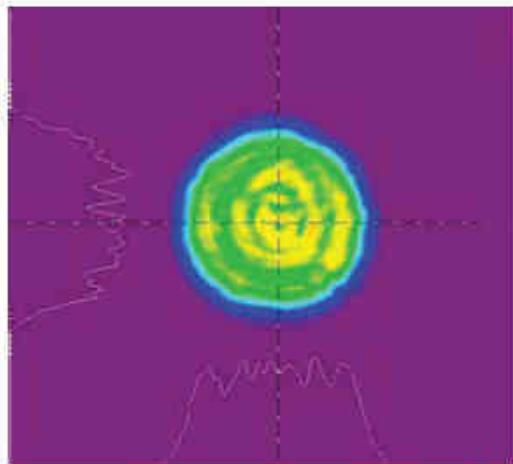
- Industrial grade of mechanical stability
- Extended temperature range
- Low maintenance cost
- Low power consumption

Q-smart

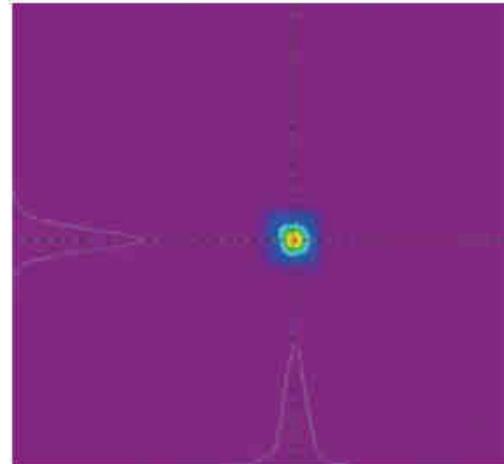


## Q-smart 450 : Excellent beam quality

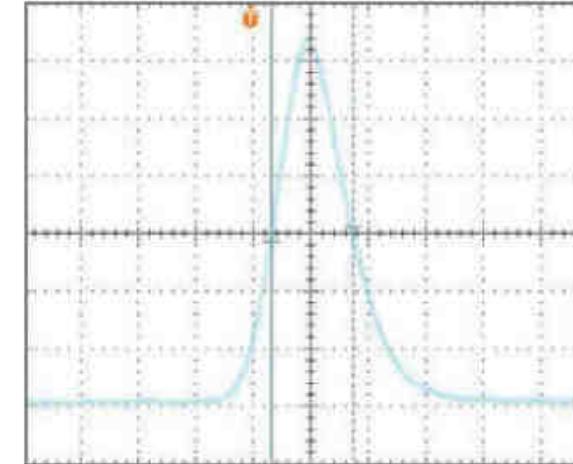
Near field @1064 nm



Far field @1064 nm



Temporal profile @1064 nm



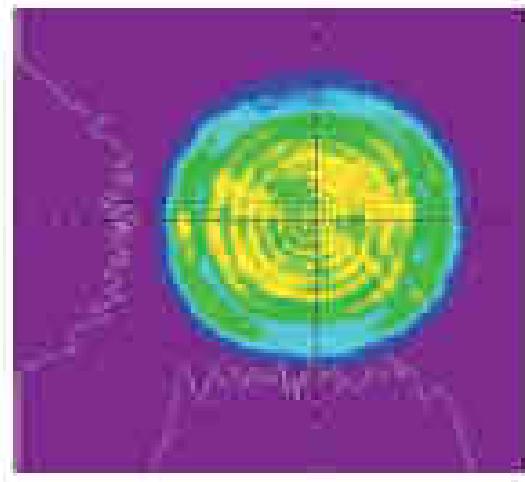
- ❑ Ceramic diffuser => Homogeneous pumping
- ❑ High global efficiency

Q-smart



## Q-smart 850 : Excellent beam quality

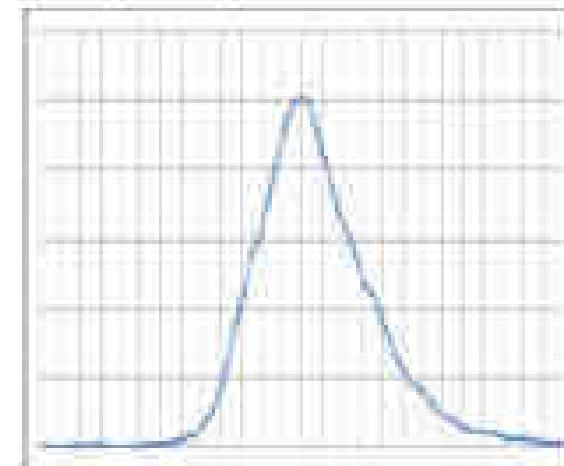
Near field @1064 nm



Far field @1064 nm



Temporal profile @1064 nm



- ❑ Ceramic diffuser => Homogeneous pumping
- ❑ High global efficiency

Q-smart



# Versatility: easy change of wavelengths

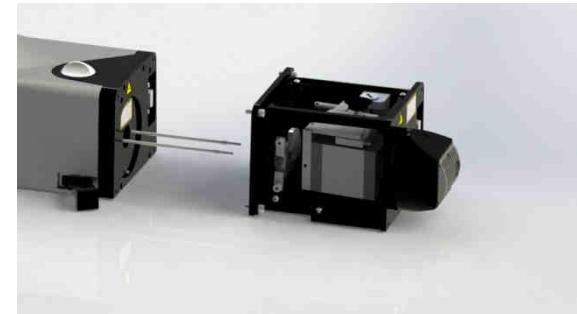
- ❑ One temperature stabilized crystal per HG
- ❑ One set of dichroïcs per module: removable dichroïcs without opening HG cover
- ❑ Automatic Phase matching in one click on the Q-touch
- ❑ Automatic recognition of the module on the Q-touch

## ► Benefits to the customer

- Intuitive and quick harmonics change
- No need to be a specialist

## ► Benefits to you

- Less technical support

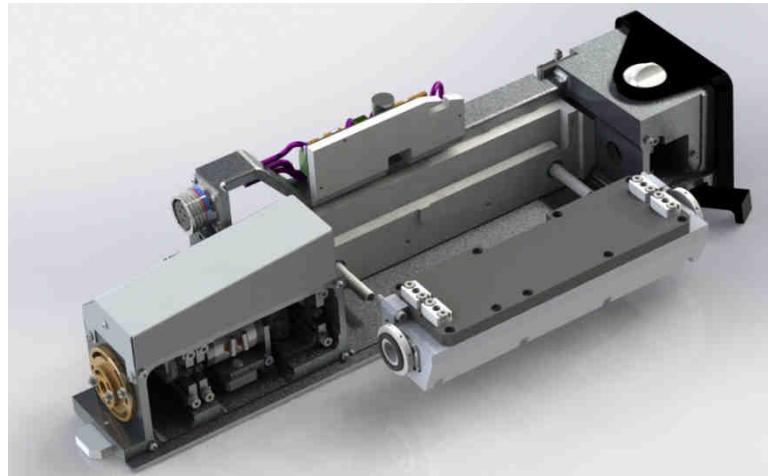




## Fast repair

**On site maintenance possible  
(with Expert level training)**

- ❑ **Removable pumping chamber**
- ❑ **Removable rod assembly**
- ❑ **Easy access to optics**
- ❑ **Back access for laser alignment**



### ► Benefits to the customer

- Fast and cheaper maintenance



### ► Benefits to you

- No need to ship back the whole system to Quantel

**Q-smart**



Fast repair

## Power supply made of 3 modules

Only 2 boards based on Evergreen design

### ► Benefits to you

- Quick standard exchange
- No need to ship back the whole system



Q-smart



# Easy consumables change

## □ Easy Coolant maintenance

**On line DI cartridge (same coolant lines as Evergreen)**

**Recommended replacement date given by the Q-touch**

### ► Benefits to the customer

- Intuitive fill, quick set up and replenishment

### ► Benefits to you

- Common parts in stock
- No horror stories of algae growth due to poor water health

## □ Easy Flashlamp replacement + long lifetime

### ► Benefits to the customer

- 100 Million shots more than 3X BB lifetime => low maintenance costs

### ► Benefits to you

- No risk of misalignment





# Evergreen - Q-smart Beginning of spare parts consolidation

## □ Common parts :

- water tank
- coolant lines
- I/O connector and cables
- DI cartridge



## ▷ Benefits to you

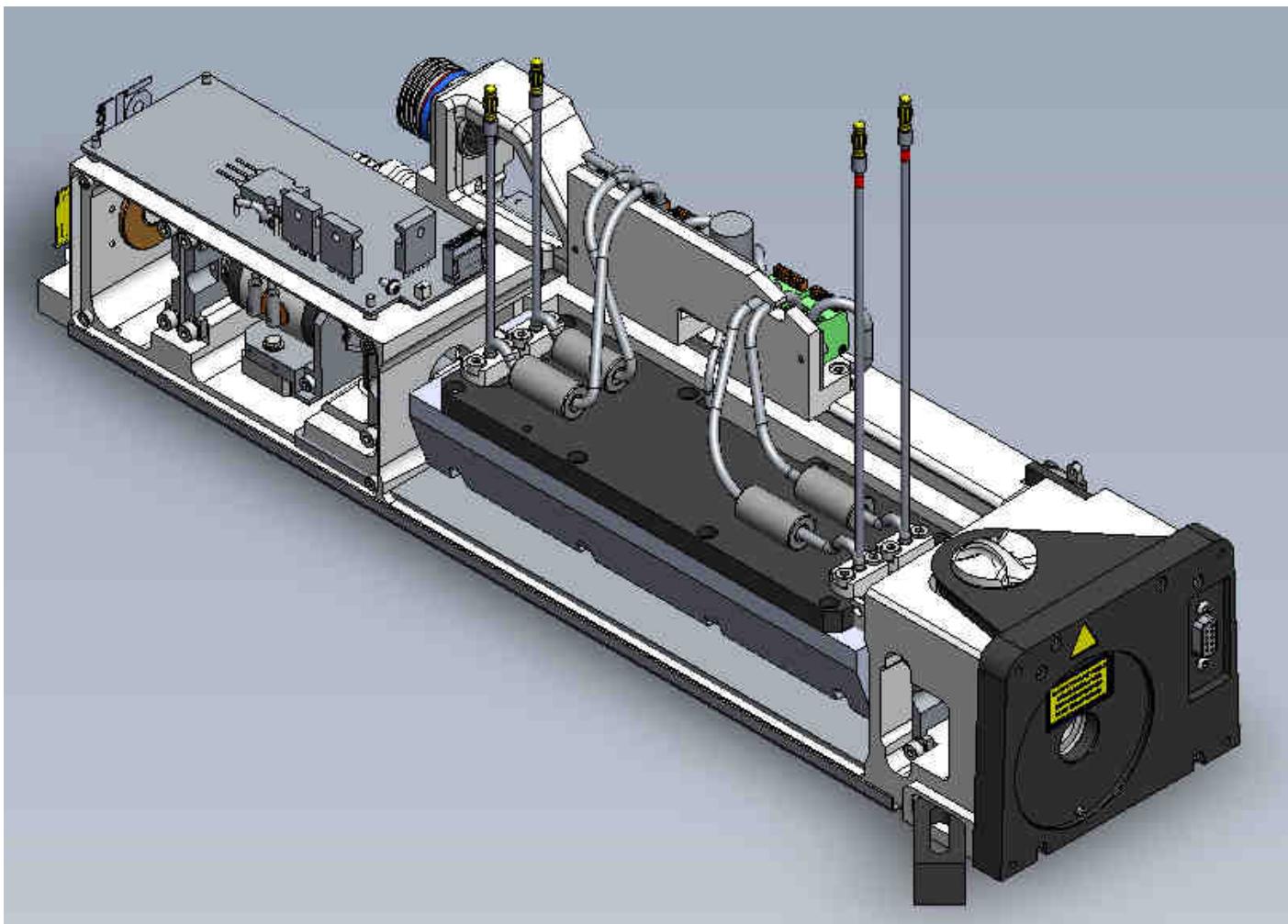
- Common parts in stock
- Quick deliveries





