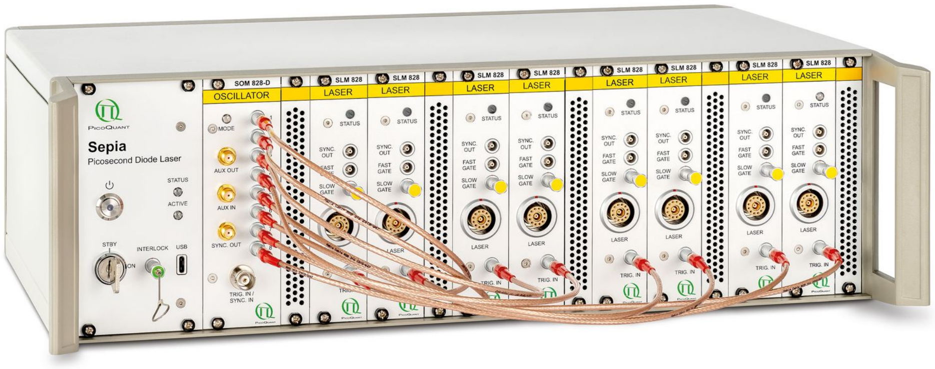
PQ Laser Device

Software Developer's API Library

PicoQuant

Generic Programming Interface for all
Members of the Family (e.g., Sepia PDL 828)



Software Developer's Manual

and

Programming Reference Handbook

Manual Version 1.3.0

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1. Introduction

The various computer controlled laser devices from PicoQuant, including the Sepia PDL 828, the Solea, the PPL 400, the Prima 3-Color Picosecond Laser as well as the VisUV and VisIR modules, all belong to a family of laser systems based on a common modular architecture, allowing for a variety of different devices and a high degree of flexibility in the configurations possible.

For these devices, all of the dynamic working parameters (e.g., intensity, repetition rate, triggering conditions, wavelength, linewidth, ...) can be configured from a computer via USB connection. If no change of the working parameters is intended, the device can also run stand alone, i.e. without computer connection. The laser devices from PicoQuant are delivered with a common graphical user interface (GUI) running on Windows™, the Laser Control Software “`PQLaserDrv.EXE`”.

In addition to this, the hereafter documented application programming interface (API) offers the possibility for the end user to build their own dedicated and tailored application. The purpose of this manual is to describe the API and explain all provided functions.

2. PQ Laser Device – Software Developer's Library

You might want to create your own control sequences or graphical user interfaces, to better adapt your PQ Laser Device to your needs and convenience. With the API provided as Windows™ dynamic link library this should be an easy task for an experienced software developer. PQ Laser Devices behave as members of a still growing family, sometimes named after its first member, which was the PDL 828 "Sepia II" (now rebranded as the Sepia PDL 828). For that reason, the generic API library is called "Sepia2_Lib", whichever member of the family you might own. Thus the aforementioned dynamic link library is named "Sepia2_Lib.dll" and all API information refer to Sepia II.

The library is provided in two different "flavours", as x86 (32 bit) and x64 (64 bit) type as well. You can tell which version you see by referring to the file version e.g. from the properties page of the Windows™ Explorer. The major high and low word code the actual software version. In the third part of the version number (a. k. a. "minor high word"), the bit width of the target architecture is encoded. The minor low word is containing the build number. A version number like e.g. "1.1.32.393" stands for the software version 1.1, compiled for an x86 target architecture and coming as build 393, whilst "1.1.64.393" identifies the same software version, but compiled for a x64 target.

With the generic system software (GUI and DLL), we also provide "ready to use" library interfaces in C/C++ and Delphi including language specific declaration files and the import library "Sepia2_Lib.lib". Developers who use other languages supporting access to DLLs may build their own interfaces analogue to the purchased, by simply adapting the declaration files to their desired language and linking their project with the aforementioned import library. It might be necessary to encapsulate the functions-to-call for convenience.

2.1. Library and Hardware Versions this Manual is Referring to

This manual is referring to library versions commencing with 1.2.xx.[build > 636]

Please note, that the version numbering convention used for this library doesn't increase the minor version number on enhancements, but only when functions aren't supported any longer (discontinued). So, due to the permanent work on the library, you might gain on improved performance, stability or functionality by simply substituting your library by the most recent version, as long as the commencing version and subversion numbers are still the same. Your software product, however, should check for not falling behind the build number, for which you released and tested it. All later library versions should work with your product as you expect it.

NOTICE	a switch to a new USB driver architecture is required s**tarting with software version 1.2.xx.636** (changing from PQUSB to WinUSB). The two driver architectures are **NOT** compatible with each other. This means that once the new drivers (WinUSB) have been installed and they have registered the PicoQuant laser driver(s), software packages relining on a Sepia2_Lib.DLL older than 1.2.{target}.636 will no longer be able to "see" or connect to these USB devices. The reverse is also true: i.e. a software package using a newer Sepia2_Lib.DLL (version 1.2.xx.636 or higher) will not be able to discover or communicate with laser drivers registered to the older USB driver architecture (PQUSB). An important consequence of this is that both the PQLaserDrv package as well as any software package using Sepia2_Lib.DLL (i.e. PicoQuant's SymPhoTime 64 or EasyTau) should be fully updated together.

The hardware should contain at least a firmware version 1.05.419

For some enhancements, a firmware version younger than this is required. For API functions, where this precondition is met, a special note is given.

2.2. General Notes on all PQ Laser Device API Functions

All functions exported by Sepia2_Lib.dll commonly behave according to a few conventions. The most important are listed below. Since we implemented the library in C/C++, we chose to document it in the same language. To reduce to the essential, we omitted storage classes, calling conventions and all compiler specific details on the individual function. If you use Pascal, consider that we used true booleans where ever appropriate.

2.2.1. Naming Convention

For names of parameters we use a typed notation in this library. The names of functions commence with the library preamble "SEPIA2_", and a group identifier following. Functions are grouped by the objects, they refer to:

- the library itself ("LIB" functions),
- the communication channel ("USB" functions),
- the main controller and firmware ("FWR" functions),
- all modules on a common level ("COM" functions),
- device operational safety ("SCM" functions).

Additionally to these generic functions, which are supported by any given PQ Laser Device, there exist:

- product model specific module properties, grouped product model by model and module type by type (function names group by **type abbreviation** as given by the COM function DecodeModuleTypeAbbr).

2.2.2. Calling Convention

Consider, all functions use the stdcall calling convention. Refer to the purchased demo code and your compiler specific developer's manuals for more detailed information.

2.2.3. Transferring Arguments Convention and Memory Allocation

The transferring convention for all importing arguments (in the lists below marked with an "I") is "by value" except for strings. For importing string arguments as well as for all exporting arguments (marked with "O"), the transferring convention is "by reference". Bi-directional arguments (marked with "B") can be used for importing as well as exporting arguments, and therefore use the transferring convention "by reference" for either direction. (Use the "var" – clause in Pascal resp. a pointer to the destination variable in C/C++ to implement exports or bi-directionals.) The calling programs have to take care of sufficient memory allocation for exporting arguments. Refer to the C header files for a list of necessary maximal string or array lengths. All strings referred by this document read as strings of 8 bit (ISO-8859) characters, zero terminated, all length information for strings are given as net sizes, so don't forget for the zero termination byte in C/C++.

2.2.4. Return Values

They all return an error code (signed integer, 32 bit).

function returns:	0 :	success
	< 0 :	error

It should be common sense to check the return code of every function call for "SEPIA2_ERR_NO_ERROR". In anticipation of the detailed description, it should be mentioned already here, that the generic library function "**SEPIA2_LIB_DecodeError**" converts any value returned by any library function into a human readable error text. refer also for chapter 4.2 for a list of error codes.

2.2.5. Running Considerations

Most of the functions need a running PQ Laser Device to work properly. Since the library is already prepared to work with more than one device, you have to identify the addressed device by iDevIdx (0…7), the index of the USB channel it occupies. You could use the Windows Device Manager to find out, which respective value you have to use. You could also more generally build a loop, trying to open devices on all channels and – with respect to the returning error code – compare to the product model or even the serial number of the desired device. But notice that the open device operation establishes an **exclusive** access to the device! You may not open a device, if there is another program having already access to it. However, an application may open more than one device and communicate with them quasi simultaneous; But keep in mind, **the library is not thread-save** by design.

2.3. Developers' Notes on PQ Laser Device Hardware API

All members of the PQ Laser Devices family are understood as strictly modular systems. But notice that it is not granted, that they in fact implement the modularity on a framework level, providing the full extensibility by a slot system as Sepia II does. An example for restricted extensibility but still fully modular design is the “Solea”. Yet, from the software developers point of view, the members of the family are working all the same, thus implying a software framework, working similarly for all of them.

As already sketched out in chapter 2.2.1, the API is organized in an object view, going from a general object level top–down to the most specialized properties of the respective modules. However, we didn't implement the object oriented approach, to not restrict the use of the API to OO–languages. Anyway, it might be helpful to keep the object idea in mind.

Generally, the functions of the “LIB” group communicate with and on informations of the library itself, hence don't even need a PQ Laser Device running, whilst from the “USB” and “FWR” group levels on, a concrete device, identified by the USB device index iDevIdx is the addressee of the function called. (See also chapter 2.2.5.) Some of the functions belonging to the “FWR” group inquire information on concrete modules, however, they still don't communicate with the module in question and thus identify them via an index into the device map.

From the “COM” group on and incorporating all more specialized groups, too, the functions have to identify their target module by its certain slot number. Since not all of the module's properties provide a true get function on module level, most of the get functions are implemented as lookup for the last value sent to the module so that the library is able to simulate the answer from the module. In fact, this reduces traffic and grants for short response times.

On the other hand, some of the modules may need some time to really set up the parameter to the new value. Especially when motorized opto–mechanical devices have to be tuned to the newly desired state (as e.g. the wavelength filters inside of “Solea”), this may take more time than a common API command usually takes. In these cases we implemented a state machine and provide a function called “GetStatusError”, retrieving the internal state of the module. The state is given as a bitcoded set, where the states of interest could be masked out and checked for. In this manual, we always placed a hint on functions that you should check for status. At least after a call to a set function it should be common sense to ensure the command to be completed (checking for BUSY state).

To let a PQ Laser Device start–up with exactly the same settings you formerly shut it down with, the settings changed are stored in the device, specifically all property settings are stored in a data area of their respective module. Additionally these data are protected by a CRC and a complete back–up in a special region. The representation is internally identical to the preset storage. On start–up, the firmware reads from this region and restores the situation as it was on shutting–down.