# LASER DESCRIPTION

## QSMART laser





# LASER DESCRIPTION

**QSMART laser head has:**

**-Pump chamber Assy**

**-GRM Assy**

**-QSWITCH cavity**

**-Laser Brain CCA Assy**

**-Trigger CCA Assy**

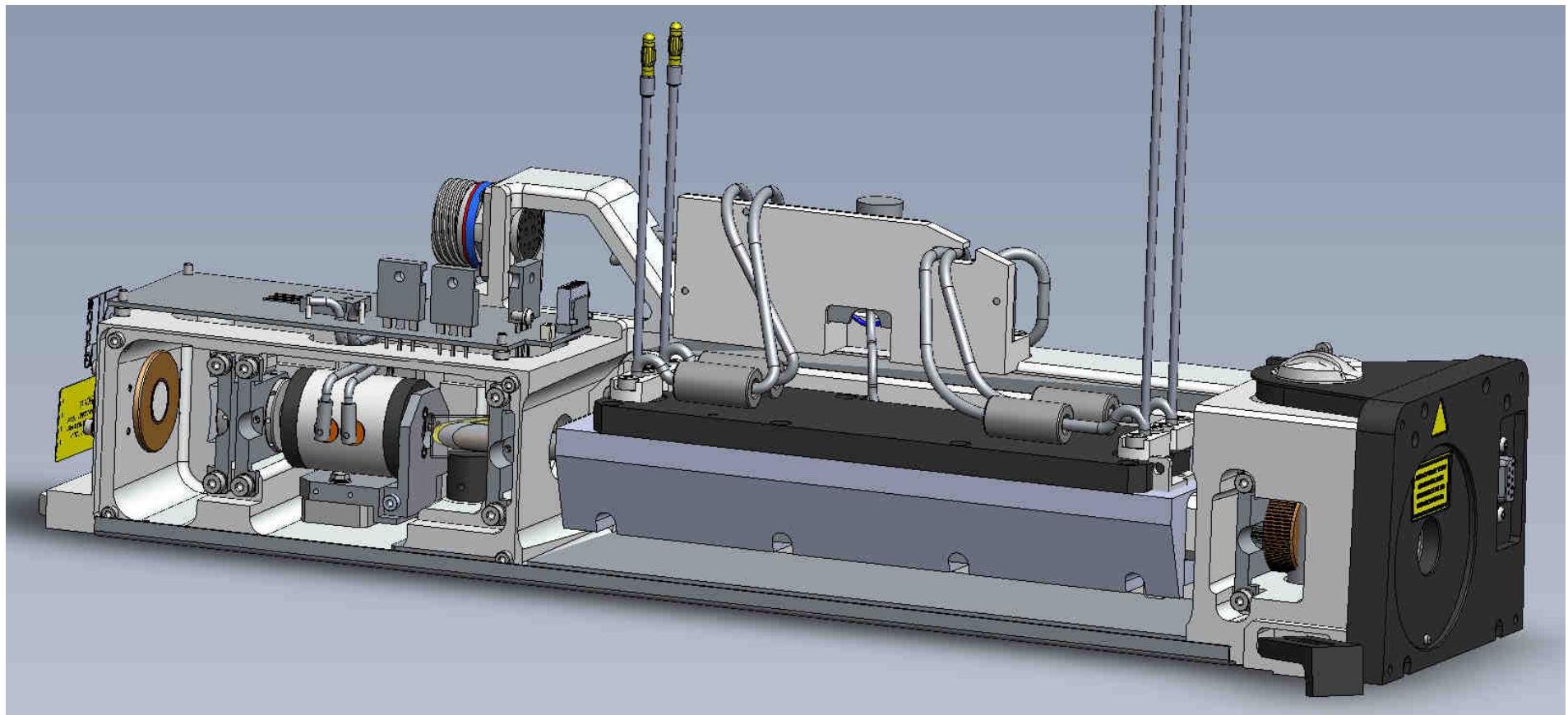
**-LED CCA Assy**

**-PSHG CCA**

**-Harmonics Generators**

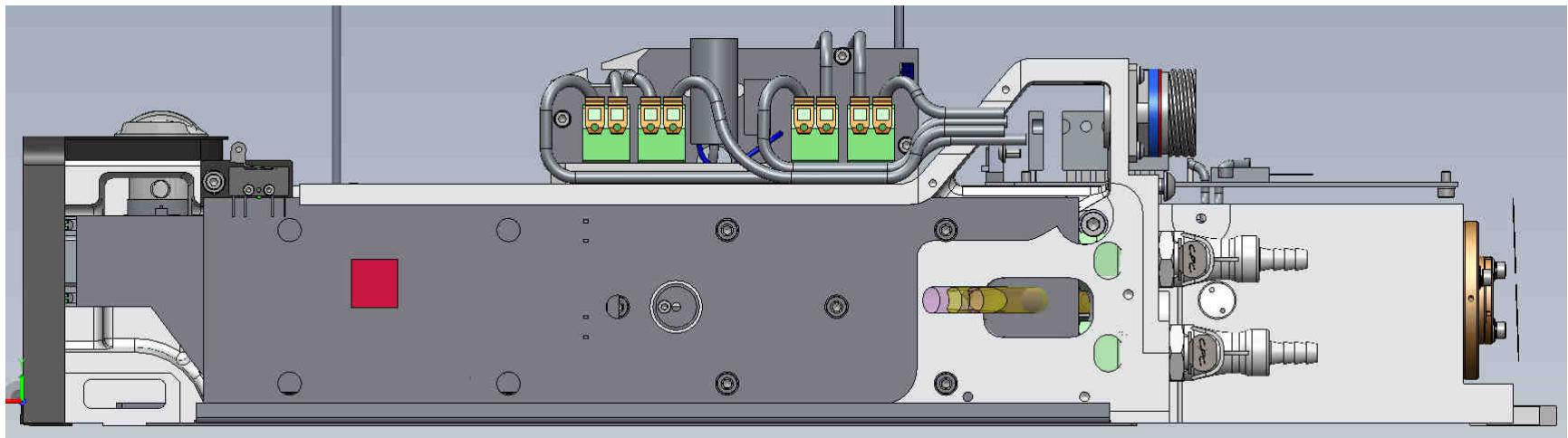
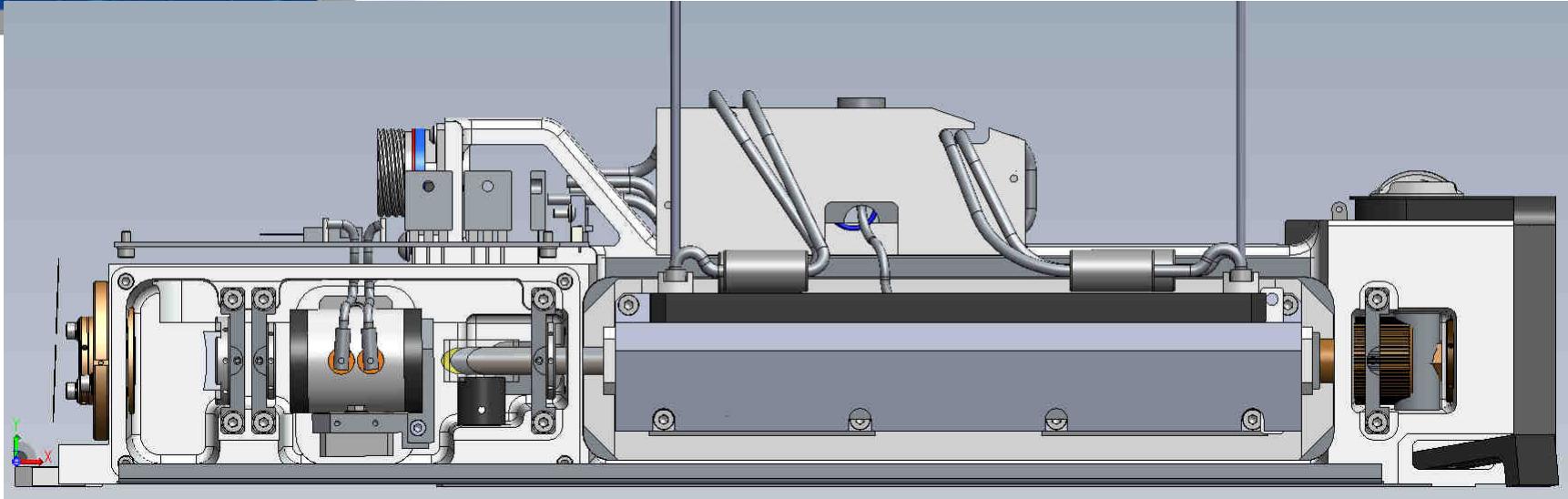


## QSMART HEAD



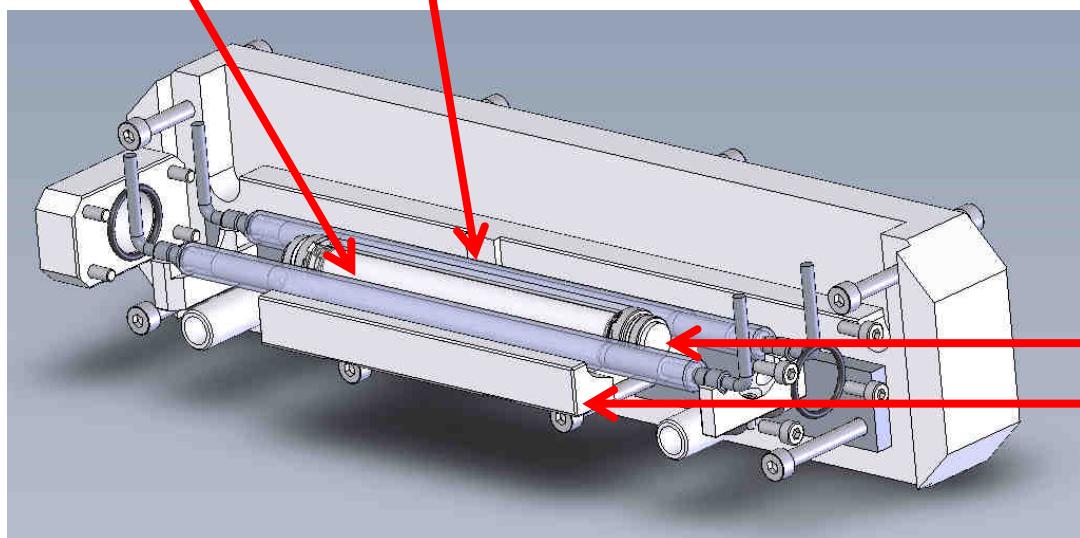
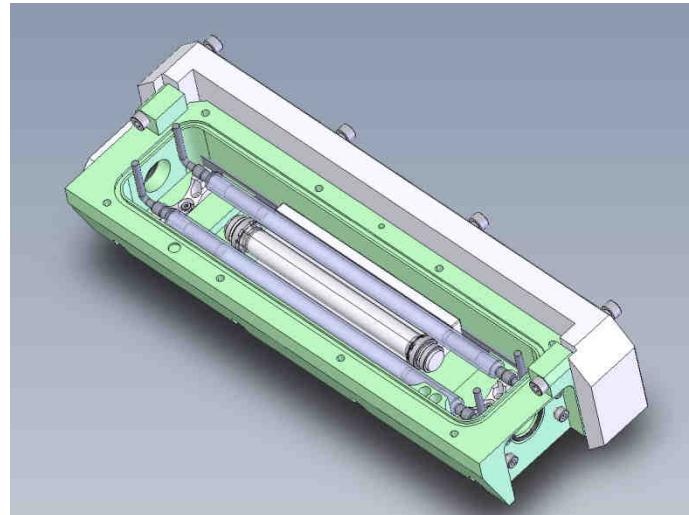
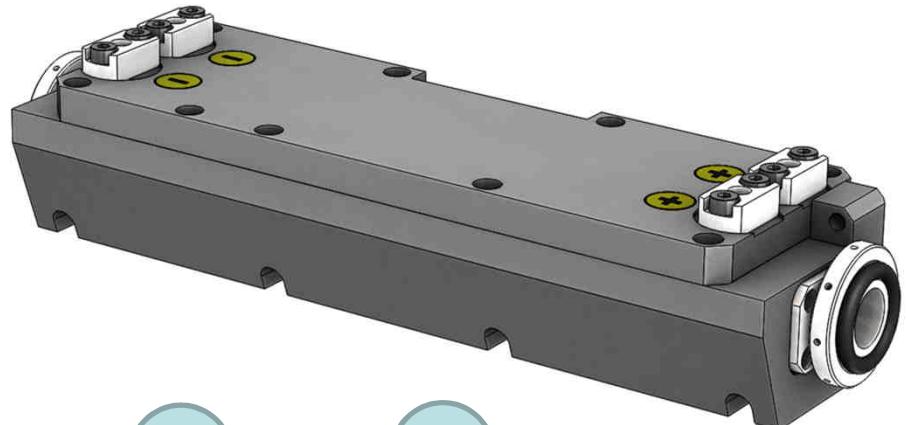


## Laser Head side views





# Pumping Chamber

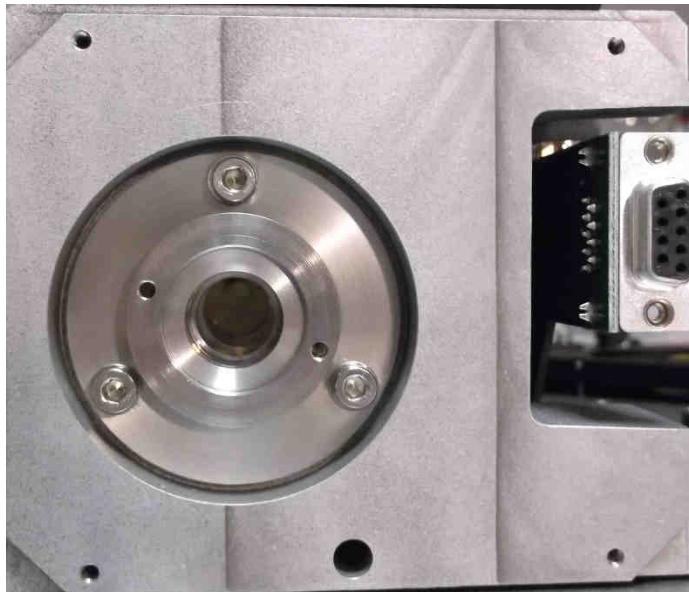


Cooling: 800W  
Temperature: 38°C with  
external temp +8°C.



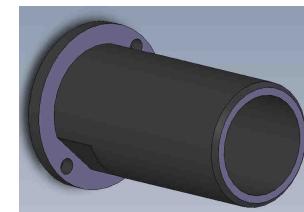
# GRM ASSY

## GRM ASSY



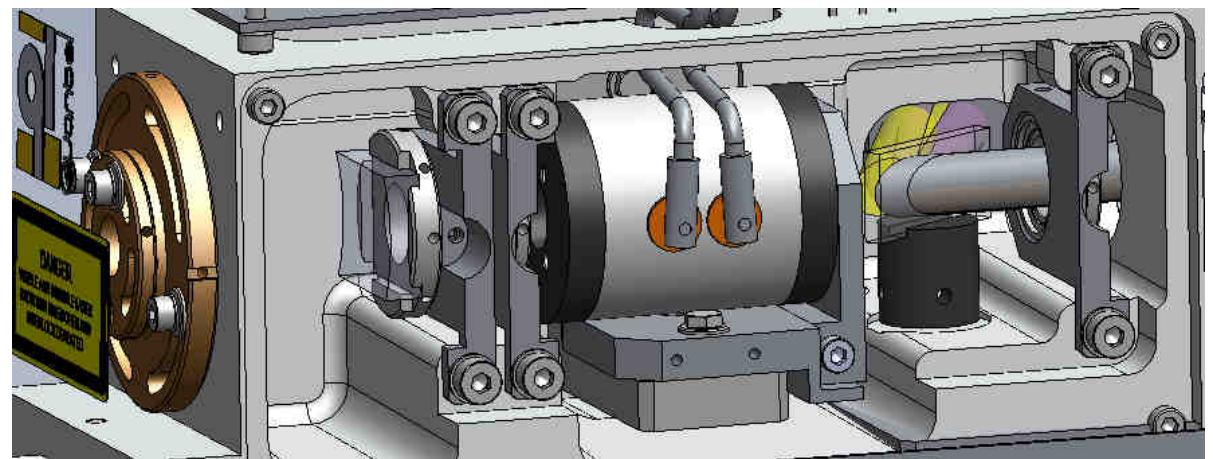
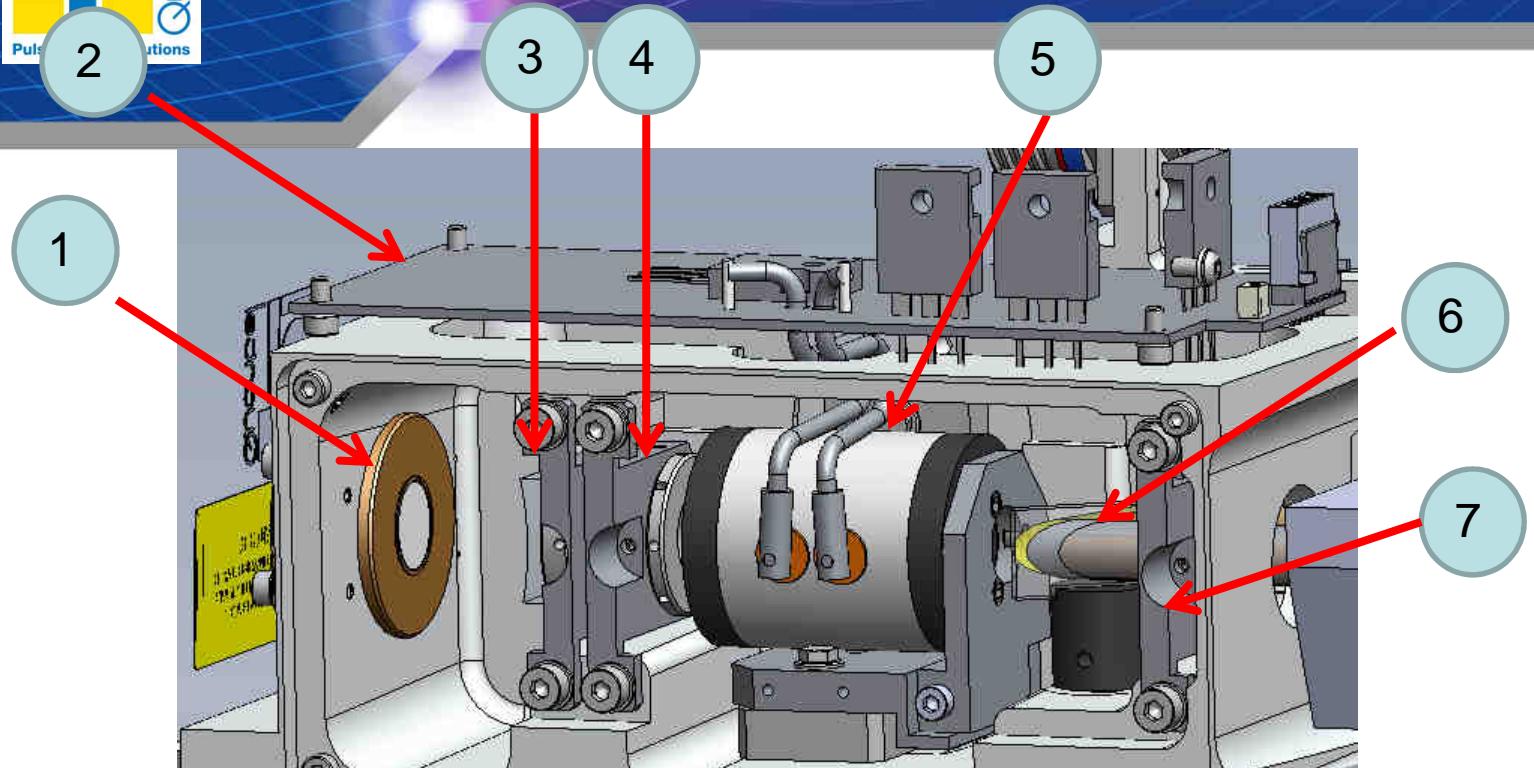
Gaussian Mirror with gradient reflectivity

Need Gaussian tool for adjustment





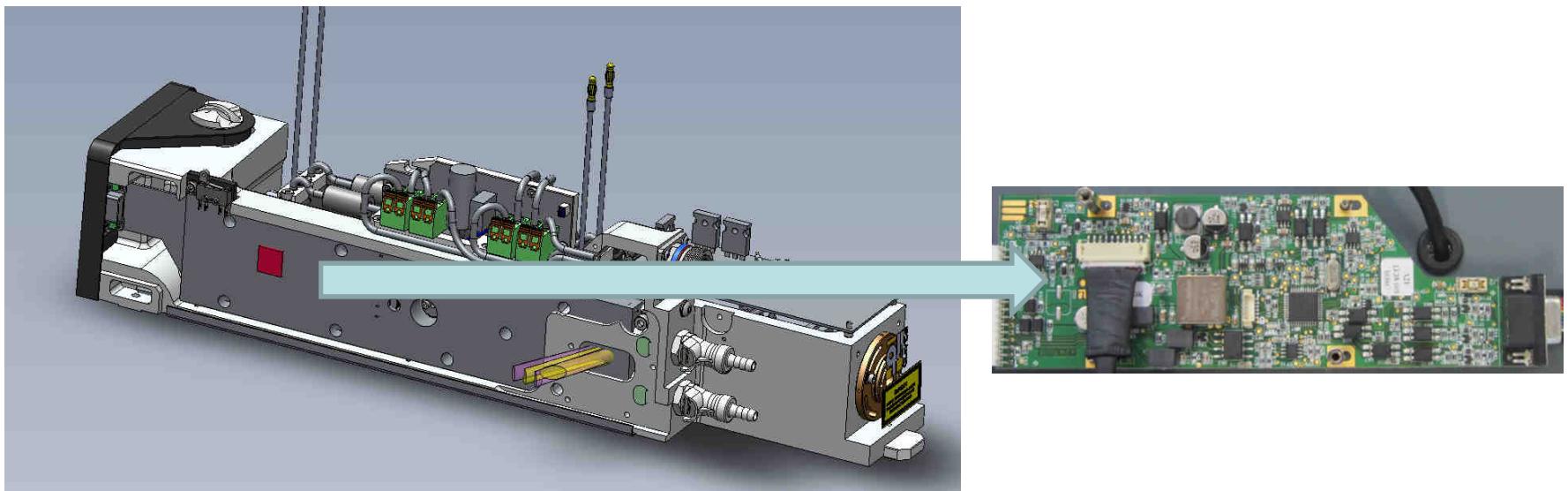
## Qswitch cavity





# Laser Head – Laser Brain CCA

## Laser Brain CCA



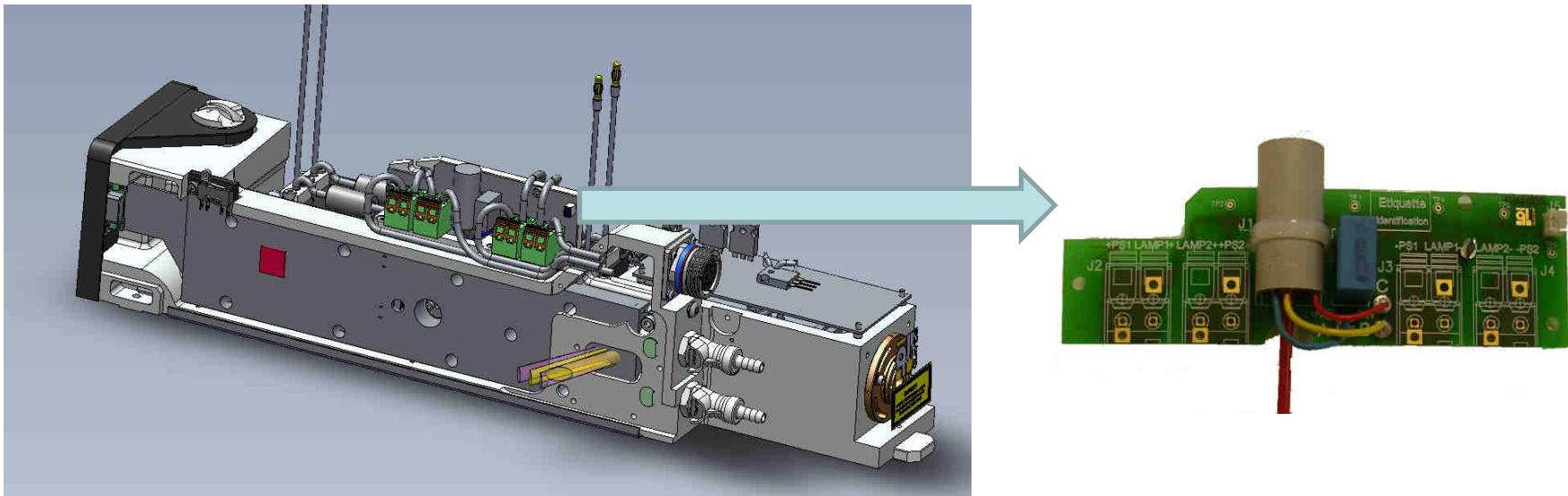
### Laser Brain CCA manages:

- Alarms
- APM: Oven regulation (harmonic generators)
- Correct function of the laser
- Parameters saving in EPROOM



## Laser Head – trigger CCA

### Trigger CCA

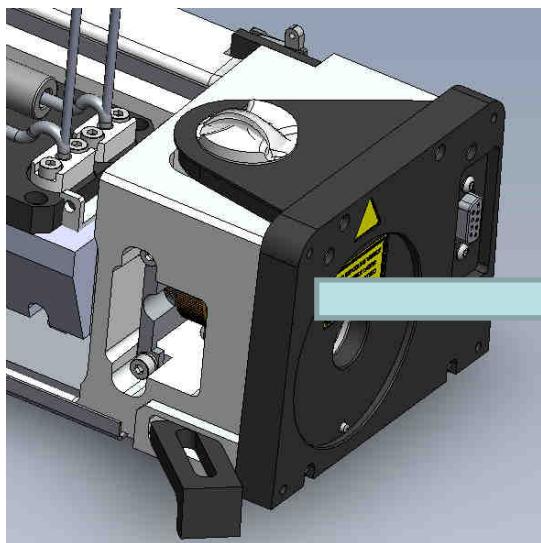


Trigger CCA manages:

- Trigger pulse on the flashlamps



## LED CCA



**LED CCA contains 3 LEDs**

**LED OFF:** The Emission Warning is off when the system is in Run Mode.

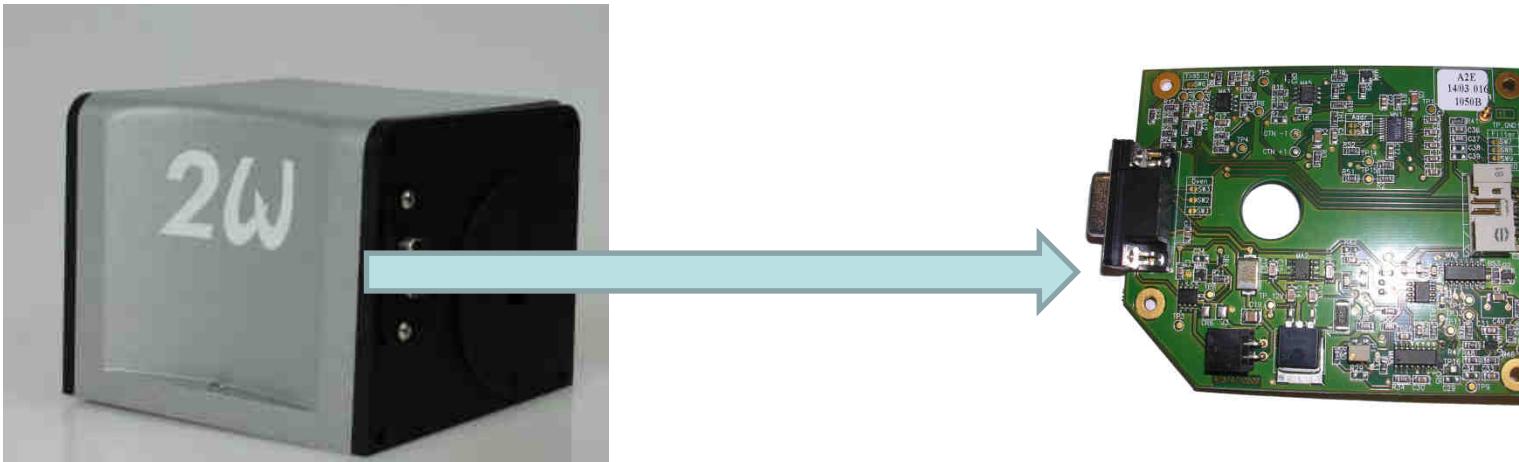
**LED ON:** The Emission Warning is illuminated continuously to indicate the high voltage is enabled and the flashlamps are active.