From the library build number 458 on and in combination with a firmware version 1.05.420 or younger only, you could temporarily suspend the set commands from writing start–up settings, protecting CRC and back–up informations by switching the library working mode from the default “stay permanent” to “volatile”, thus slightly increasing the performance of these set commands. Consider, that in case of an unexpected shut–down, with the next power up the system will fall back to the situation it had when it was switched to the “volatile” working mode. All settings after this point are lost. (Refer to the Get/SetWorkingMode commands from the “FWR” group in chapter 2.4.3.1 for more information.)

2.4. Common Generic API Functions

This chapter aims on functions, needed with any PQ Laser Device, independent from its product model type.

2.4.1. Library Functions (LIB)

Unlike most of the others, all functions of the LIB group also work "off-line", without a PQ Laser Device running. They are intended to provide informations on the running conditions of the library itself.

```
/* C/C++ */  int  SEPIA2_LIB_DecodeError          (int            iErrCode,
                                                   char*          cErrorString );
```

arguments: iErrCode I : error code, integer returned from any SEPIA2_…- function call
cErrorString O : error string, pointer to a buffer for at least 64 characters

description: This function is supposed to return an error string (human–readable) associated with a given error code. If <iErrCode> is no member of the legal error codes list, the function returns an error code -9999 itself, which reads "LIB: unknown error code".

```
/* C/C++ */  int  SEPIA2_LIB_GetVersion           (char*          cLibVersion );
```

arguments: cLibVersion O : library version string, pointer to a buffer for at least 12 characters

description: This function returns the current library version string. To be aware of version changing trouble, you should call this function and check the version string in your programs, too. The format of the version string is:

```
<MajorVersion:1>.<MinorVersion:1>.<Target:2>.<Build>
```

where <Target> identifies the word width of the CPU, the library was compiled for. A legal version string could read e.g. "1.1.32.393", which stands for the software version 1.1, compiled for an x86 target architecture and coming as build 393, whilst "1.1.64.393" identifies the same software version, but compiled for a x64 target.
Take care that at least the first three parts of the version string comply with the expected reference, thus check for compliance of the first 7 characters.

```
/* C/C++ */  int  SEPIA2_LIB_GetUSBVersion        (char*          cLibUSBVersion );
```

arguments: cLibUSBVersion O : library version string, pointer to a buffer for at least 3 characters

description: This function returns the current library version string of the USB driver. This function is commonly used together with the previous function **SEPIA2_LIB_GetVersion** to generate a version string that contains both the current library and USB driver version. A pseudo code example is given below:

```
SEPIA2_LIB_GetLibVersion (cLibVersion);
SEPIA2_LIB_GetLibUSBVersion (cLibUSBVersion);
Output = "Lib-Version: " + cLibVersion + "/" + cLibUSBVersion;
```

This code snippet might result in the following output: "Lib-Version: 1.2.32.636/339" (depending, of course on the installed library and USB driver versions.

```
/* C/C++ */  int  SEPIA2_LIB_IsRunningOnWine      (unsigned char* pbRunsOnWine );
```

arguments: pbRunsOnWine O : boolean (pointer to a byte);
true, if running in a Wine environment on a POSIX system

description: This function returns the boolean information if the library is running on Wine, relevant in a case of service. Besides this, this function is solely informative.

2.4.2. Device Communication Functions (USB)

The functions of the USB group handle the PQ Laser Device as an USB device. Besides opening and closing, they provide information on the device and help to identify the desired instance if there is more than one PQ Laser Device connected to the PC.

```
/* C/C++ */  int  SEPIA2_USB_OpenDevice             (int             iDevIdx,
                                                    char*           cProductModel
                                                    char*           cSerialNumber );
```

arguments:	iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
	cProductModel	B	:	product model, pointer to a buffer for at least 32 characters
	cSerialNumber	B	:	serial number, pointer to a buffer for at least 12 characters

description: On success, this function grants exclusive access to the PQ Laser Device on USB channel <iDevIdx>. It returns the product model and serial number of the device, even if the device is blocked or busy (error code -9004 or -9005; refer to appendix 4.2). If called with non-empty string arguments, the respective string works as condition. If you pass a product model string, e.g., “Sepia II” or “Solea”, all devices other than the specified model are ignored. The analogue goes, if you pass a serial number; Specifying both will work out as a logical AND (“&&” in C-terms) performed on the respective conditions. Thus an error code is returned, if none of the connected devices match the condition

```
/* C/C++ */  int  SEPIA2_USB_IsOpenDevice           (int             iDevIdx,
                                                    unsigned char* pbIsOpen );
```

arguments:	iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
	pbIsOpen	O	:	boolean (pointer to a byte); true, if device is open

description: Callng this function query whether the USB device with index `iDevIdx` has been opened or not. The function returns the value true is the specified device is open.

```
/* C/C++ */  int  SEPIA2_USB_OpenGetSerNumAndClose (int             iDevIdx,
                                                    char*           cProductModel
                                                    char*           cSerialNumber );
```

arguments:	iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
	cProductModel	B	:	product model, pointer to a buffer for at least 32 characters
	cSerialNumber	B	:	serial number, pointer to a buffer for at least 12 characters

description: When called with empty string parameters given, this function is used to iteratively get a complete list of all currently present PQ Laser Devices. It returns the product model and serial number of the device, even if the device is blocked or busy (error code -9004 or -9005; refer to appendix 4.2). The function opens the PQ Laser Device on USB channel <iDevIdx> non-exclusively, reads the product model and serial number and immediately closes the device again. Don't forget to clear the returned parameter strings if called in a loop. When called with non-empty string parameters, with respect to the conditions, the function behaves as specified for the OpenDevice function.

```
/* C/C++ */  int  SEPIA2_USB_GetStrDescriptor       (int             iDevIdx,
                                                    char*           cDescriptor );
```

arguments:	iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
	cDescriptor	O	:	USB string descriptors, pointer to a buffer for at least 255 characters

description: Returns the concatenated string descriptors of the USB device. For a PQ Laser Device, you could find e.g., the product model string, the firmware build number, as well as the serial number there, which is relevant when requesting support by PicoQuant. Otherwise, this function is solely informative.

```
/* C/C++ */  int  SEPIA2_USB_GetStrDescByIdx       (int            iDevIdx,
                                                    int            iDescrIdx,
                                                    char*          cDescriptor );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)

iDescrIdx I : Index that allows selecting a specific part of the descriptor (1…4)

cDescriptor O : USB string descriptors, pointer to a buffer for at least 255 characters

description: Returns a specific part of the device descriptor for a PQ Laser Device (use **SEPIA2_USB_GetStrDescriptor** for obtaining the full descriptor string). The part to be returned is selected by the `iDescrIdx` value: 1 returns the vendor identifier; 2 returns the model descriptor; 3 returns the firmware build number; 4 returns the device’s serial number.

```
/* C/C++ */  int  SEPIA2_USB_CloseDevice           (int            iDevIdx );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)

description: Terminates the exclusive access to the PQ Laser Device identified by <iDevIdx>.

2.4.3. Firmware Functions (FWR)

The functions of this group directly access low level structures from the firmware of the PQ Laser Device to initialize the dynamic data layer of the library. Right after opening a PQ Laser Device, any program utilizing this API has to perform a call to the GetModuleMap function, before it can access any module of the laser device.

```
/* C/C++ */  int  SEPIA2_FWR_DecodeErrPhaseName    (int             iErrPhase,
                                                   char*           cErrorPhase );
```

arguments:	iErrPhase	I :	error phase, integer returned by firmware function GetLastError
	cErrorPhase	O :	error phase string, pointer to a buffer for at least 24 characters

description: This function also works “off-line”, without a PQ Laser Device running. It decodes the phase in which an error occurred during the latest firmware start up. Refer to the **GetLastError** function from the same group below.

```
/* C/C++ */  int  SEPIA2_FWR_GetVersion            (int             iDevIdx,
                                                   char*           cFWVersion );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	cLibVersion	O :	firmware version string, pointer to a buffer for at least 8 characters

description: This function, in opposite to other GetVersion functions only works “on line”, with the need for a PQ Laser Device running. It returns the actual firmware version string. To be aware of version changing trouble, you should call this function and check the version in your programs, too.

```
/* C/C++ */  int  SEPIA2_FWR_GetLastError          (int             iDevIdx,
                                                   int*            piErrCode,
                                                   int*            piPhase,
                                                   int*            piLocation,
                                                   int*            piSlot,
                                                   char*           cCondition );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	piErrCode	O :	error code, pointer to an integer
	piPhase	O :	error phase, pointer to an integer
	piLocation	O :	error location, pointer to an integer
	piSlot	O :	error slot, pointer to an integer
	cCondition	O :	error condition string, pointer to a buffer for at least 55 characters

description: This function returns the error description data from the last start up of the PQ Laser Device's firmware. Decode the error code transferred on <piErrCode> using the function DecodeError from the LIB group. Analogous, use the function DecodeErrPhaseName from the FWR group on <piPhase>. Location and condition can't be decoded and are introduced only for a few phases, but if given, they identify the circumstances of error more detailed.

```
/* C/C++ */  int  SEPIA2_FWR_GetModuleMap          (int             iDevIdx,
                                                   int             iPerformRestart,
                                                   int*            pwModuleCount );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iPerformRestart	I :	boolean (integer), defines, if a soft restart should precede fetching the map
	pwModuleCount	O :	current number of PQ Laser Device configurational elements, (pointer to an integer)

description: The map is a firmware and library internal data structure, which is essential to the work with PQ Laser Devices. It will be created by the firmware during start up. The library needs to have a copy of an actual map before you may access any module. You don't need to prepare memory, the function autonomously manages the memory acquirements for this task.
Since the firmware doesn't actualise the map once it is running, you might wish to restart the firmware to assure up to date mapping. You could switch the power off and on again to reach the same goal, but you also could more simply call this function with iPerformRestart set to 1. The PQ Laser Device will perform the whole booting cycle with the tiny difference of not needing to load the firmware again…

```
/* C/C++ */  int  SEPIA2_FWR_GetModuleInfoByMapIdx (int             iDevIdx,
                                                   int             iMapIdx,
                                                   int*            piSlotId,
                                                   unsigned char*  pbIsPrimary,
                                                   unsigned char*  pbIsBackPlane,
                                                   unsigned char*  pbHasUTC );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iMapIdx	I :	index into the map; defines, which module's info is requested
	piSlotId	O :	slot number (pointer to an integer) of the module identified by iMapIdx
	pbIsPrimary	O :	boolean (pointer to a byte); true, if the index given points to a primary module
	pbIsBackPlane	O :	boolean (pointer to a byte); true, if the map index given points to a backplane
	pbHasUTC	O :	boolean (pointer to a byte); true, if the map index given points to a module with uptime counter

description: Once the map is created and populated by the function **`GetModuleMap`**, you can scan it module by module, using this function. It returns the slot number, which is needed for all module-related functions later on, and three additional boolean information, namely if the module in question is a primary (e. g. laser driver) or a secondary module (e. g. laser head), if it identifies a backplane and furthermore, if the module supports uptime counters.

```
/* C/C++ */  int  SEPIA2_FWR_GetUptimeInfoByMapIdx (int              iDevIdx,
                                                  int              iMapIdx,
                                                  unsigned long*   pulMainPwrUp,
                                                  unsigned long*   pulActivePwrUp,
                                                  unsigned long*   ulScaledPwrUp );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iMapIdx	I :	index into the map; defines, which module's info is requested
	pulMainPwrUp	O :	main power up counter value (pointer to an unsigned long) of the module identified by iMapIdx; Divide by 51 to get an approximation of the power up time in minutes
	pulActivePwrUp	O :	active power up counter value (pointer to an unsigned long) of the module identified by iMapIdx; Divide by 51 to get an approximation of the active power up time (i.e. laser unlocked) in minutes
	pulScaledPwrUp	O :	scaled power up counter value (pointer to an unsigned long) of the module identified by iMapIdx; If it is > 255, divide this value by the active power up counter to get an approximation of the power factor.

description: If the function **`GetModuleInfoByMapIdx`** returned true for HasUTC, you can get three counter values using this function. They can be used to roughly calculate the power up times.

```
/* C/C++ */  int  SEPIA2_FWR_CreateSupportRequestText(int            iDevIdx,
                                                      char*          cPreamble,
                                                      char*          cCallingSW,
                                                      unsigned long  ulOptions,
                                                      int            iBufferLen,
                                                      char*          cBuffer );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	cPreamble	I :	preamble string; pointer to the text buffer
	cCallingSW	I :	description of the calling software; pointer to the text buffer
	ulOptions	I :	options specification; bitcoded (unsigned long, 0…4294967295)
	iBufferLen	I :	length of destination buffer
	cBuffer	O :	destination buffer for the text produced; (pointer to char)

description: This function creates a comprehensive description of the laser device in its running environment e.g. for use in support requests. In case support is needed, PicoQuant relies on proper information on the current system state.

The function creates a standardized description of the as-is state of the whole system. The user has to provide it with additional system information: The **preamble** as given in <cPreamble> is equivalent to the prompting text at the beginning, finishing right before the first cutting mark. The information on the **calling software** as given in <cCallingSW> is led in by an appropriate title and ends just before the information on the DLL itself.

The analysis result of the current state of the PicoQuant Laser Device is presented in form of a **module list**. This information is supplemented by global **system information**, incorporating the paragraphs on the processors, memory usage, the operating system and all currently loaded software modules at the end of the description. To get an idea of the resulting content, refer to the provided GUI. Press the "About..." button to understand the upper mentioned components of the call.
The layout of the requested text may be optionally changed by use of the parameter <ulOptions>, which represents a bitset, each bit standing for an (independent) option. Default value is 0, this results in a full information set. The currently supported options are as follows:

Symbol	Value	DescriptionSymbol
`SEPIA2_SUPREQ_OPT_NO_PREAMBLE`	0x00000001	No preamble text processing (if given, it is ignored)
`SEPIA2_SUPREQ_OPT_NO_TITLE`	0x00000002	No title created
`SEPIA2_SUPREQ_OPT_NO_CALLING_SW_INDENT`	0x00000004	Lines on calling software are not indented
`SEPIA2_SUPREQ_OPT_NO_SYSTEM_INFO`	0x00000008	No system info is processed

Note: Since state and configuration of your computer and the attached laser device are a matter of very high dynamics, the length of the resulting text is hardly to predict. Assure sufficient length of the destination buffer. If the function reaches its limits, it terminates with the error code `SEPIA2_ERR_FW_MEMORY_ALLOCATION_ERROR`. While for a small frame Sepia PDL828 device a buffer length of 8 kB might be more than sufficient, the buffer might need to have more than 20 kB for a "Solea". For all contingencies you should grant for e.g. 64kB.

```
/* C/C++ */  int  SEPIA2_FWR_FreeModuleMap          (int              iDevIdx );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)

description: Since the library had to allocate memory for the map during the **GetModuleMap** function, this function is to restitute the memory just before your program terminates. You don't need to call this function between two calls of **GetModuleMap** for the same device index but you should call it for each device you ever inquired a map during the runtime of your program.

2.4.3.1. Firmware Working Mode Functions (FWR, only for FW V1.05.420 and above)

Notice that the following needs at least a firmware version 1.05.420

As already mentioned in chapter 2.3, the set functions for module specific properties have to do some overhead to take care of the restarting conditions of PQ Laser Devices. In the default working mode, all set commands for values that should be restored on the next start–up have to be written to a special region in the data space of the module. Additionally these data are protected by a CRC and a complete back–up in another region. On start–up, the firmware reads from this region and restores the situation as it was on shutting–down. Therefore we call this working mode "`SEPIA2_FW_WORKINGMODE_STAY_PERMANENT`" or shorter "**stay permanent**".

All this additional writing to the module, the CRC calculation and the back–up copy will take its time. Furthermore this is done function call by function call, even despite the fact, that more than one call might refer to exactly the same module, so that the data transfer and CRC calculation after the least call should be more than enough to protect the whole data.

For this very situation as pointed out above, where many set commands are called for the same module, we introduced another working mode, called "`SEPIA2_FW_WORKINGMODE_VOLATILE`". To switch to this working mode, use the FWR function "**SetWorkingMode**". In volatile mode, all commands are sent to the module, but not the set–up and protective data. The library itself preserves the data and sets a marker that the module is still in "dirty state", i.e. needs to be actualized, and protective data have to be recalculated and transferred as well.

This will happen either when the working mode is changed back to “**stay permanent**” or a call to the special FWR function “**StoreAsPermanentValues**” occurs. This call results in an actualized protective region but the working mode stays “**volatile**”. By means of another special FWR function, named “**RollBackToPermanentValues**” the user can discard all changes made since working mode was changed to “**volatile**” and switch back to working mode “**stay permanent**” in the same call.

```
/* C/C++ */  int  SEPIA2_FWR_GetWorkingMode            (int        iDevIdx,
                                                        int*       piCurFWMode );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
piCurFWMode O : current FW working mode; pointer to an integer

description: This function returns the current working mode. Legal values are:

Symbol	Value	Description
SEPIA2_FW_WORKINGMODE_STAY_PERMANENT	0	Default mode: Commands & full protective data are written immediately
SEPIA2_FW_WORKINGMODE_VOLATILE	1	Volatile mode: Commands sent immediately, protective data retarded

```
/* C/C++ */  int  SEPIA2_FWR_SetWorkingMode            (int        iDevIdx,
                                                        int        iCurFWMode );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iCurFWMode I : new FW working mode; (integer, 0…1)

description: This function sets the new working mode.

```
/* C/C++ */  int  SEPIA2_FWR_StoreAsPermanentValues    (int        iDevIdx );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)

description: This function calculates the protective data for all modules changed and sends them to the device. The working mode stays “volatile”.

```
/* C/C++ */  int  SEPIA2_FWR_RollBackToPermanentValues (int        iDevIdx );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)

description: This function re–sends commands to discard all changes made since the working mode was switched. The working mode changes to “stay permanent”.

2.4.4. Common Module Functions (COM)

The functions of the COM group are strictly generic and will work on any module you might find plugged to a PQ Laser Device. Except for the functions on presets and updates, they are mainly informative.

To obtain the same information for the backplane, which is strictly speaking not a module at all, you can input "-1" as the slot number, where appropriate. This appplies especially to the common function **`GetSerialNumber`**, by which you could get the serial number of the whole Sepia II device.

```
/* C/C++ */  int  SEPIA2_COM_DecodeModuleType      (int          iModuleType,
                                                    char*        cModuleType );
```

arguments:
iModuleType I : module type, integer returned by common function GetModuleType
cModuleType O : module type string, pointer to a buffer for at least 55 characters

description:
This function works “off line”, without a PQ Laser Device running. It decodes the module type code returned by the common function **GetModuleType** and returns the appropriate module type string (ASCII–readable).

```
/* C/C++ */  int  SEPIA2_COM_DecodeModuleTypeAbbr  (int          iModuleType,
                                                    char*        cModTypeAbbr );
```

arguments:
iModuleType I : module type, integer returned by common function GetModuleType
cModTypeAbbr O : module type abbr. string, pointer to a buffer for at least 4 characters

description:
This function works “off line”, without a PQ Laser Device running, too. It decodes the module type code returned by the common function **`GetModuleType`** and returns the appropriate module type abbreviation string (ASCII–readable).

```
/* C/C++ */  int  SEPIA2_COM_GetModuleType         (int          iDevIdx,
                                                    int          iSlotId,
                                                    int          iGetPrimary,
                                                    int*         piModuleType );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary I : boolean (integer), defines, if this call concerns a primary
(e. g. laser driver) or a secondary module (e. g. laser head)
in the given slot
piModuleType O : module type, pointer to an integer

description:
Returns the module type code for a primary or secondary module respectively, located in a given slot.

```
/* C/C++ */  int  SEPIA2_COM_GetSerialNumber       (int          iDevIdx,
                                                    int          iSlotId,
                                                    int          iGetPrimary,
                                                    char*        cSerialNumber );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary I : boolean (integer), defines, if this call concerns a primary
(e. g. laser driver) or a secondary module (e. g. laser head)
in the given slot
cSerialNumber O : serial number string, pointer to a buffer for at least 12 characters

description:
Returns the serial number for a given module.