**Flashing:** The Emission Warning flashes at a 1 Hz rate to indicate that a Q-Switch is enabled.



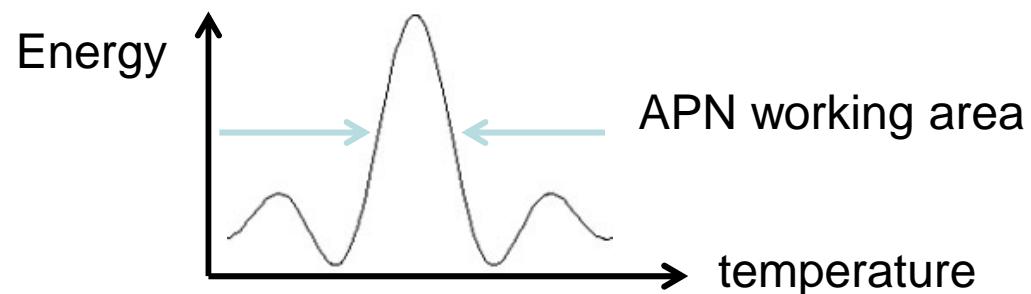
## PSHG CCA

### PSHG CCA



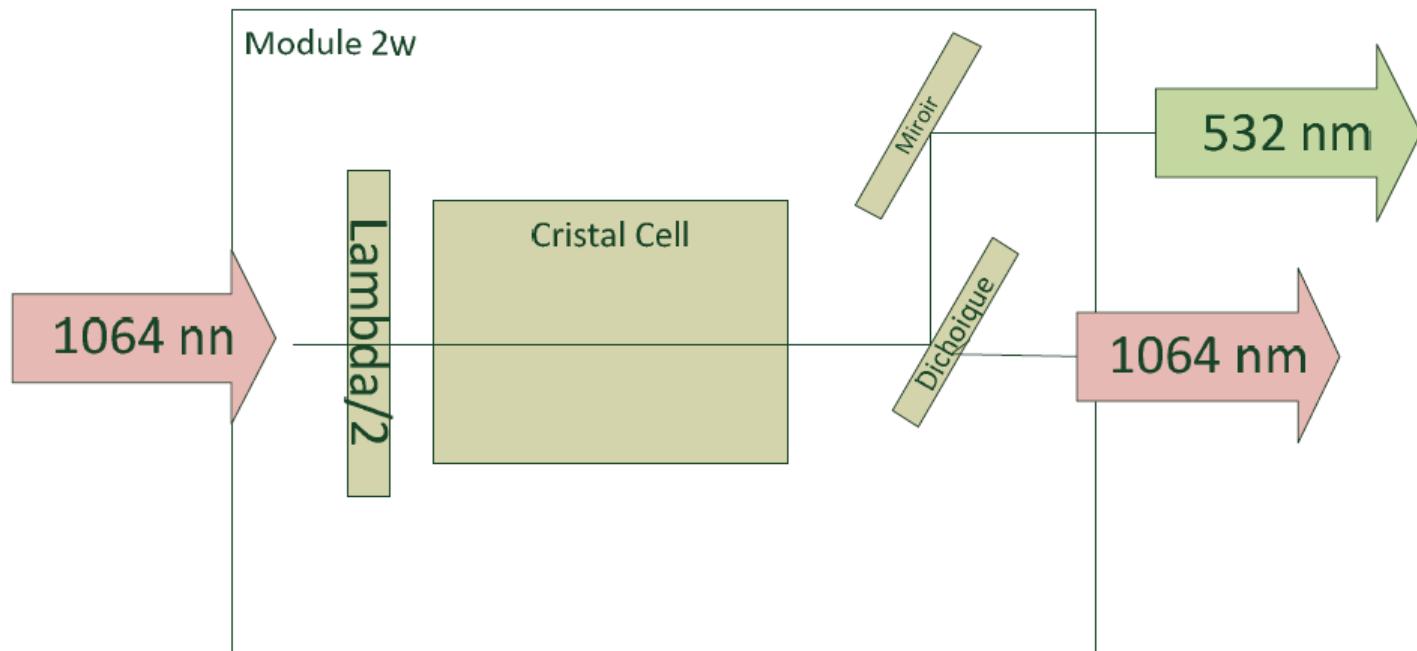
-Manages Auto Phase Matching

APM do automatic phase matching on harmonic generator crystal by energy optimization loop (photodiode).