```
/* C/C++ */  int  SEPIA2_COM_GetPresetInfo         (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iGetPrimary,
                                                    int             iPresetNr,
                                                    unsigned char* pbIsSet,
                                                    char*           cPresetMemo );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary I : boolean (integer), defines, if this call concerns a primary (e. g. laser driver) or a secondary module (e. g. laser head) in the given slot
iPresetNr I : preset number, integer (-1 = factory defaults,
0 = current settings,
1 = preset 1,
2 = preset 2)
pbIsSet O : boolean (pointer to a byte), true, if preset block was already assigned
cPresetMemo O : preset memo, pointer to a buffer for at least 64 characters

description: Returns the preset info identified by iPresetNr for a given module. Initially, the content of preset 1 and preset 2 is not assigned; In this case, the content of pbIsSet will be false (i. e. 0). Additionally, the text stored with the presets when the function **SaveAsPreset** was last invoked for the preset block, is returned in cPresetMemo.

```
/* C/C++ */  int  SEPIA2_COM_RecallPreset          (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iGetPrimary,
                                                    int             iPresetNr );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary I : boolean (integer), defines, if this call concerns a primary (e. g. laser driver) or a secondary module (e. g. laser head) in the given slot
iPresetNr I : preset number, integer (-1 = factory defaults,
1 = preset 1,
2 = preset 2)

description: Recalls the preset data as stored in the preset block identified by iPresetNr. Recalling a preset means to overwrite all current settings by the desired ones.
The settings previously active are lost!

```
/* C/C++ */  int  SEPIA2_COM_SaveAsPreset          (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iGetPrimary,
                                                    int             iPresetNr,
                                                    char*           cPresetMemo );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary I : boolean (integer), defines, if this call concerns a primary (e. g. laser driver) or a secondary module (e. g. laser head) in the given slot
iPresetNr I : preset number, integer (-1 = factory defaults,
0 = current settings,
1 = preset 1,
2 = preset 2)
cPresetMemo I : preset memo, pointer to a buffer for at least 64 characters

description: Stores the currently active settings into the preset block identified by iPresetNr for a given module. Consider, if presets were already stored in the desired presets block, they will be overwritten without any further request. Don't forget to pass a meaningful text over with the cPresetMemo; It might be working as a remainder to prevent you from an unintentional loss of preset data. Use the **GetPresetInfo** function to get informed on potential presets already stored in the destination block.

```
/* C/C++ */  int  SEPIA2_COM_GetSupplementaryInfos (int           iDevIdx,
                                                    int           iSlotId,
                                                    int           iGetPrimary,
                                                    char*         cLabel,
                                                    char*         cReleaseDate,
                                                    char*         cRevision,
                                                    char*         cMemo );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary I : boolean (integer), defines, if this call concerns a primary (e. g. laser driver) or a secondary module (e. g. laser head) in the given slot
cLabel O : internal label string, pointer to a buffer for at least 8 characters
cReleaseDate O : release date string, pointer to a buffer for at least 8 characters, format is “YY/MM/DD”
cRevision O : revision string, pointer to a buffer for at least 8 characters
cMemo O : serial number string, pointer to a buffer for at least 128 characters

description: Returns supplementary string information for a given module. Mainly needed for support...

```
/* C/C++ */  int  SEPIA2_COM_HasSecondaryModule    (int           iDevIdx,
                                                    int           iSlotId,
                                                    int*          piHasSecondary);
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
piHasSecondary O : boolean, (pointer to an integer)

description: Returns if the module in the named slot has attached a secondary one (laser head).

```
/* C/C++ */  int  SEPIA2_COM_IsWritableModule      (int           iDevIdx,
                                                    int           iSlotId,
                                                    int           iGetPrimary,
                                                    unsigned char* pbIsWritable );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary I : boolean (integer), defines, if this call concerns a primary (e. g. laser driver) or a secondary module (e. g. laser head) in the given slot
pbIsWritable O : boolean, (pointer to a byte); false, if the memory block is write protected

description: Returns the write protection state of the module's definition, calibration and set-up memory.

```
/* C/C++ */  int  SEPIA2_COM_UpdateModuleData      (int           iDevIdx,
                                                    int           iSlotId,
                                                    int           iSetPrimary,
                                                    char*         cDCLFileName );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number, integer (000…989; refer to manual on slot numbers)
iSetPrimary I : boolean (integer), defines, if this call concerns a primary (e. g. laser driver) or a secondary module (e. g. laser head) in the given slot
cDCLFileName I : file name (coming as windows path), of the binary image of the update data; pointer to a zero-terminated ANSI character buffer

description: Returns the write protection state of the module's definition, calibration and set-up memory.

```
/* C/C++ */  int  SEPIA2_COM_GetFormatVersion      (int           iDevIdx,
                                                     int           iSlotId,
                                                     int           iGetPrimary,
                                                     word*         pwFormatVersion );
```

arguments:

iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I :	slot number, integer (000…989; refer to manual on slot numbers)
iGetPrimary	I :	boolean (integer), defines, if this call concerns a primary (e. g. laser driver) or a secondary module (e. g. laser head) in the given slot
pwFormatVersion	O :	pointer to a word, returning the format version number for the specified module

description: This function returns the value of the “format version” field from the header of the specified module. This format version identifies the descriptive structures (e.g., `0x0105` stands for version 1.05). Besides for support tools written by PicoQuant, this data is purely informative.

2.4.5. Device Operational Safety Controller Functions (SCM)

This module implements the safety features of the PQ Laser Device, as there are the thermal and voltage monitoring, the interlock (hard locking) and soft locking capabilities.

```
/* C/C++ */  int  SEPIA2_SCM_GetPowerAndLaserLEDS  (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char* pbPowerLED,
                                                   unsigned char* pbLaserActLED);
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SCM module
pbPowerLED O : boolean (pointer to a byte), state of the power LED; true : LED is on
pbLaserActLED O : boolean (pointer to a byte), state of the laser active LED; true : LED is on

description: Returns the state of the power LED and the laser active LED.

```
/* C/C++ */  int  SEPIA2_SCM_GetLaserLocked       (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char* pbLocked );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SCM module
pbLocked O : boolean (pointer to a byte), laser lock state

description: Returns the state of the laser power line. If the line is down either by hardlock (key), power failure or softlock (firmware, GUI or custom program) it returns locked (i. e. true or 1), otherwise unlocked (i. e. false or 0).
Note that you can't decide for what reason the line is down…

```
/* C/C++ */  int  SEPIA2_SCM_GetLaserSoftLock     (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char* pbSoftLocked );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SCM module
pbSoftLocked O : boolean (pointer to a byte), contents of the soft lock register

description: Returns the contents of the soft lock register.
Note, that this information will not stand for the real state of the laser power line. A hard lock overrides a soft unlock.

```
/* C/C++ */  int  SEPIA2_SCM_SetLaserSoftLock     (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char  bSoftLocked );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SCM module
bSoftLocked I : boolean (byte), desired value for the soft lock register

description: Sets the contents of the soft lock register.
Note, that this information will not stand for the real state of the laser power line. A hard lock overrides a soft unlock.

2.5. API Functions for Sepia PDL 828 (a.k.a. PDL 828 “Sepia II”) Specific Modules

PQ Laser Devices of the product model “Sepia II” are usually equipped with an oscillator module (type SOM 828 or SOM 828-D) in slot 100 and a variable number of SLM 828 laser driver modules in the higher numbered slots. But as the Sepia II is the forebear to the whole family, it could house literally all types of slot-mountable modules designed for the family (i.e. all except for the “Solea” modules, that are fully integrated into the “Solea” chassis).

2.5.1. Oscillator Functions

As you could already learn from the main manual chapters on the oscillator modules, these modules are a very powerful means for the design of synchronized controlling signals. They incorporate the complex functionalities of a base clock oscillator with pre-divider, a burst generator, a sequencer and a signal splitter for multiple synchronous outputs in one entity. To date, PicoQuant offers oscillator modules mainly in two variants: the SOM 828 and the SOM 828-D.

2.5.1.1. Basic Oscillator Functions (SOM)

The following list represents the API of the basic oscillator module SOM 828.

```
/* C/C++ */  int  SEPIA2_SOM_DecodeFreqTrigMode    (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iFreqTrigMode,
                                                    char*           cFreqTrigMode );
```

arguments:

iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I :	slot number of a SOM module
iFreqTrigMode	I :	index into the list of reference sources, integer (0…4)
cFreqTrigMode	O :	frequency resp. trigger mode string, pointer to a buffer for at least 32 characters

description: Returns the frequency resp. trigger mode string at list position <iFreqTrigMode> for a given SOM module. This function only works “on line”, with a PQ Laser Device running, because each SOM may carry its individual list of reference sources. Only the list positions 0 and 1 are identical for all SOM modules: They always carry the external trigger option on respectively raising and falling edges. To get the whole table, loop over the list position index starting with 0 until the function terminates with an error.

```
/* C/C++ */  int  SEPIA2_SOM_GetFreqTrigMode       (int             iDevIdx,
                                                    int             iSlotId,
                                                    int*            piFreqTrigMode);
```

arguments:

iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I :	slot number of a SOM module
piFreqTrigMode	O :	index (pointer to an integer) into the list of reference sources

description: This function inquires the current setting for the reference source in a given SOM. In the integer variable, pointed to by <piFreqTrigMode> it returns an index into the list of possible sources.

```
/* C/C++ */  int  SEPIA2_SOM_SetFreqTrigMode       (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iFreqTrigMode );
```

arguments:

iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I :	slot number of a SOM module
iFreqTrigMode	I :	index (integer) into the list of reference sources,

description: This function sets the new reference source for a given SOM. It is passed over as a new value for the index into the list of possible sources.

```
/* C/C++ */  int  SEPIA2_SOM_GetTriggerRange      (int             iDevIdx,
                                                  int             iSlotId,
                                                  int*            piMilliVoltLow,
                                                  int*            piMilliVoltHigh);
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOM module
	piMilliVoltLow	O :	pointer to an integer, containing the lower limit of the trigger range
	piMilliVoltHigh	O :	pointer to an integer, containing the upper limit of the trigger range

description: This function gets the adjustable range of the trigger level. The limits are specified in mV.

```
/* C/C++ */  int  SEPIA2_SOM_GetTriggerLevel      (int             iDevIdx,
                                                  int             iSlotId,
                                                  int*            piMilliVolt );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOM module
	piMilliVolt	O :	pointer to an integer, returning the actual value of the trigger level

description: This function gets the current value of the trigger level specified in mV.

```
/* C/C++ */  int  SEPIA2_SOM_SetTriggerLevel      (int             iDevIdx,
                                                  int             iSlotId,
                                                  int             iMilliVolt );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOM module
	iMilliVolt	I :	integer, containing the desired value of the trigger level

description: This function sets the new value of the trigger level specified in mV. To learn about the individual valid range for the trigger level, call **GetTriggerRange**.

Notice: Since the scale of the trigger level has its individual step width, the value you specified will be rounded off to the nearest valid value. It is recommended to call the GetTriggerLevel function to check the “level in fact”.