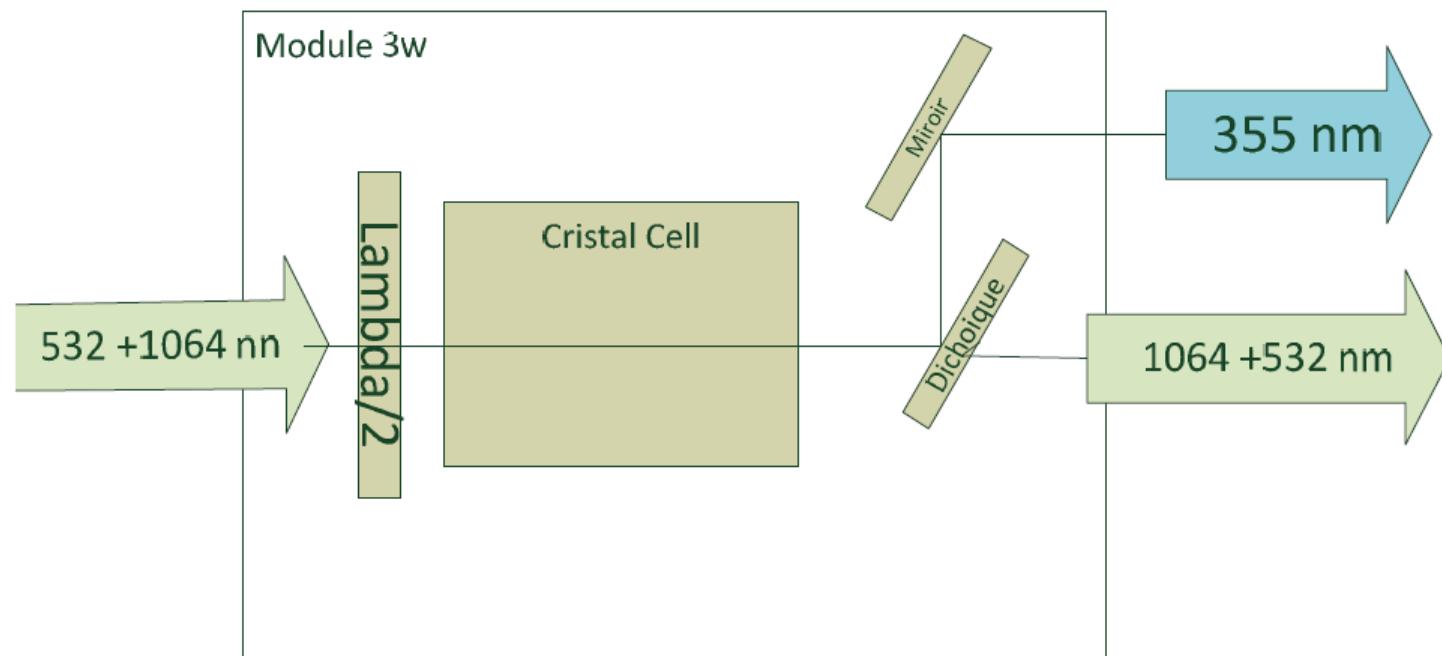


# Second Harmonic Generator



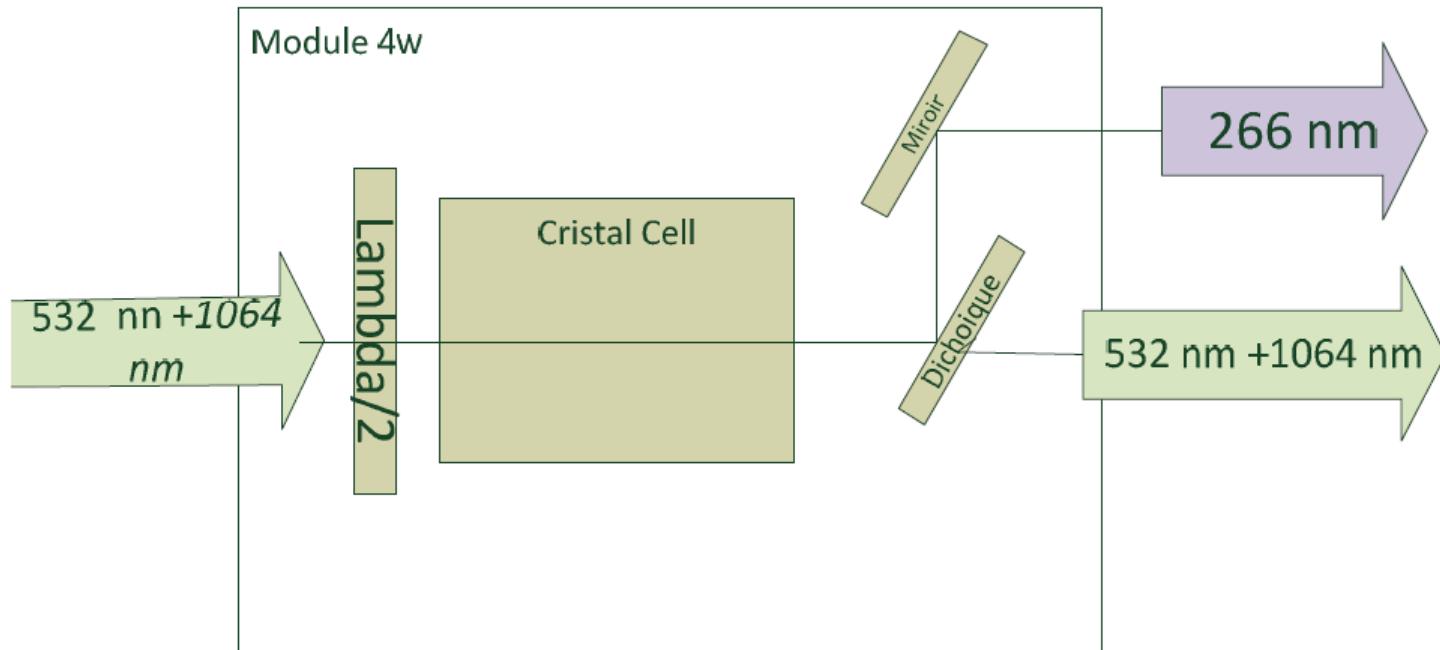


# Third Harmonic Generator

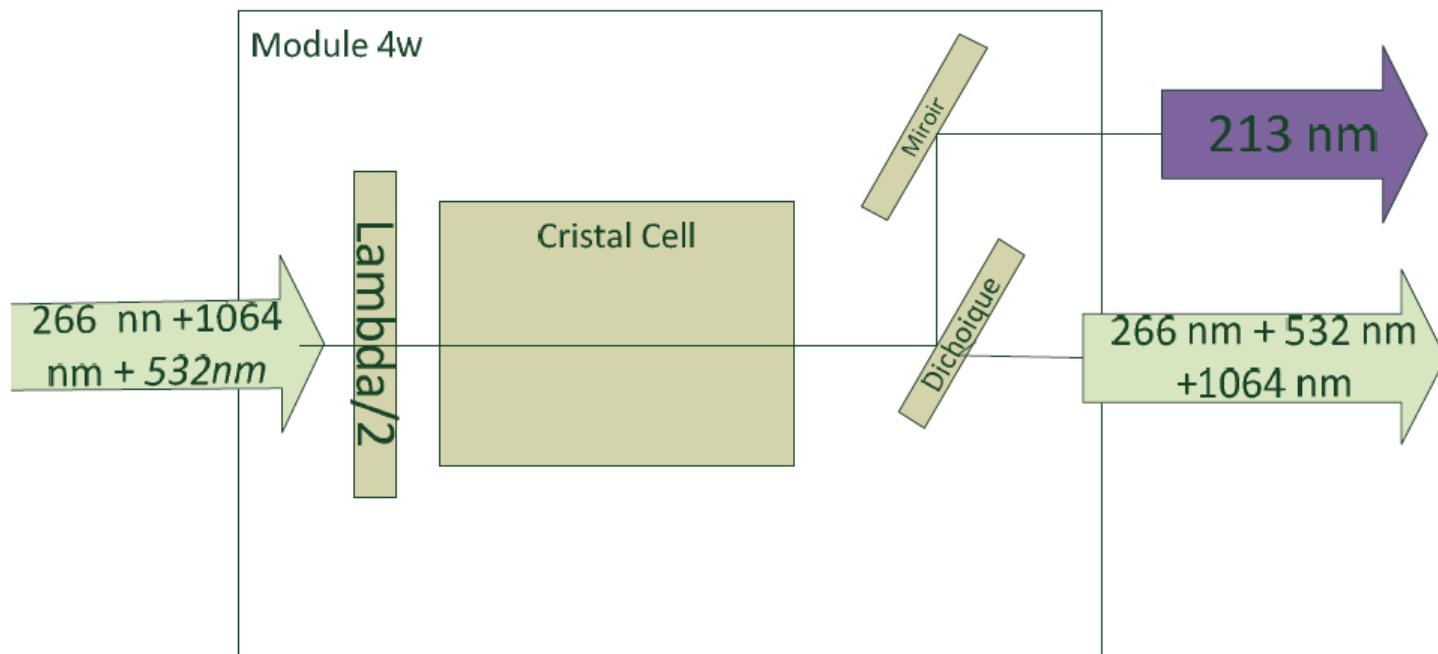




# Fourth Harmonic Generator



# Fifth Harmonic Generator





## Qsmart- ICE760

**ICE760 contains 3 modules:**

- CPU controller**
- Cooling group**
- Power supply**

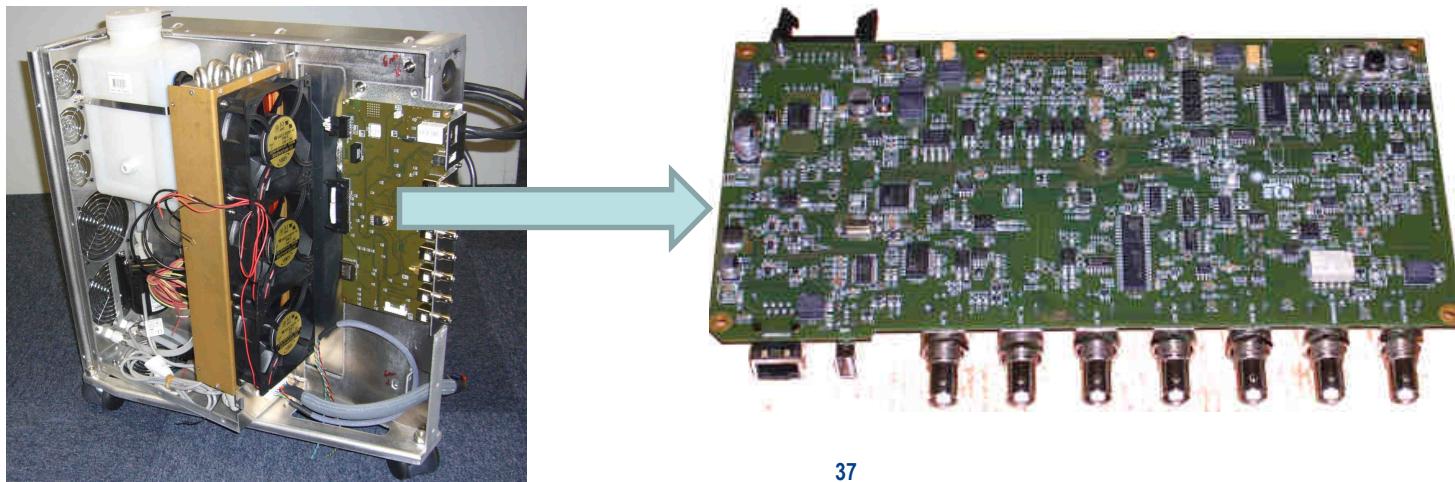




# Controller Processing Unit board

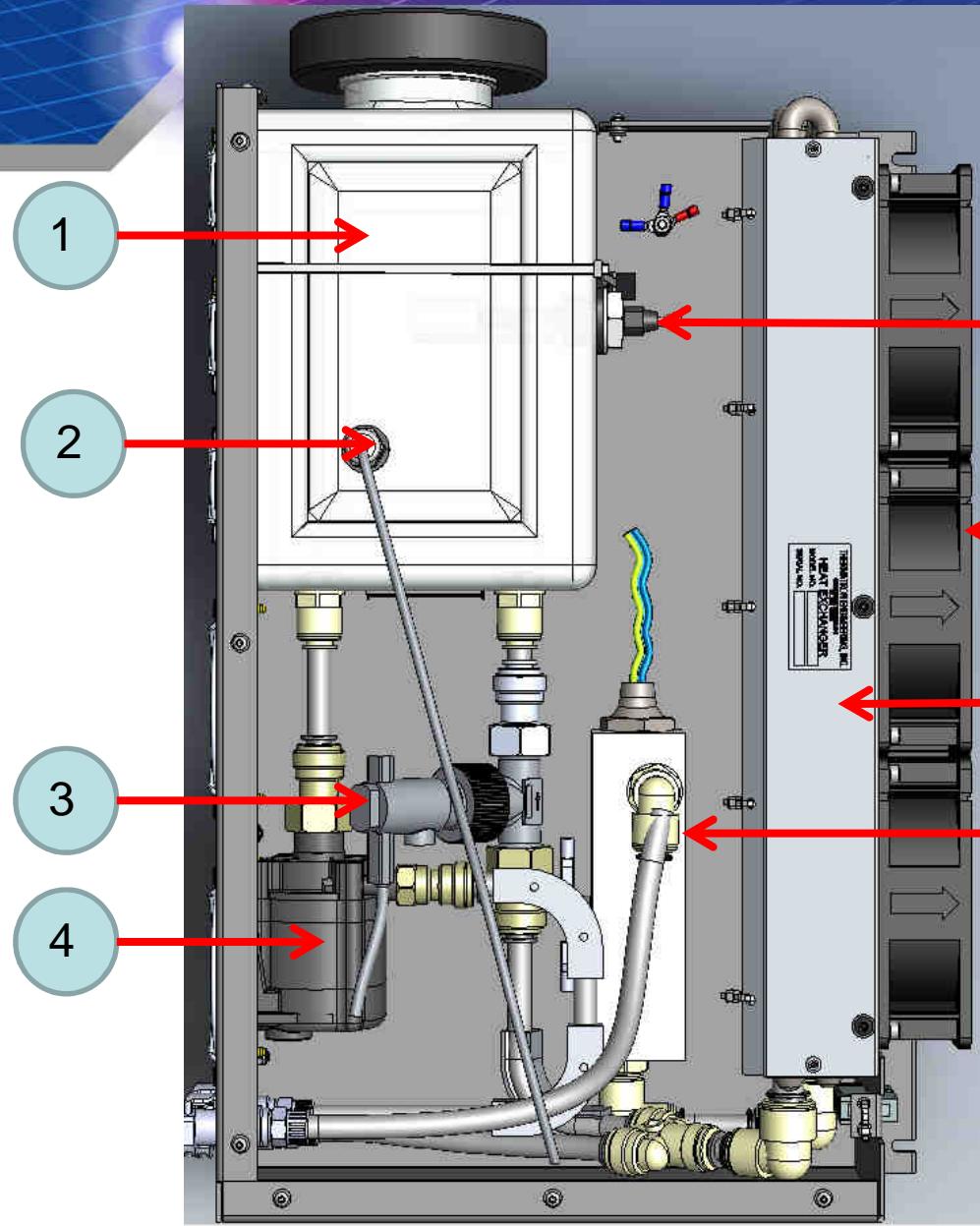
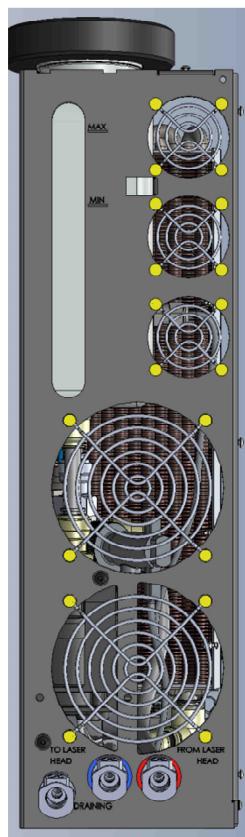
## CPU board manages:

- Power supply I/O
- Cooling group I/O
- External communication port : USB & Ethernet
- Internal communication port: CAN BUS between power supply and laser brain board
- BNC Analog I/O
- Securities: PFC temp, DC/DC temp, water temp, water level, water flow





# Cooling Group

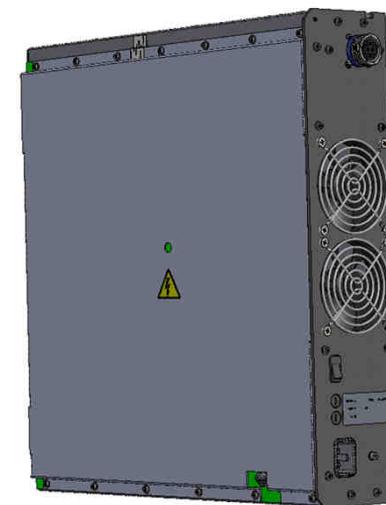


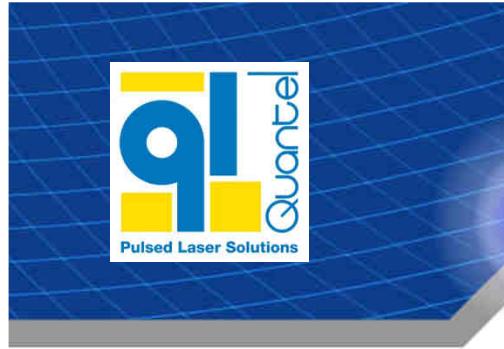


## Power supply

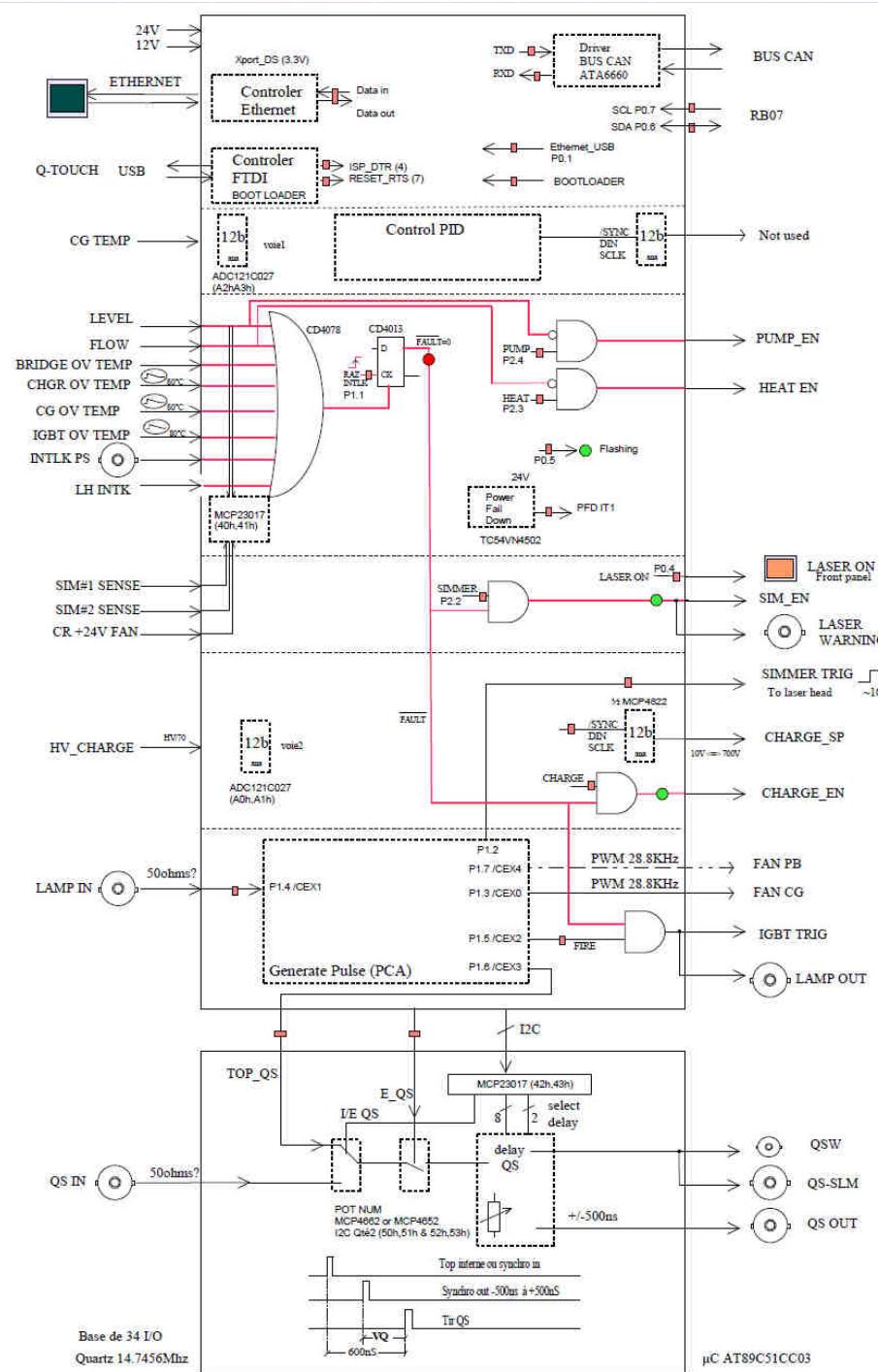
### Power Supply manages:

- **PFC 1,2kW to supply boards DC voltage: 380, 24 et 12V: boards, fans, heating resistance, pump...**
- **PS Charger (700V max) creates voltage for Flash**
  - ▶ **variable current pulse**
  - ▶ **38J per Flashes**
- **P/S simmer 1 & P/S simmer 2**