```
/* C/C++ */  int  SEPIA2_SOM_GetBurstValues       (int             iDevIdx,
                                                  int             iSlotId,
                                                  unsigned char* pbDivider,
                                                  unsigned char* pbPreSync,
                                                  unsigned char* pbMaskSync );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOM module
	pbDivider	O :	pointer to a byte, returning the current divider for the pre scaler
	pbPreSync	O :	pointer to a byte, returning the current pre sync value
	pbMaskSync	O :	pointer to a byte, returning the current mask sync value

description: This function returns the current settings of the determining values for the timing of the pre scaler. Refer to the main manual chapter on SOM 828 modules to learn about these values.

```
/* C/C++ */  int  SEPIA2_SOM_SetBurstValues       (int             iDevIdx,
                                                  int             iSlotId,
                                                  unsigned char  bDivider,
                                                  unsigned char  bPreSync,
                                                  unsigned char  bMaskSync );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOM module
	bDivider	I :	byte (1…255), containing the desired divider for the pre scaler
	bPreSync	I :	byte (0…<bDivider>-1), containing the desired pre sync value
	bMaskSync	I :	byte (0…255), containing the desired mask sync value

description: This function sets the new determining values for the timing of the pre scaler. Refer to the main manual chapter on SOM 828 modules to learn about these values.

```
/* C/C++ */  int  SEPIA2_SOM_GetBurstLengthArray  (int            iDevIdx,
                                                   int            iSlotId,
                                                   long*          plBurstLen1,
                                                   long*          plBurstLen2,
                                                   long*          plBurstLen3,
                                                   long*          plBurstLen4,
                                                   long*          plBurstLen5,
                                                   long*          plBurstLen6,
                                                   long*          plBurstLen7,
                                                   long*          plBurstLen8 );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SOM module
plBurstLen1 O : channel 1st current burst length (pointer to long int, 0…16777215)
…
plBurstLen8 O : channel 8th current burst length (pointer to long int, 0…16777215)

description: This function gets the current values for the respective burst length of the eight output channels.

```
/* C/C++ */  int  SEPIA2_SOM_SetBurstLengthArray  (int            iDevIdx,
                                                   int            iSlotId,
                                                   long           lBurstLen1,
                                                   long           lBurstLen2,
                                                   long           lBurstLen3,
                                                   long           lBurstLen4,
                                                   long           lBurstLen5,
                                                   long           lBurstLen6,
                                                   long           lBurstLen7,
                                                   long           lBurstLen8 );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SOM module
lBurstLen1 I : channel 1st desired burst length (long int, 0…16777215)
…
lBurstLen8 I : channel 8th desired burst length (long int, 0…16777215)

description: This function sets the new values for the respective burst length of the eight output channels.

```
/* C/C++ */  int  SEPIA2_SOM_GetOutNSyncEnable    (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char* pbOutEnable,
                                                   unsigned char* pbSyncEnable,
                                                   unsigned char* pbSyncInverse );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SOM module
pbOutEnable O : output channel enable mask, bitcoded (pointer to byte, 0…255)
pbSyncEnable O : sync channel enable mask, bitcoded (pointer to byte, 0…255)
pbSyncInverse O : sync function inverse, boolean (pointer to byte, 0…1)

description: This function gets the current values of the output control and sync signal composing.
(For the following illustrations refer to the screen shot of the main dialogue in the main manual and to the chapter on sync signal composition with SOM 828 modules.)
Each bit in the byte pointed at by <pbOutEnable> stands for an output enable boolean. Thus if all bits are set except of the second and fifth, this byte reads 0xED, which means all but the second and fifth output channel are enabled.
Each bit in the byte pointed at by <pbSyncEnable> stands for an sync enable boolean. Thus if all bits are clear except of the first and third, this byte reads 0x05, which means only the first and third output channel is mirrored to the sync signal composition.
The byte pointed at by <pbSyncInverse> stands for a boolean. It defines whether the sync mask length stands for the count of pulses first let through (bSyncInverse = true, 1) or for the count of pulses first blocked (bSyncInverse = false, 0)

```
/* C/C++ */  int  SEPIA2_SOM_SetOutNSyncEnable     (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char  bOutEnable,
                                                   unsigned char  bSyncEnable,
                                                   unsigned char  bSyncInverse );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOM module
	bOutEnable	I :	output channel enable mask, bitcoded (byte, 0…255)
	bSyncEnable	I :	sync channel enable mask, bitcoded (byte, 0…255)
	bSyncInverse	I :	sync mask inverse, boolean (byte, 0…1)

description: This function sets the new values for the output control and sync signal composing.
(For the following illustrations refer to the screen shot of the main dialogue in the main manual and to the chapter on sync signal composition with SOM 828 modules.)
Each bit in the byte <bOutEnable> stands for an output enable boolean. Thus if all bits are set except of the second and fifth, this byte reads 0xED, which means all but the second and fifth output channel are enabled.
Each bit in the byte <bSyncEnable> stands for a sync enable boolean. Thus if all bits are clear except of the first and third, this byte reads 0x05, which means only the first and third output channel is mirrored to the sync signal composition.
The byte <bSyncInverse> stands for a boolean. It defines whether the sync mask length stands for the count of first pulses let through (bSyncInverse = true, 1) or for the count of first pulses blocked (bSyncInverse = false, 0) of each individual burst when composing the sync signal.

```
/* C/C++ */  int  SEPIA2_SOM_DecodeAUXINSequencerCtrl (int         iAUXInCtrl,
                                                       char*       cSequencerCtrl);
```

arguments:	iAUXInCtrl	I :	sequencer control, integer, taking the byte value as returned by the SOM function GetAUXIOSequencerCtrl
	cSequencerCtrl	O :	sequencer control string, pointer to a buffer for at least 24 characters

description: This function works “off line”, without a PQ Laser Device running, too. It decodes the sequencer control code returned by the SOM function **GetAUXIOSequencerCtrl** and returns the appropriate sequencer control string (ASCII–readable).

```
/* C/C++ */  int  SEPIA2_SOM_GetAUXIOSequencerCtrl (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char* pbAUXOutCtrl,
                                                   unsigned char* pbAUXInCtrl );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOM module
	pbAUXOutCtrl	O :	true, if sequence index pulse enabled on AUX OUT, bool. (byte, 0…1)
	pbAUXInCtrl	O :	current restarting condition of the sequencer, (pointer to byte, 0…2)

description: This function gets the current control values for AUX OUT and AUX IN.
The byte pointed at by <pbAUXOutCtrl> stands for a boolean “sequence index pulse enabled on AUX Out”. The value of the byte pointed at by <pbAUXInCtrl> stands for the current running/restart mode of the sequencer. The user can decode this value to a human readable string using the **DecodeAUXINSequencerCtrl** function. The SOM 828 sequencer knows three modes:

0 : free running,
1 : running / restarting, if AUX IN is on logical High level,
2 : running / restarting, if AUX IN is on logical Low level.

Additionally, the SOM 828-D knows a fourth mode:
3 : disabled / restarting on neither level at AUX IN.

```
/* C/C++ */  int  SEPIA2_SOM_SetAUXIOSequencerCtrl (int            iDevIdx,
                                                    int            iSlotId,
                                                    unsigned char  bAUXOutCtrl,
                                                    unsigned char  bAUXInCtrl );
```

arguments:	iDevIdx	**I** :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	**I** :	slot number of a SOM module
	bAUXOutCtrl	**I** :	boolean byte; if true, sequence index pulse is enabled on AUX OUT
	bAUXInCtrl	**I** :	controls restarting condition of the sequencer, (pointer to byte, 0…2)

description: This function sets the current control values for AUX OUT and AUX IN.
The byte given by <bAUXOutCtrl> stands for a boolean “sequence index pulse enabled on AUX Out”. The value of the byte <bAUXInCtrl> stands for the intended running/restart mode of the sequencer. The user can decode this value to a human readable string using the **DecodeAUXINSequencerCtrl** function. Refer to the sequencer modes as described at SOM function **GetAUXIOSequencerCtrl**.

2.5.1.2. Enhanced Oscillator Functions (SOMD)

Compared to the API of the described before SOM 828, the feature list of the SOM 828-D (or also short: "SOMD") is augmented by an independent delay or alternatively a synchronous burst combiner for each individual burst signal output. Though the common convention of this API, to have different functions for different modules is still met, many of the functions to follow are sort of "clones" of the SOM 828 functions in functionality and footprint, despite their naming and the fact, that they only work on their respective designated module type. Hence, in order to avoid redundancy in this document, we rather refer to the SOM 828 functions than produce duplications. The following table lists all SOM 828-D functions of this type with their corresponding SOM 828 function reference.

For the following SOM 828-D functions...	...refer to these SOM 828 functions:
SEPIA2_SOMD_DecodeFreqTrigMode	**SEPIA2_SOM_DecodeFreqTrigMode**
SEPIA2_SOMD_GetTriggerRange	**SEPIA2_SOM_GetTriggerRange**
SEPIA2_SOMD_GetTriggerLevel	**SEPIA2_SOM_GetTriggerLevel**
SEPIA2_SOMD_SetTriggerLevel	**SEPIA2_SOM_SetTriggerLevel**
SEPIA2_SOMD_GetBurstLengthArray	**SEPIA2_SOM_GetBurstLengthArray**
SEPIA2_SOMD_SetBurstLengthArray	**SEPIA2_SOM_SetBurstLengthArray**
SEPIA2_SOMD_GetOutNSyncEnable	**SEPIA2_SOM_GetOutNSyncEnable**
SEPIA2_SOMD_SetOutNSyncEnable	**SEPIA2_SOM_SetOutNSyncEnable**
SEPIA2_SOMD_DecodeAUXINSequencerCtrl	**SEPIA2_SOM_DecodeAUXINSequencerCtrl**
SEPIA2_SOMD_GetAUXIOSequencerCtrl	**SEPIA2_SOM_GetAUXIOSequencerCtrl**
SEPIA2_SOMD_SetAUXIOSequencerCtrl	**SEPIA2_SOM_SetAUXIOSequencerCtrl**

The functions to follow have their SOM counterpart name, too, but they differ in some details:

```
/* C/C++ */  int  SEPIA2_SOMD_GetFreqTrigMode      (int            iDevIdx,
                                                    int            iSlotId,
                                                    int*           piFreqTrigMode,
                                                    unsigned char* pbSynchronize );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SOMD module
piFreqTrigMode O : index (pointer to an integer) into the list of reference sources
pbSynchronize O : if true, synchronization is mandatory (only on ext. trigger modes), boolean (pointer to byte, 0…1)

description: This function inquires the current setting for the reference source in a given SOMD. In the integer variable, pointed to by <piFreqTrigMode> it returns an index into the list of possible sources. If the trigger source is external, <pbSynchronize> tells, if the module should run synchronized to the signal using **SynchronizeNow**. (The delay feature for the burst outputs is only allowed for internal triggers, or if the module is synchronized to an external trigger signal.)