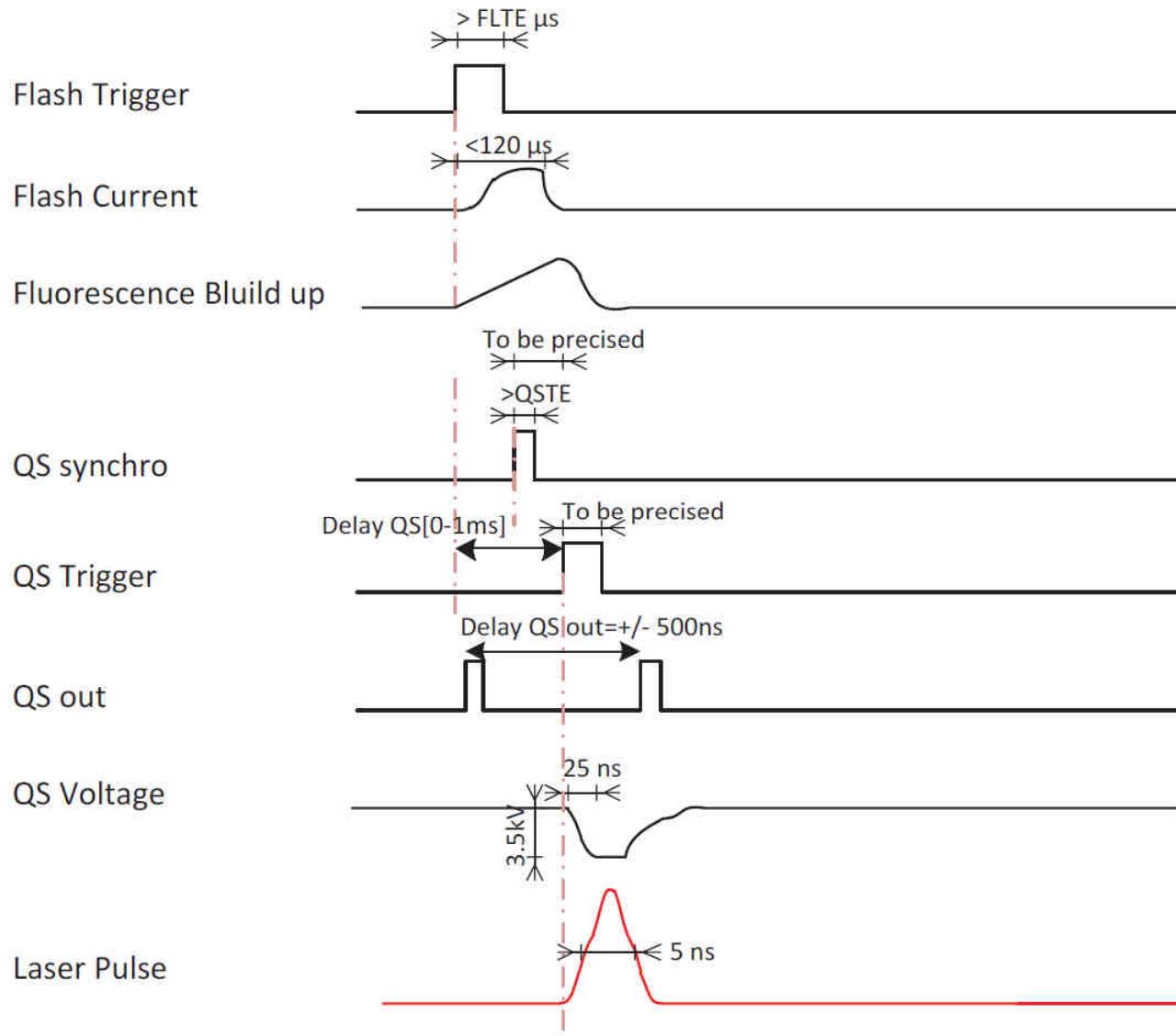




# CPU Functions

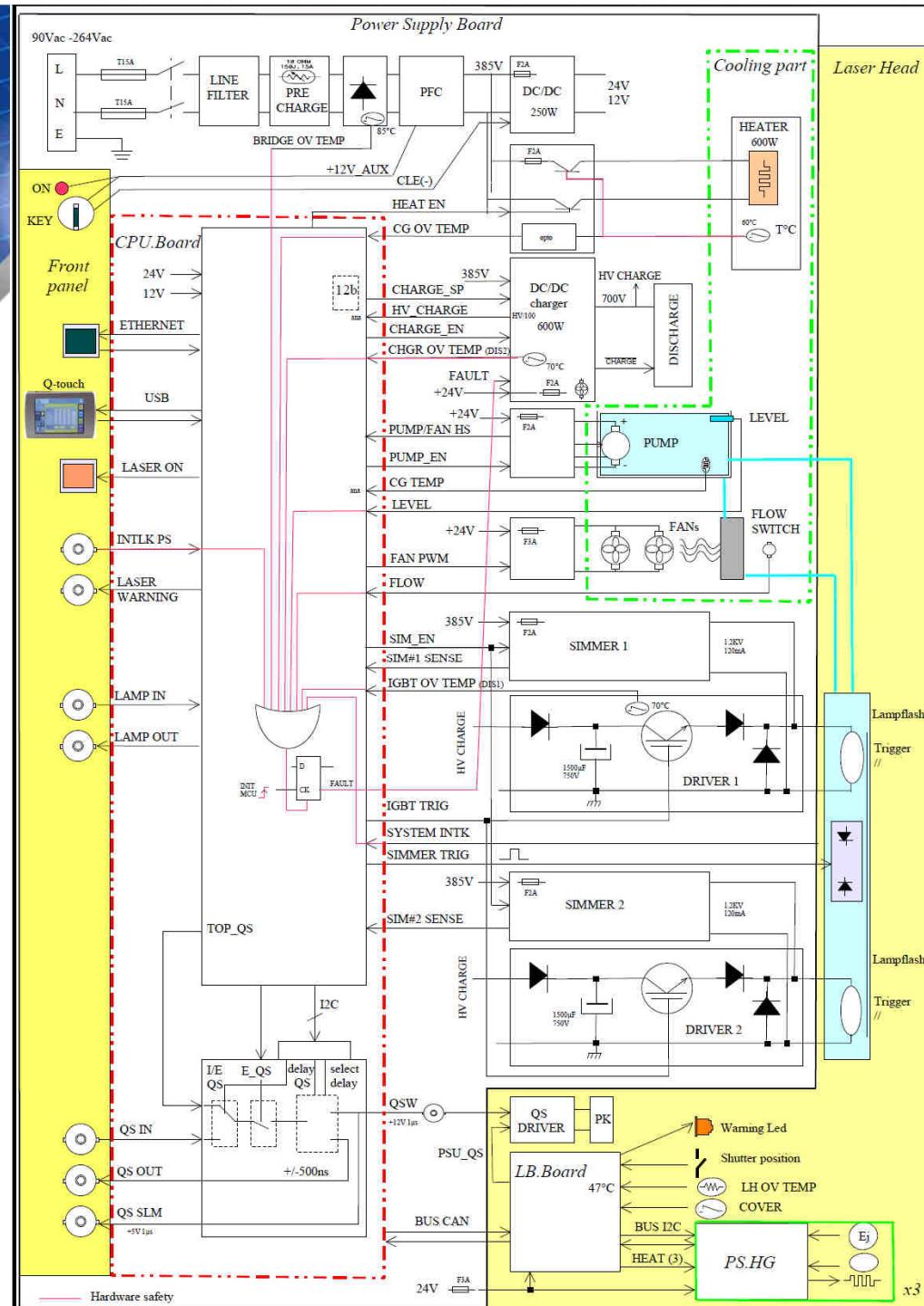


# TIMING





# QSMART BLOCK DIAGRAM





## Q-smart 850 : Laser control

- ▶ **Intuitive touch screen control via USB port**
- ▶ **Light and easy to handle**