```
/* C/C++ */  int  SEPIA2_SOMD_SetFreqTrigMode      (int             iDevIdx,
                                                  int             iSlotId,
                                                  int             iFreqTrigMode,
                                                  unsigned char   bSynchronize );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	iFreqTrigMode	I :	index (integer) into the list of reference sources
	bSynchronize	I :	if true, synchronization is mandatory (only on ext. trigger modes), boolean (byte, 0…1)

description: This function sets the new reference source for a given SOMD. It is passed over as a new value for the index into the list of possible sources. Additionally, if externally triggered, the module could be synchronized to the external signal using the function **SynchronizeNow**. (The delay feature for the burst outputs is only allowed for internal triggers, or if the module is synchronized to an external trigger signal.) Call **GetStatusError** to check the state afterwards!

```
/* C/C++ */  int  SEPIA2_SOMD_GetBurstValues       (int              iDevIdx,
                                                  int              iSlotId,
                                                  unsigned short*  psDivider,
                                                  unsigned char*   pbPreSync,
                                                  unsigned char*   pbSyncMask );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	psDivider	O :	pointer to a word, returning the current divider for the pre scaler
	pbPreSync	O :	pointer to a byte, returning the current pre sync value
	pbSyncMask	O :	pointer to a byte, returning the current sync mask value

description: This function returns the current settings of the determining values for the timing of the pre scaler. Refer to the main manual chapter on SOM 828-D modules to learn about these values. (This function differs from the SOM type in the wider range of the divider.)

```
/* C/C++ */  int  SEPIA2_SOMD_SetBurstValues       (int              iDevIdx,
                                                  int              iSlotId,
                                                  unsigned short   sDivider,
                                                  unsigned char    bPreSync,
                                                  unsigned char    bSyncMask );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	sDivider	I :	word (1…65535), containing the desired divider for the pre scaler
	bPreSync	I :	byte (0…<bDivider>-1), containing the desired pre sync value
	bSyncMask	I :	byte (0…255), containing the desired sync mask value

description: This function sets the new determining values for the timing of the pre scaler. Refer to the main manual chapter on SOM 828-D modules to learn about these values. (This function differs from the SOM type in the wider range of the divider.) Call **GetStatusError** to check the state afterwards!

All remaining functions are true new enhancements that come first time with the SOMD modules:

```
/* C/C++ */  int  SEPIA2_SOMD_DecodeModuleState    (unsigned short   wState,
                                                  char*            cStatusText );
```

arguments:	wState	I :	module state (unsigned short, 0…65535)
	cStatusText	O :	module status string, pointer to a buffer for at least 95 characters

description: Decodes the module state to a string. The module state is a bit-coded word; Each bit may decode to a certain string. So, the length of the string needed is depending on the bits set in the status word. Currently, all strings added produce an output with a length of 94 characters (terminator excluded).

To be ready for future changes and enhancements, consider this: None of the parts is longer than 30 characters. (We will strictly adhere to this in future versions.) The parts are linked by the sequence “, “ (with a length of two characters); So the maximum length ever needed, calculates to 16 times 30 plus 15 times 2 plus terminator, hence 511 bytes.

```
/* C/C++ */  int  SEPIA2_SOMD_GetStatusError        (int             iDevIdx,
                                                     int             iSlotId,
                                                     unsigned short* pwState,
                                                     short*          piErrorCode );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SOMD module
pwState O : state of the SOMD module, (pointer to an unsigned short; 0...65535)
piErrorCode O : error code (pointer to a short integer)

description: The state is bit coded and can be decoded by the SOMD function **DecodeModuleState**. If the error state bit (0x0010) is set, the error code <piErrorCode> is transmitted as well, else this variable is zero. As a side effect, error state bit and error code are cleared, if there are no further errors pending. Decode the error codes received with the LIB function **DecodeError.**

The SOMD states are listed in the following table:

Symbol	**Value**	**DescriptionSymbol**
SEPIA2_SOMD_STATE_READY	0x0000	Module ready
SEPIA2_SOMD_STATE_INIT	0x0001	Module initialising
SEPIA2_SOMD_STATE_BUSY	0x0002	Busy until (re-)locking PLL or update data processed
SEPIA2_SOMD_STATE_HARDWAREERROR	0x0010	Error code pending
SEPIA2_SOMD_STATE_FWUPDATERUNNING	0x0020	Firmware update running
SEPIA2_SOMD_STATE_FRAM_WRITEPROTECTED	0x0040	FRAM write protected: set, write enabled: cleared
SEPIA2_SOMD_STATE_PLL_UNSTABLE	0x0080	PLL not stable after changing base osc. or trigger mode

```
/* C/C++ */  int  SEPIA2_SOMD_GetHWParams          (int             iDevIdx,
                                                    int             iSlotId,
                                                   unsigned short* pwHWParTemp1,
                                                   unsigned short* pwHWParTemp2,
                                                   unsigned short* pwHWParTemp3,
                                                   unsigned short* pwHWParVolt1,
                                                   unsigned short* pwHWParVolt2,
                                                   unsigned short* pwHWParVolt3,
                                                   unsigned short* pwHWParVolt4,
                                                   unsigned short* pwHWParAUX );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SOMD module
pwHWParTemp1 O : pointer to a word, returning the temperature at measuring point 1
pwHWParTemp2 O : pointer to a word, returning the temperature at measuring point 2
pwHWParTemp3 O : pointer to a word, returning the temperature at measuring point 3
pwHWParVolt1 O : pointer to a word, returning the voltage at measuring point 1
pwHWParVolt2 O : pointer to a word, returning the voltage at measuring point 2
pwHWParVolt3 O : pointer to a word, returning the voltage at measuring point 3
pwHWParVolt4 O : pointer to a word, returning the voltage at measuring point 4
pwHWParAUX O : pointer to a word, returning the result of an auxiliary measurement

description: This function returns the current results of some temperature and voltage measurements inside the SOMD module. These values are used to rate the working conditions and judge the stability of the module. The function is needed for documentation of the module's current working conditions in case of a support request, beside this, it is solely informative.

```
/* C/C++ */  int  SEPIA2_SOMD_GetFWVersion        (int            iDevIdx,
                                                  int            iSlotId,
                                                  unsigned long* pulFWVersion );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	pulFWVersion	O :	firmware version (pointer to unsigned long)

description: Firmware Version is coded (byte[3] = major-nr., byte[2] = minor-nr., byte[1] + byte[0] as word = build-nr.)

```
/* C/C++ */  int  SEPIA2_SOMD_SynchronizeNow      (int            iDevIdx,
                                                  int            iSlotId );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module

description: If the triggering is set to one of the external modes using the function **SetFreqTrigMode**, this function is used to synchronize to the external triggering signal. Once this function succeeded, it is allowed to apply delay info to the bursts at the sequencer outputs. Call **GetStatusError** to check the state afterwards!
Get information on the synchronized-to signal calling **GetTrigSyncFreq**.

```
/* C/C++ */  int  SEPIA2_SOMD_GetTrigSyncFreq     (int            iDevIdx,
                                                  int            iSlotId,
                                                  unsigned char* pbFreqStable,
                                                  unsigned long* pulTrigSyncFrq );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	pbFreqStable	O :	boolean (pointer to a byte, 0…1), denoting, if the synchronized-to frequency is still stable (within a tolerance window of ±100 ppm).
	pulTrigSyncFrq	O :	triggering frequency (pointer to unsigned long) in Hz

description: If synchronized, call this function to get information on the triggering signal. <pbFreqStable> stays true, as long as the signal stays within the tolerance window of ±100 ppm.

```
/* C/C++ */  int  SEPIA2_SOMD_GetDelayUnits       (int            iDevIdx,
                                                  int            iSlotId,
                                                  double*        pfCoarseDlyStep,
                                                  byte*          pbFineDlySteps );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	pfCoarseDlyStep	O :	width of a coarse delay step (pointer to a double), in sec.
	pbFineDlySteps	O :	fine delay maximum step count (pointer to a byte).

description: This function should always be called, after the base oscillator values (source, divider, synchronized frequency, etc.) had changed. It returns the coarse delay stepwidth in seconds and the currently possible amount of fine steps to apply. The coarse delay stepwidth is mainly varying with the main clock, depending on the trigger source (base oscillator or external signal) and the pre-division factor. Usually the stepwidth will be about 650 to 950 psec; the value is given in seconds. Since this value is varying on all changes to the main clock, the amount of steps to meet a desired delay length has to be recalculated then. The same goes for the amount of fine steps. A fine step has a module depending, individually varying steplength of typically 15 to 35 psec.

```
/* C/C++ */  int  SEPIA2_SOMD_GetSeqOutputInfos    (int             iDevIdx,
                                                    int             iSlotId,
                                                    byte            bSeqOutputIdx,
                                                    byte*           pbDelayed,
                                                    byte*           pbForcdUndlyd,
                                                    byte*           pbOutCombi,
                                                    byte*           pbMaskedCombi
                                                    double*         pfCoarseDly
                                                    byte*           pbFineDly );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	bSeqOutputIdx	I :	sequencer output index (byte, 1…8)
	pbDelayed	O :	boolean (pointer to a byte, 0…1),
	pbForcdUndlyd	O :	forced being undelayed, boolean (pointer to a byte, 0…1),
	pbOutCombi	O :	output channel combination mask, bitcoded (pointer to byte, 1…255)
	pbMaskedCombi	O :	boolean (pointer to a byte, 0…1),
	pfCoarseDly	O :	coarse delay (pointer to a double), in ns.
	pbFineDly	O :	fine delay steps (pointer to a byte, 0…63) in a.u.

description: This function returns all information necessary to describe the state of the sequencer output identified by <bSeqOutputIdx>. Note, that it returns apparently redundant information: If e.g. <pbDelayed> is true, the information on output combinations seems sort of useless, since burst combinations aren't allowed on delayed signals. On the other hand, there is no virtue in reading delay data, if <pbDelayed> is false or <pbForcdUndlyd> is true. But then again, consider, this function was designed for complex GUI purposes. It offers all the alternately hidden, but still effective information, to enable a GUI to seamlessly switch back and forth between the different states.

```
/* C/C++ */  int  SEPIA2_SOMD_SetSeqOutputInfos    (int             iDevIdx,
                                                    int             iSlotId,
                                                    byte            bSeqOutputIdx,
                                                    byte            bDelayed,
                                                    byte            bOutCombi,
                                                    byte            bMaskedCombi
                                                    double          fCoarseDly
                                                    byte            bFineDly );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SOMD module
	bSeqOutputIdx	I :	sequencer output index (byte, 1…8)
	bDelayed	I :	boolean (byte, 0…1),
	bOutCombi	I :	output channel combination mask, bitcoded (byte, 1…255)
	bMaskedCombi	I :	boolean (byte, 0…1),
	fCoarseDly	I :	coarse delay (double), in ns.
	bFineDly	I :	fine delay steps (byte, 0…63) in a.u.

description: This function sets all information necessary to describe the state of the sequencer output identified by <bSeqOutputIdx>. Note, that it transmits apparently redundant information: If e.g. <bDelayed> is true, the information on output combinations seems sort of useless, since burst combinations aren't allowed on delayed signals. On the other hand, there is no virtue in setting delay data, if <bDelayed> is false. But then again, consider, this function was designed for complex GUI purposes. It sends all the alternately hidden, but still effective information, to enable a GUI to seamlessly switch back and forth between the different states.

Note: <bOutCombi> must not equal 0. (At least one channel has to be assigned to the output.)

Note that the currently legal values for <pbFineDly> are module state dependent and have to be queried using the SOMD function `GetDelayUnits`.

2.5.2. Laser Driver Functions (SLM)

SLM 828 modules can interface the huge families of pulsed laser diode heads (LDH series) and pulsed LED heads (PLS series) from PicoQuant. These functions let the application control their working modes and intensity.

```
/* C/C++ */  int  SEPIA2_SLM_DecodeFreqTrigMode    (int             iFreq,
                                                   char*           cFreqTrigMode );
```

arguments:
iFreq I : index into the list of int. frequencies/ext. trigger modi, integer (0…7)
cFreqTrigMode O : frequency resp. trigger mode string, pointer to a buffer for at least 28 characters

description:
Returns the frequency resp. trigger mode string at list position <iFreq> for any SLM module. This function also works “off line”, since all SLM modules provide the same list of int. frequencies resp. ext. trigger modi.

```
/* C/C++ */  int  SEPIA2_SLM_DecodeHeadType        (int             iHeadType,
                                                   char*           cHeadType );
```

arguments:
iHeadType I : index into the list of pulsed LED / laser head types, integer (0…3)
cHeadType O : head type string, pointer to a buffer for at least 18 characters

description:
Returns the head type string at list position <iHeadType> for any SLM module. This function also works “off line”, since all SLM modules provide the same list of pulsed LED / laser head types.

```
/* C/C++ */  int  SEPIA2_SLM_GetIntensityFineStep  (int             iDevIdx,
                                                   int             iSlotId,
                                                   unsigned short* pwIntensity );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SLM module
pwIntensity O : intensity (as per mille of the ctrl. voltage; pointer to word, 0…1000)

description:
This function gets the current intensity value of a given SLM driver module: The word pointed at by <pwIntensity> stands for the current per mille value of the laser head controlling voltage.

```
/* C/C++ */  int  SEPIA2_SLM_SetIntensityFineStep  (int             iDevIdx,
                                                   int             iSlotId,
                                                   unsigned short  wIntensity );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SLM module
wIntensity I : intensity (as per mille of the ctrl. voltage; pointer to word, 0…1000)

description:
This function sets the intensity value of a given SLM driver module:
The word <wIntensity> stands for the desired per mille value of the laser head controlling voltage.

```
/* C/C++ */  int  SEPIA2_SLM_GetPulseParameters    (int              iDevIdx,
                                                    int              iSlotId,
                                                    int*             piFreq,
                                                    unsigned char*   pbPulseMode,
                                                    int*             piHeadType );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SLM module
	piFreq	O :	index into list of frequencies/trigger modi (pointer to integer, 0…7)
	pbPulseMode	O :	pulse enabled, boolean (pointer to byte, 0…1)
	piHeadType	O :	index into list of pulsed LED/laser head types (pointer to byte, 0…3)

description: This function gets the current pulse parameter values of a given SLM driver module:
The integer pointed at by <piFreq> stands for an index into the list of int. frequencies / ext. trigger modi. Decode this value using the function **DecodeFreqTrigMode**.
The byte pointed at by <pbPulseMode> stands for a boolean and may be read as follows: 1 : “pulses enabled”; 0 : either “laser off” or “continuous wave”, depending on the capabilities of the used head.
The integer pointed at by <piHeadType> stands for an index into the list of pulsed LED / laser head types. Decode this value using the SLM function **DecodeHeadType**.

```
/* C/C++ */  int  SEPIA2_SLM_SetPulseParameters    (int              iDevIdx,
                                                    int              iSlotId,
                                                    int              iFreq,
                                                    unsigned char    bPulseMode );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SLM module
	iFreq	I :	index into list of frequencies/trigger modi (integer, 0…7)
	bPulseMode	I :	pulse enabled, boolean (byte, 0…1)

description: This function gets the current pulse parameter values of a given SLM driver module:
The integer <iFreq> stands for an index into the list of int. frequencies / ext. trigger modi. Decode this value using the function **DecodeFreqTrigMode**. The byte <bPulseMode> stands for a boolean and may be read as follows: 1 : “pulses enabled”; 0 : either “laser off” or “continuous wave”, depending on the capabilities of the used head.

```
/* C/C++ */  int  SEPIA2_SLM_GetParameters         (int              iDevIdx,
                                                    int              iSlotId,
                                                    int*             piFreq,
                                                    unsigned char*   pbPulseMode,
                                                    int*             piHeadType,
                                                    unsigned char*   pbIntensity );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SLM module
	piFreq	O :	index into list of frequencies/trigger modi (pointer to integer, 0…7)
	pbPulseMode	O :	pulse enabled, boolean (pointer to byte, 0…1)
	piHeadType	O :	index into list of pulsed LED/laser head types (pointer to byte, 0…3)
	pbIntensity	O :	intensity (as percentage of ctrl. voltage; pointer to byte, 0…100)

description: **deprecated, instead use**
SEPIA2_SLM_GetIntensityFineStep,
SEPIA2_SLM_GetPulseParameters
This function gets the current values of a given SLM driver module:
The integer pointed at by <piFreq> stands for an index into the list of int. frequencies / ext. trigger modi for SLM modules. The byte pointed at by <pbPulseMode> stands for a boolean and may be read as follows: 1 : “pulses enabled”; 0 : either “laser off” or “continuous wave”, depending on the capabilities of the used head. The integer pointed at by <piHeadType> stands for an index into the list of pulsed LED / laser head types. The byte pointed at by <pbIntensity> stands for the current percentage of the laser head controlling voltage.

```
/* C/C++ */  int  SEPIA2_SLM_SetParameters        (int             iDevIdx,
                                                   int             iSlotId,
                                                   int             iFreq,
                                                   unsigned char   bPulseMode,
                                                   unsigned char   bIntensity );
```

arguments:

iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I	:	slot number of a SLM module
iFreq	I	:	index into list of frequencies/trigger modi (integer, 0…7)
bPulseMode	I	:	pulse enabled, boolean (byte, 0…1)
bIntensity	I	:	intensity (as percentage of ctrl. voltage; byte, 0…100)

description: **deprecated, instead use**

`SEPIA2_SLM_SetIntensityFineStep,`
`SEPIA2_SLM_SetPulseParameters`

This function gets the current values of a given SLM driver module: The integer <iFreq> contains the new index into the list of int. frequencies / ext. trigger modi for SLM modules. The byte <bPulseMode> contains the new pulse mode (boolean) and may be read as follows: 1 : “pulses enabled”; 0 : either “laser off” or “continuous wave”, depending on the capabilities of the used head. The byte <bIntensity> contains the desired percentage of the laser head controlling voltage.

2.5.3. Multi Laser Driver Functions (SML)

In contrast to the SLM modules, the SML 828 multi laser driver module is not only generating the controlling voltage for an external laser head, but houses up to four laser diodes itself. These lasers are synchronized and combining coupled to a common output fiber, thus enhancing the optical output power of the individual lasers.

```
/* C/C++ */  int  SEPIA2_SML_DecodeHeadType        (int             iHeadType,
                                                  char*           cHeadType );
```

arguments:
iHeadType I : index into the list of pulsed LED / laser head types, integer (0…2)
cHeadType O : head type string, pointer to a buffer for at least 18 characters

description: Returns the head type string at list position <iHeadType> for any SML module. This function also works “off line”, since all SML modules provide the same list of pulsed LED / laser head types.

```
/* C/C++ */  int  SEPIA2_SML_GetParameters         (int             iDevIdx,
                                                  int             iSlotId,
                                                  unsigned char* pbPulseMode,
                                                  int*            piHead,
                                                  unsigned char* pbIntensity );
```

arguments:
iDevIdx I : Sepia II device index (USB channel number, 0…7)
iSlotId I : slot number of a SML module
pbPulseMode O : pulse enabled, boolean (pointer to byte, 0…1)
piHead O : index into list of pulsed LED/laser head types (pointer to byte, 0…2)
pbIntensity O : intensity (as percentage of optical power; pointer to byte, 0…100)

description: This function gets the current values of a given SML multi lasers driver module:
The byte pointed at by <pbPulseMode> stands for a boolean and may be read as follows:
1 : “pulses enabled”; 0 : “continuous wave”.
The integer pointed at by <piHead> stands for an index into the list of pulsed LED / laser head types
The byte pointed at by <pbIntensity> stands for the current percentage of the optical power of the laser heads.