**Q-touch**



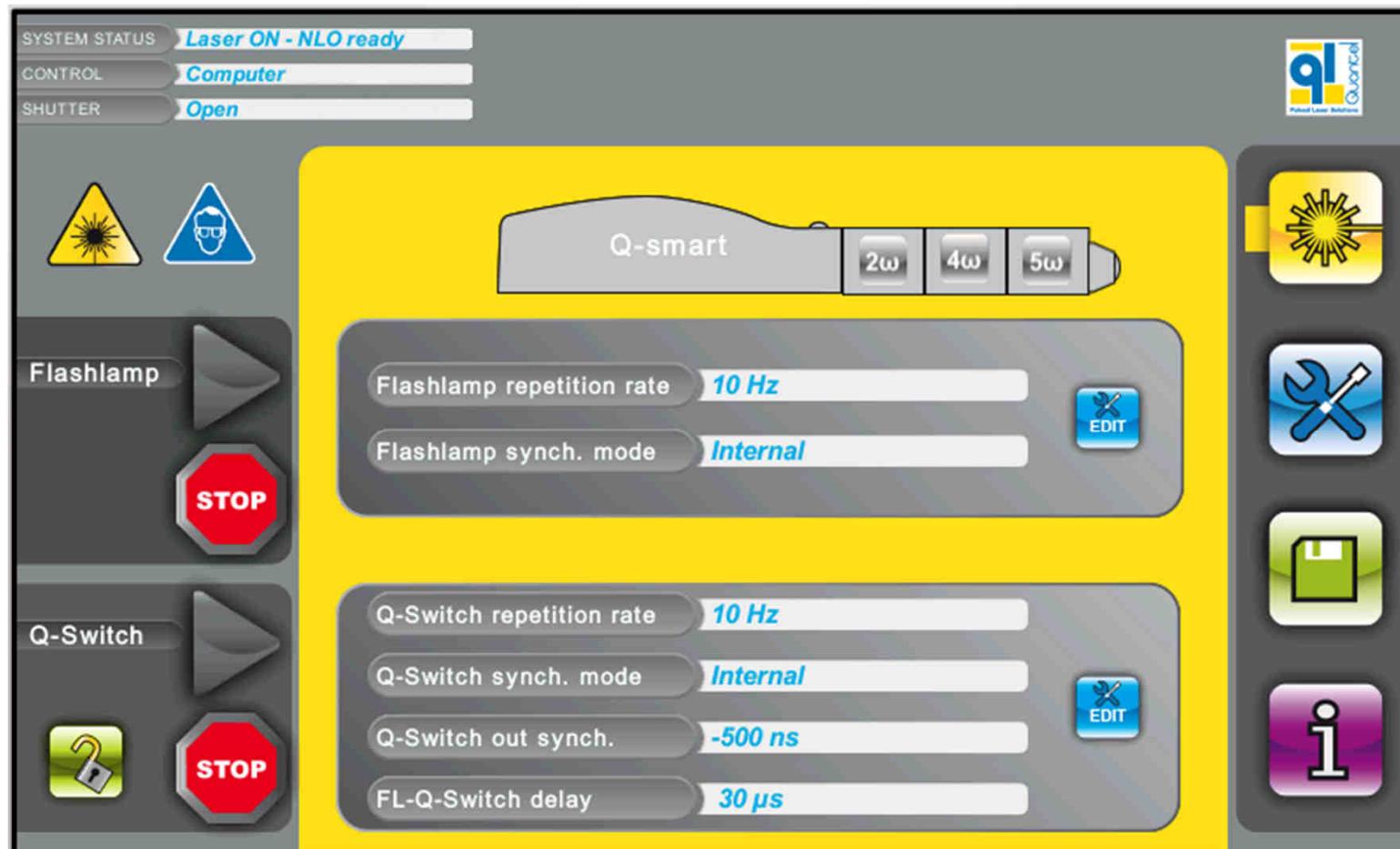
- ▶ **Ethernet control :**

- **Q-touch GUI software on windows based system**
- **Serial communication**

**Q-smart**

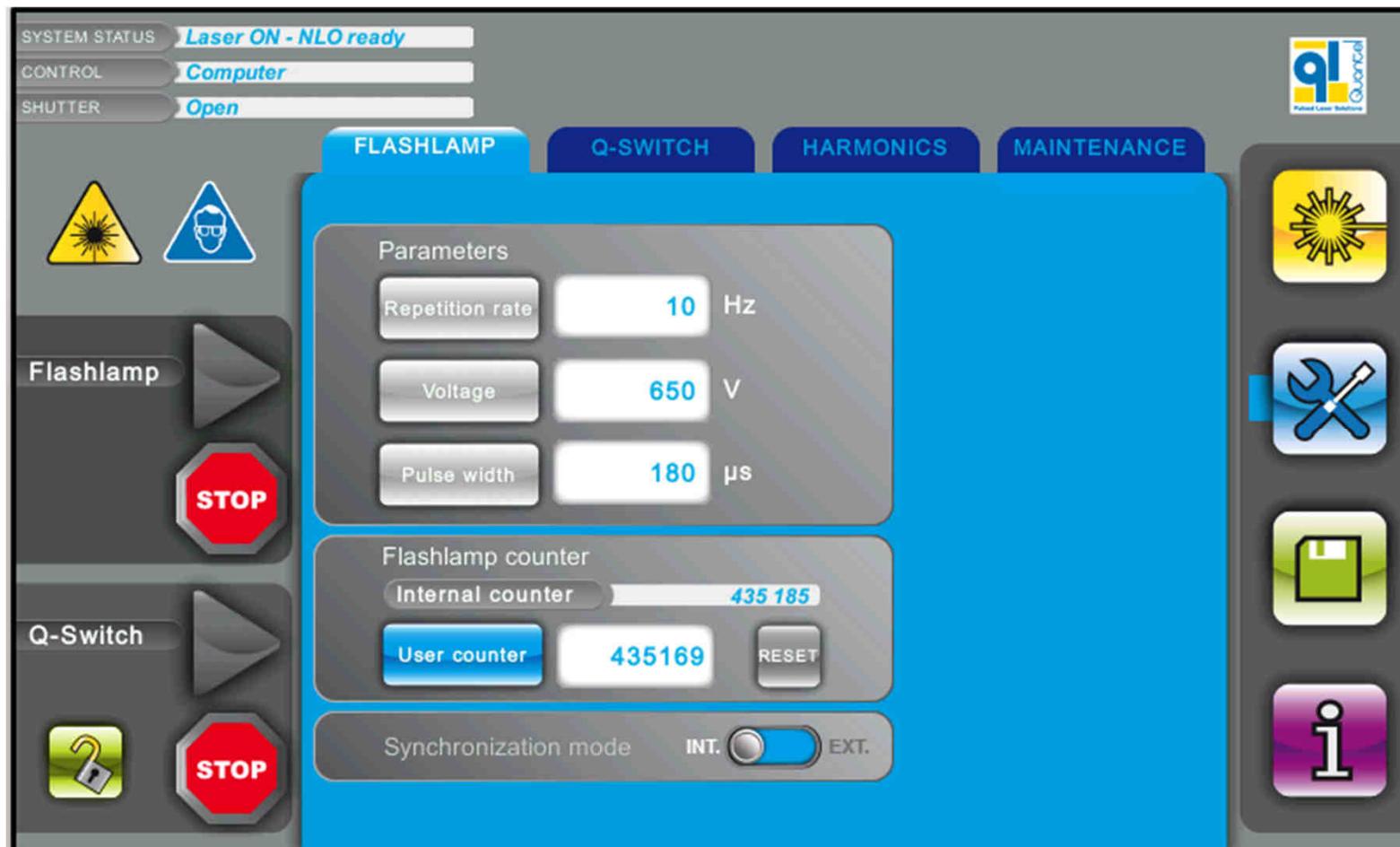


# Q-touch: GUI interface



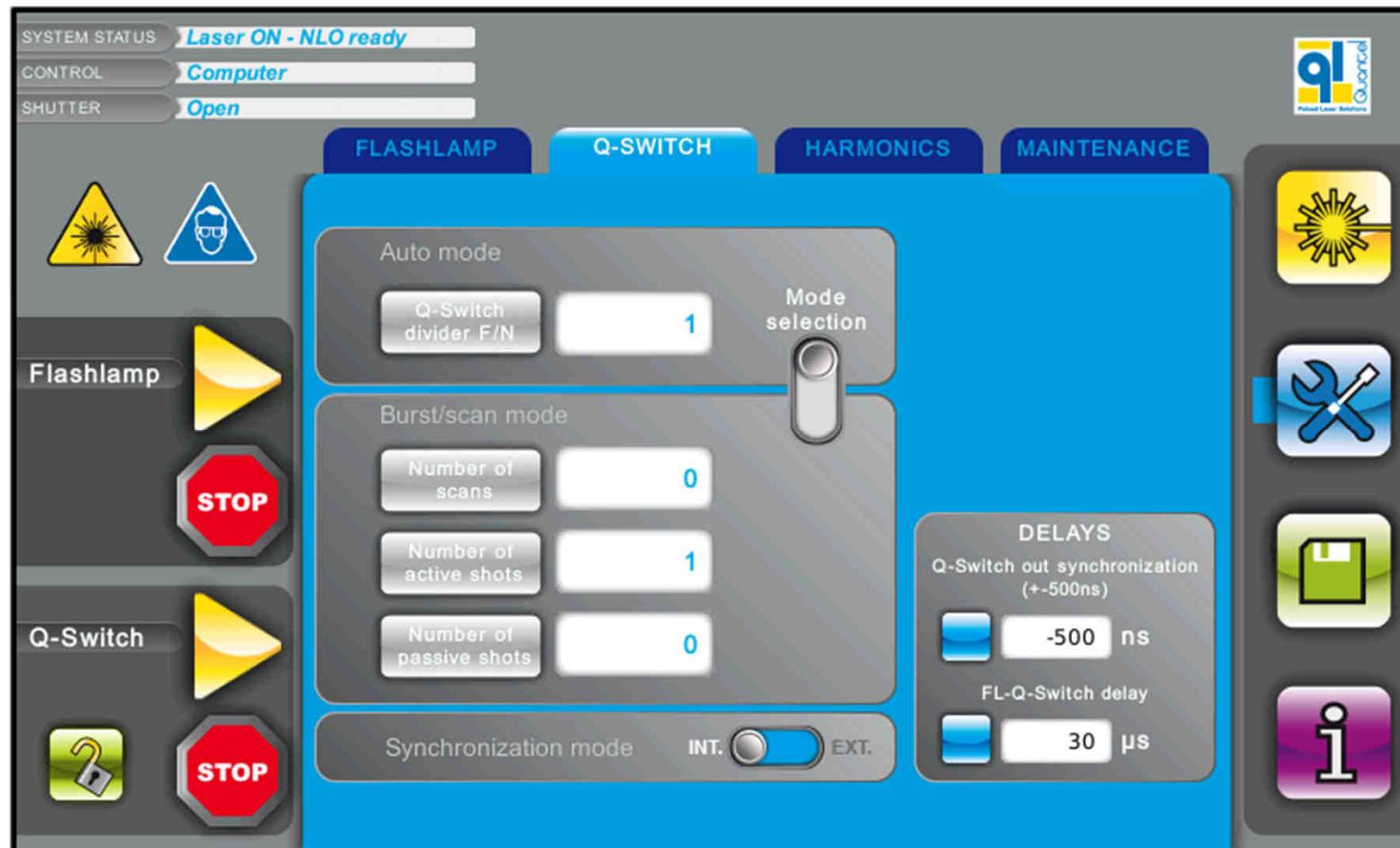


# Q-touch: GUI interface



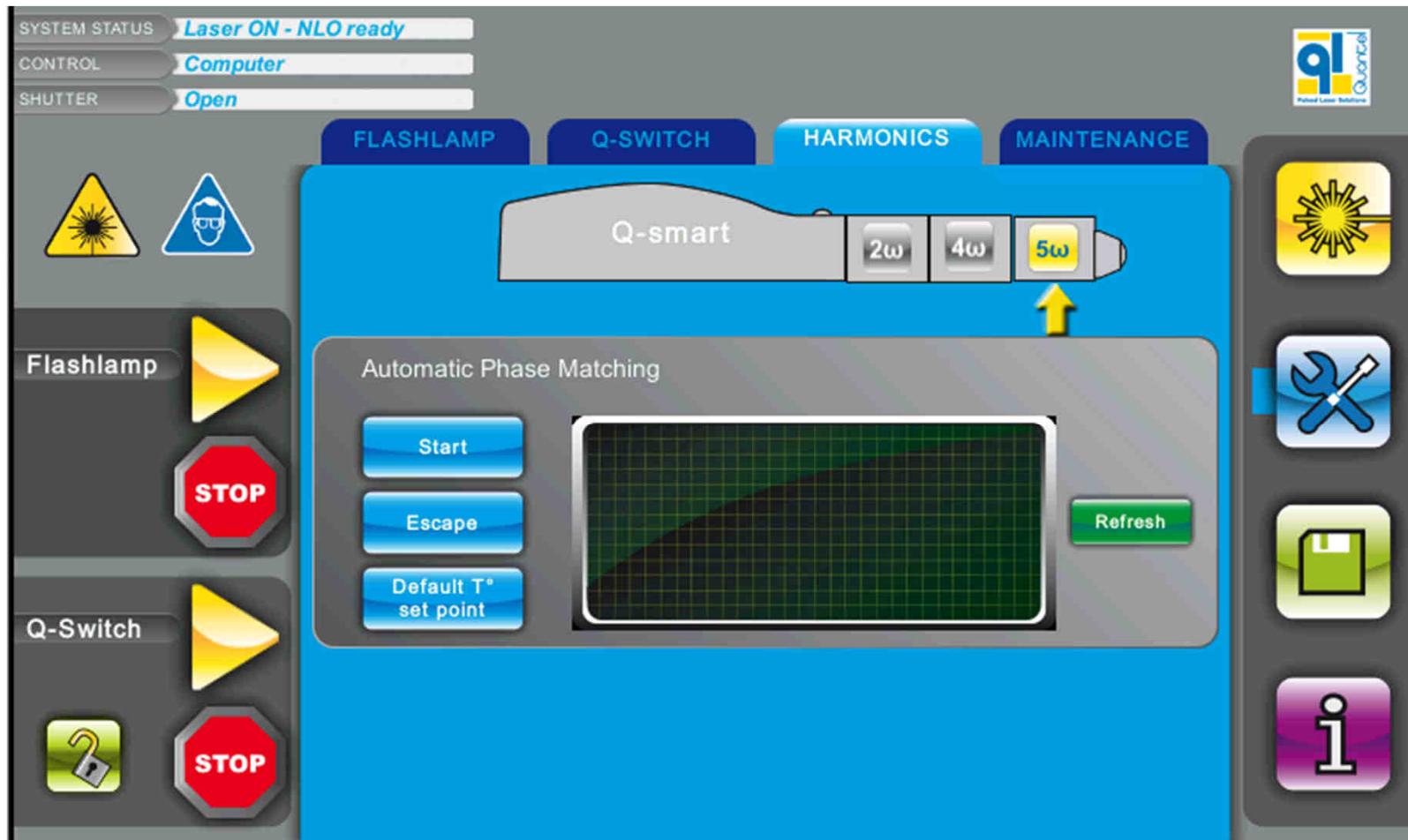


# Q-touch: GUI interface





# Q-touch: GUI interface





# Q-touch: GUI interface

The screenshot shows the Q-touch graphical user interface. At the top left, the system status is displayed as "Laser ON - NLO ready". Below this, the control mode is "Computer" and the shutter status is "Open". The interface is divided into several sections:

- FLASHLAMP**: Includes icons for a laser beam and a person wearing glasses, and a "Flashlamp" button with a play icon and a red "STOP" button.
- Q-SWITCH**: Includes a "Q-Switch" button with a play icon and a red "STOP" button.
- HARMONICS**: This tab is currently selected.
- MAINTENANCE**: This tab is also present.

In the center, under the HARMONICS tab, there is a section for the "DI Cartridge". It shows the "Replacement date" as "09/2013", the "Next replacement date" as "03/2014", and the "Replacement recommended every 6 months". It also lists the "Part number DI cartridge" as "88800098". Contact information for service centers is provided:

- Service center France & International: [service@quantel-laser.com](mailto:service@quantel-laser.com)
- Service center USA & Canada: [customerservice@quantelusa.com](mailto:customerservice@quantelusa.com)

At the bottom, there is a "Flashlamp counter" section with a "User counter" of "435524" and a "RESET" button. To the right, a "Screen Brightness" slider is set to "56 %". On the far right, there is a vertical column of icons: a sun icon, a wrench and screwdriver icon, a floppy disk icon, and an information icon.



# Q-touch: GUI interface

**Transfer laser control from Q-touch to computer**





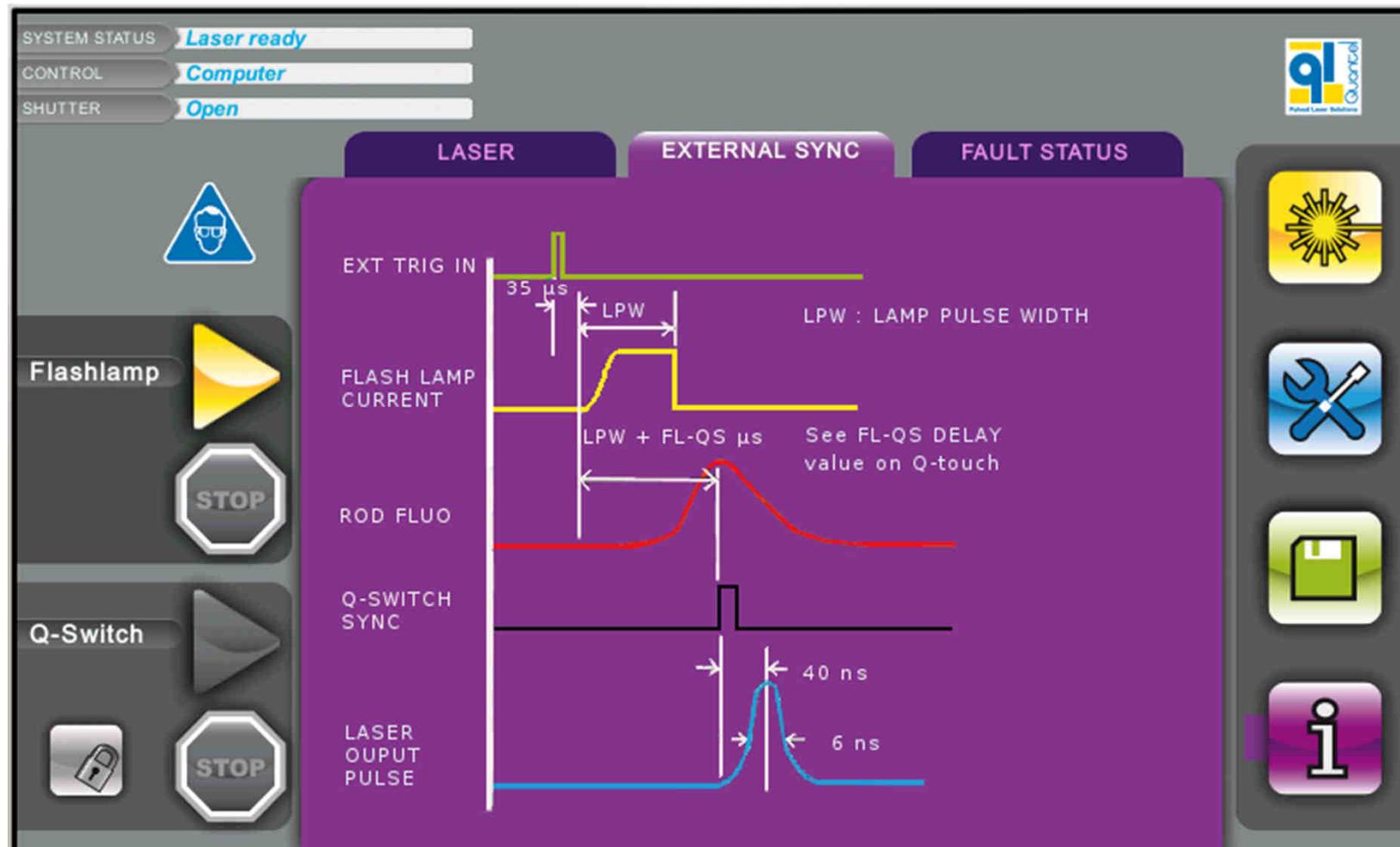
# Q-touch: GUI interface

The screenshot shows the Q-touch graphical user interface. At the top left, there are three status indicators: 'SYSTEM STATUS' (Laser ready), 'CONTROL' (Computer), and 'SHUTTER' (Open). On the right side, there is a small Quantel logo. The interface is divided into several sections:

- LASER**: This section contains 'Laser Information' with the following details:
  - Laser head serial #: 0
  - Power supply serial #: 234567801
  - System serial #: 0
  - Software version: 1.21
  - Firmware version: 4.06/3.03
- EXTERNAL SYNC**: This section displays 'Flashlamp' status:
  - FL shot counter: 434 732
  - FL part #: 2/FLA/0019
  - Battery level: 99 %
- FAULT STATUS**: This section contains a large, empty purple area.
- Right Panel**: A vertical column of icons with labels:
  - Flashlamp (yellow sun icon)
  - Tools (wrench and screwdriver icon)
  - Disk (floppy disk icon)
  - Information (info icon)
- Left Panel**: A vertical column of icons with labels:
  - Head (person wearing glasses icon)
  - Flashlamp (yellow play button icon)
  - STOP (stop sign icon)
  - Q-Switch (play button icon)
  - LOCK (padlock icon)
  - STOP (stop sign icon)

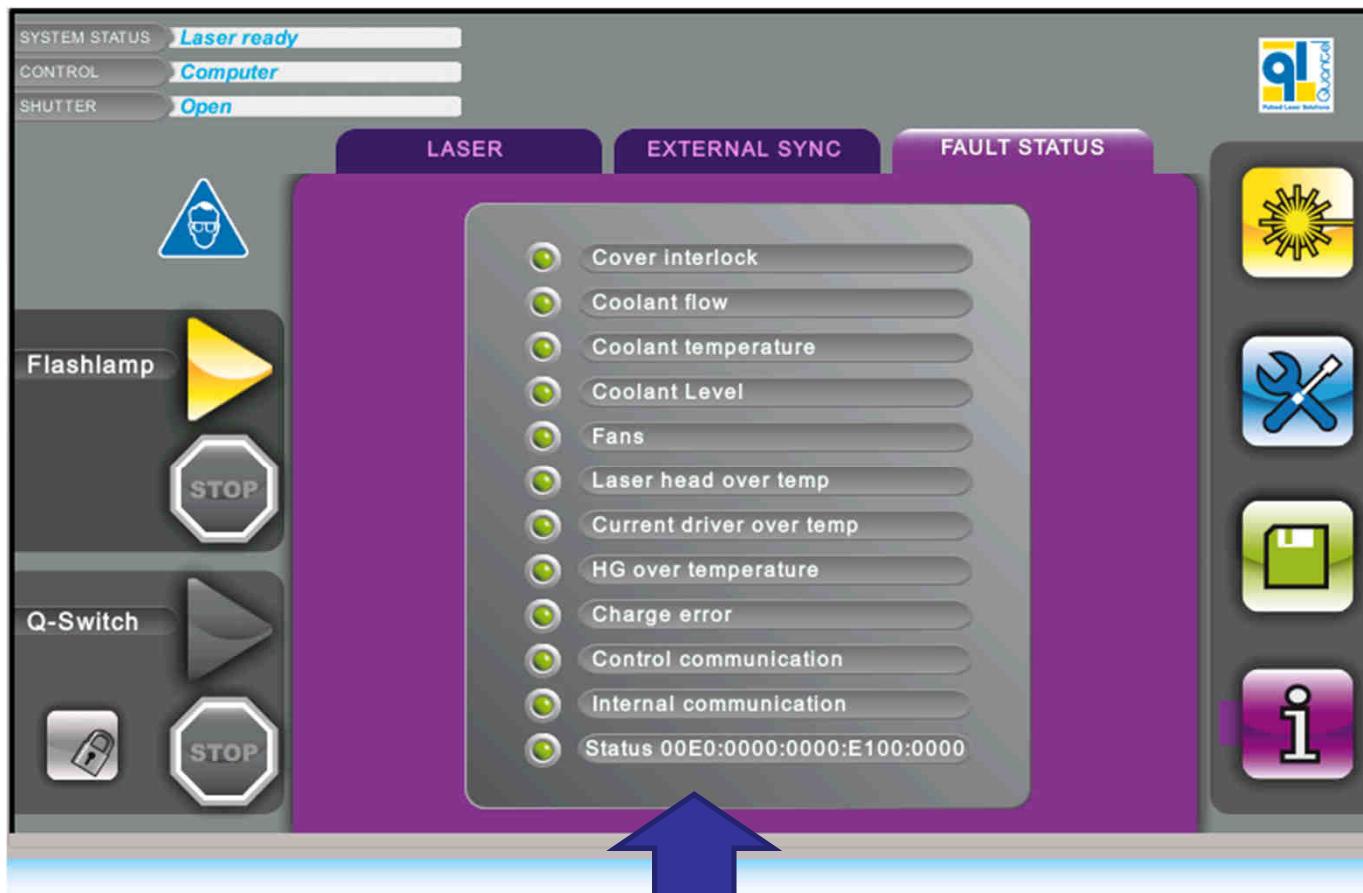


# Q-touch: GUI interface





# Easy Troubleshooting



**Ask for the status word to have an overview of the system**



# Service Software - STATUS

QSmart-Service 1.0.8.4

Commands

Addr 169.254.0.1

Status Pilotage Harmonics

Clear Alarms

Flash Lamp

serial

0 Volt 0 us

QSwitch

0 us

Config

Output

Cmd VSTATUS LOG RESET

\*\*\* 169.254.0.1 \*\*\*

```
Traceback (most recent call last):
  File "prod/prod_ui.py", line 135, in set_addr
  File "C:\Projects\Modulo\tags\v1.0.8.4\modulo\laser.py", line 92, in port
  File "C:\Projects\Modulo\tags\v1.0.8.4\modulo\com.py", line 73, in port
  File "C:\Projects\Modulo\tags\v1.0.8.4\modulo\com.py", line 163, in _set_port
  File "C:\Projects\Modulo\tags\v1.0.8.4\modulo\com.py", line 244, in __init__
  File "c:\Python27\lib\socket.py", line 224, in meth
ValueError: 169.254.0.1
```

Shots

session reset 0

system 0



# Service Software - PILOTAGE

Pulsed

QSmart-Service 1.0.8.4

Commands

Addr: 169.254.0.1

Flash Lamp

serial

0 Volt 0 us

QSwitch

0 us

Config

shots

session reset 0

system 0

Status

PILOTAGE

Address IP ou COM  
169.254.0.1

Commands

**Flashing**      **Lasing**  
QS enable  
Start Lamp      Start QS  
Stop Lamp      Stop QS  
Single QS  
 check\_serial  
 updater 1,00 s

Energy

Joulemeter **not\_connected**  
Calib -1,000 J  
Wavelength 0 nm  
photodiode 1 0  
photodiode 2 0  
photodiode 3 0

Lamp

Charger SetPoint 0 Volt  
Charger 0 Volt  
Charger Precision 0 Volt  
Charger Min 0 Volt  
Charger Max 0 Volt

CoolingGroup

Water T° SetPoint 0,00 °C  
Water T° 0,00 °C  
P 0,00000  
I 0,00000  
D 0,00000

Factory Settings

Load Save

Switch to USB Ethernet

Stats

# shot 0  
# user shot 0  
shooting hours  
working hours  
ovens  
model  
laser head version  
power supply version  
laser head serial  
power supply serial  
system serial

Frequency

Voltage 0  
Delay vs Flash 0 us  
Delay Sync Out 0 ns  
Trigger Mode  extern  
Pattern  
# cycles 0  
# shots 0  
# active shots 0  
Double Pulse  
 enable  
Delay 50 us

repetition rate 10,00 Hz  
min 10,00 Hz  
max 10,00 Hz  
 extern  
detect low rate 0 shots



# Service Software - HARMONICS

QSmart-Service 1.0.8.4

Commands

Addr: 169.254.0.1

serial

Flash Lamp

Heat Max Duty Cycle: 0 / 255

P: 0,00000  
I: 0,00000  
D: 0,00000

Qswitch

0 us

Config

Shots

session: reset 0  
system: 0

APM

Stop  is running  
Validate  has finished  
APM: 0  
# APM enable lamp shot: 0  
# APM enable qswitch shot: 0

Oven Heater

Photodiode: 0 => 0,000 J

1 APM: 0  
Name:   
Temp: 0,00 °C  
Temp SetPoint: 0,00 °C  
Temp Card: 0,00 °C  
Photodiode mean: 0  
Photodiode: 0 => 0,000 J

2 APM: 0  
Name:   
Temp: 0,00 °C  
Temp SetPoint: 0,00 °C  
Temp Card: 0,00 °C  
Photodiode mean: 0  
Photodiode: 0 => 0,000 J

3 APM: 0  
Name:   
Temp: 0,00 °C  
Temp SetPoint: 0,00 °C  
Temp Card: 0,00 °C  
Photodiode mean: 0  
Photodiode: 0 => 0,000 J

last APM: 0  
Name:   
Temp: 0,00 °C  
Temp SetPoint: 0,00 °C  
Temp Card: 0,00 °C  
Photodiode mean: 0  
Photodiode: 0 => 0,000 J

2W

ID: 0  is detected  
Temp Default: 0,00 °C  
Photodiode: 0  
0,000 J  
coef: 1,000  
offset: 0,000 J  
mean: 0 shots  
inc: 0,00 °C  
time: 0,00 shots / °C  
algo: 0  
Offset 3W: 0,0 °C  
Option 3W:

3W

ID: 0  is detected  
Temp Default: 0,00 °C  
Photodiode: 0  
0,000 J  
coef: 1,000  
offset: 0,000 J  
mean: 0 shots  
inc: 0,00 °C  
time: 0,00 shots / °C  
algo: 0

4W

ID: 0  is detected  
Temp Default: 0,00 °C  
Photodiode: 0  
0,000 J  
coef: 1,000  
offset: 0,000 J  
mean: 0 shots  
inc: 0,00 °C  
time: 0,00 shots / °C  
algo: 0  
Offset 4W: 0,00  
Boost 4W: 0,00

5W

ID: 0  is detected  
Temp Default: 0,00 °C  
Photodiode: 0  
0,000 J  
coef: 1,000  
offset: 0,000 J  
mean: 0 shots  
inc: 0,00 °C  
time: 0,00 shots / °C  
algo: 0

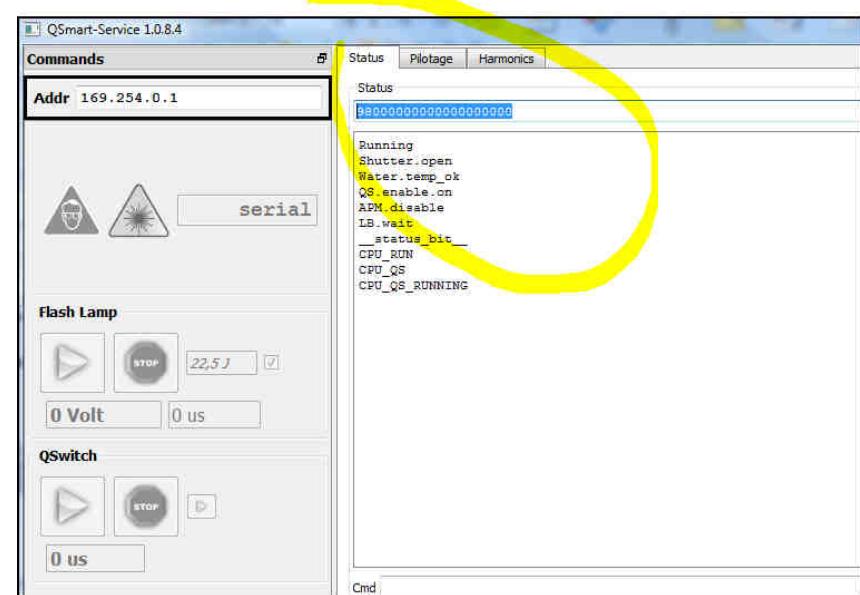
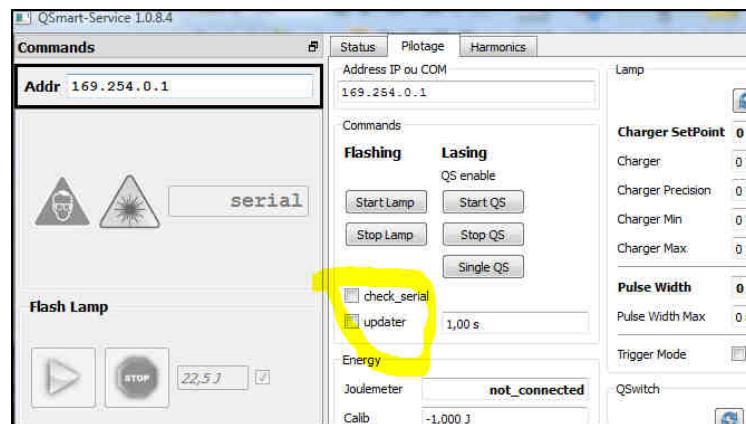


# Service Software

To know laser status (fault, interlock...)

-ON line mode: service software provide status in status tab.

-OFF line mode: use PuTTY to inquiry VSTATUS and paste answer in service software





## Q-smart series : key features

### □ High Performances :

- Best efficiency out of harmonics (refer to xls competition analysis)
- Excellent long term stabilities thanks to temperature controlled crystals
- Excellent beam profiles thanks to homogeneous pumping

### □ High Flexibility

- Fully disconnectable
- Compact, portable
- Universal voltage

### □ Surpassing ease of use:

- Plug and play harmonics module with no manual adjustment thanks to its innovative hands off phase matching
- Alignment guaranteed over a wide temperature range thanks to its single thermally stabilized aluminum casting
- Intuitive touch screen interface or ethernet control

Q-smart



## Q-smart series: key features

### **Low ownership cost**

- Long FL lifetime : 100millions
- 2 years full warranty

### **Fast repair**

- No need to ship back the whole system
- Swappable power supplies between Q-smart 450/850
- Swappable laser heads

### **Q-S Out option : +/-500ns**

### **SLM option available on both Q-smart 450 & 850**

Q-smart