```
/* C/C++ */  int  SEPIA2_SML_SetParameters         (int             iDevIdx,
                                                  int             iSlotId,
                                                  unsigned char  bPulseMode,
                                                  unsigned char  bIntensity );
```

arguments:
iDevIdx I : Sepia II device index (USB channel number, 0…7)
iSlotId I : slot number of a SML module
bPulseMode I : pulse enabled, boolean (byte, 0…1)
bIntensity I : intensity (as percentage of the optical power; byte, 0…100)

description: This function gets the current values of a given SML driver module:
The byte <bPulseMode> contains the new pulse mode (boolean) and may be read as follows:
1 : “pulses enabled”; 0 : “continuous wave”.
The byte <bIntensity> contains the desired percentage of the optical power of the laser heads.

2.6. API Functions for “PPL 400” Specific Modules

PicoQuant's “Programmable Pulse Shape Laser Device” PPL 400 combines the already illustrated features of the SOM 828 or SOM 828-D, respectively, allowing for variable sequences of burst pulses, with up to two of the specialized waveform generation modules SWM 828. The output curves of these modules are combined to be the modulating input of the VCL 828 voltage controlled laser module.

2.6.1. Waveform Generation Module Functions (SWM)

Each SWM module can generate two independent scalable curves. All timing parameters of these curves are defined in per mille with respect to the individual curve's time base. At the output of the SWM module, the independent signals are superposed to the sum of the curves. The following restrictions have to be taken into account:

For a given curve, the start point of the ramp may or may not lie before the start point of the pulse, however, the ramp signal is not connected through to the output, unless the pulse signal has started.

```
/* C/C++ */  int  SEPIA2_SWM_DecodeRangeIdx        (int              iDevIdx,
                                                    int              iSlotId,
                                                    int              iTimeBaseIdx,
                                                    int*             piUpperLimit );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SWM module
iTimeBaseIdx I : index into the list of time bases
piUpperLimit O : upper limit of the range (pointer to an integer) in nsec

description: This function returns the upper limit of the time base identified by <iTimeBaseIdx> in nano seconds.

```
/* C/C++ */  int  SEPIA2_SWM_GetUIConstants        (int              iDevIdx,
                                                    int              iSlotId,
                                                    unsigned char*  pbTimeBasesCnt,
                                                    unsigned short* pwMaxAmplitude,
                                                    unsigned short* pwMaxSlewRate,
                                                    unsigned short* pwExpRampFctr,
                                                    unsigned short* pwMinUsrValue,
                                                    unsigned short* pwMaxUsrValue,
                                                    unsigned short* pwUserRes );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SWM module
pbTimeBasesCnt O : count of entries in the list of time bases (pointer to a byte)
pwMaxAmplitude O : maximum pulse amplitude (pointer to a word) in mV
pwMaxSlewRate O : maximum ramp slew rate (pointer to a word) in mV/µsec
pwExpRampFctr O : exponential factor for the ramp (pointer to a word)
pwMinUsrValue O : lower limit for user entries (pointer to a word) in ‰
pwMaxUsrValue O : upper limit for user entries (pointer to a word) in ‰
pwUserRes O : user resolution i.e. stepwidth for user entries (pointer to a word) in ‰

description: This function returns all necessary values to initialize a GUI for all legal entries.

```
/* C/C++ */  int  SEPIA2_SWM_GetCurveParams        (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iCurveIdx,
                                                    unsigned char*  pbTimeBaseIdx,
                                                    unsigned short* pwPAPml,
                                                    unsigned short* pwRRPml,
                                                    unsigned short* pwPSPml,
                                                    unsigned short* pwRSPml,
                                                    unsigned short* pwWSPml );
```

arguments:	iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	:	slot number of a SWM module
	iCurveIdx	I	:	curve number (0; 1)
	pbTimeBaseIdx	O	:	index into the list of time bases (pointer to a byte)
	pwPAPml	O	:	pulse amplitude (pointer to a word, 0..1000) in ‰ of the max. amplitude
	pwRRPml	O	:	ramp slew rate (pointer to a word, 0..1000) in ‰ of the max. slew rate
	pwPSPml	O	:	pulse start delay (pointer to a word, 0..1000) in ‰ of the time base
	pwRSPml	O	:	ramp start delay (pointer to a word, 0..1000) in ‰ of the time base
	pwWSPml	O	:	wave stop delay (pointer to a word, 0..1000) in ‰ of the time base

description: This function returns the describing parameters of the curve identified by iCurveIdx.

```
/* C/C++ */  int  SEPIA2_SWM_SetCurveParams        (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iCurveIdx,
                                                    unsigned char   bTimeBaseIdx,
                                                    unsigned short  wPAPml,
                                                    unsigned short  wRRPml,
                                                    unsigned short  wPSPml,
                                                    unsigned short  wRSPml,
                                                    unsigned short  wWSPml );
```

arguments:	iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	:	slot number of a SWM module
	iCurveIdx	I	:	curve number (0; 1)
	bTimeBaseIdx	I	:	index into the list of time bases (byte)
	wPAPml	I	:	pulse amplitude (word, 0..1000) in ‰ of the max. amplitude
	wRRPml	I	:	ramp slew rate (word, 0..1000) in ‰ of the max. slew rate
	wPSPml	I	:	pulse start delay (word, 0..1000) in ‰ of the time base
	wRSPml	I	:	ramp start delay (word, 0..1000) in ‰ of the time base
	wWSPml	I	:	wave stop delay (word, 0..1000) in ‰ of the time base

description: This function sets the describing parameters for the curve identified by iCurveIdx.

```
/* C/C++ */  int  SEPIA2_SWM_GetCalTableVal        (int             iDevIdx,
                                                    int             iSlotId,
                                                    char*           cTableName,
                                                    unsigned char   bTableRow,
                                                    unsigned char   bTableColumn,
                                                    unsigned short* pwValue );
```

arguments:	iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	:	slot number of a SWM module
	cTableName	I	:	pointer to a character buffer, containing the name of the table
	bTableRow	I	:	byte, containing the table row (zero based) to be addressed
	bTableColumn	I	:	byte, containing the table column (zero based) to be addressed
	pwValue	O	:	pointer to a word, returning the calibration value as read from the table

description: Returns the content of a given cell of the internal calibration tables. The tables are identified by their names, the index into the table (line-number) is zero based. The most important table is “UI_Consts”, because it is the only fixed length table, but contains the lengths of all the other tables. The function is needed for documentation of the module's calibration parameters in case of a support request, beside this, it is solely informative.

Table Name	***Col.***	***Content***	***Unit(s)***	***Table Length***
UI_Consts	1	Constants for the user interface: 00. DAC resolution 01. min. user value 02. max. user value 03. user resolution 04. max. pulse amplitude 05. max. slew rate 06. exponential ramp effect 07. table length: number of time bases 08. table length: number of pulse cal-points 09. table length: number of ramp cal-points 10. table length: number of delay cal-points (tb1) 11. table length: number of delay cal-points (tb2) 12. table length: number of delay cal-points (tb3)	 [bit] [‰] [‰] [‰] [mV] [mV/µs]	13

Having read this table, we know the lengths of all other tables and may begin to read them:

Table Name	***Col.***	***Content***	***Unit(s)***	***Table Length***
TaW1TRng	1	Wave 1: Timebase upper range	[ns]	UI_Consts [7]
TaW1TStw	1	Wave 1: Timebase start value	[mV]	UI_Consts [7]
TaW1TSlr	1	Wave 1: Timebase slew rate	[mV/µs]	UI_Consts [7]
TaW2TRng	1	Wave 2: Timebase upper range	[ns]	UI_Consts [7]
TaW2TStw	1	Wave 2: Timebase start value	[mV]	UI_Consts [7]
TaW2TSlr	1	Wave 2: Timebase slew rate	[mV/µs]	UI_Consts [7]
TaW1PAmp	2	Wave 1: Pulse amplitude DAC calibration	([‰] | [a.u.])	UI_Consts [8]
TaW1PDyn	2	Wave 1: Pulse dynamics DAC calibration	([‰] | [a.u.])	UI_Consts [8]
TaW1RSlr	2	Wave 1: Ramp slew rate DAC calibration	([‰] | [a.u.])	UI_Consts [9]
TaW2PAmp	2	Wave 2: Pulse amplitude DAC calibration	([‰] | [a.u.])	UI_Consts [8]
TaW2PDyn	2	Wave 2: Pulse dynamics DAC calibration	([‰] | [a.u.])	UI_Consts [8]
TaW2RSlr	2	Wave 2: Ramp slew rate DAC calibration	([‰] | [a.u.])	UI_Consts [9]

The other tables hold the delay calibration (wave-shape timing correction) and could be understood as as many huge tables as there are timebases (as given in UI_Consts [7]), each of these tables with 7 columns and as many rows as given in the corresponding field of UI_Consts (i.e. UI_Consts [10+tb_idx] with tb_idx going from 0 to UI_Consts [7] – 1). All delay values are arbitrary values: They stand for DAC values, which compensate for proper timing.

Table Name	***Col.***	***Content***	***Unit(s)***	***Table Length***
TaPmlDly0	1	UI argument for DAC values (tb_idx==0)	[‰]	UI_Consts [10]
TaW1PDly0	1	Wave 1: Pulse start delay with timebase 1	[a.u.]	UI_Consts [10]
TaW1RDly0	1	Wave 1: Ramp start delay with timebase 1	[a.u.]	UI_Consts [10]
TaW1SDly0	1	Wave 1: Wave stop delay with timebase 1	[a.u.]	UI_Consts [10]
TaW2PDly0	1	Wave 2: Pulse start delay with timebase 1	[a.u.]	UI_Consts [10]
TaW2RDly0	1	Wave 2: Ramp start delay with timebase 1	[a.u.]	UI_Consts [10]
TaW2SDly0	1	Wave 2: Wave stop delay with timebase 1	[a.u.]	UI_Consts [10]

Table Name	***Col.***	***Content***	***Unit(s)***	***Table Length***
TaPmlDly1	1	UI argument for DAC values (tb_idx==1)	[‰]	UI_Consts [11]
TaW1PDly1	1	Wave 1: Pulse start delay with timebase 2	[a.u.]	UI_Consts [11]
TaW1RDly1	1	Wave 1: Ramp start delay with timebase 2	[a.u.]	UI_Consts [11]
TaW1SDly1	1	Wave 1: Wave stop delay with timebase 2	[a.u.]	UI_Consts [11]
TaW2PDly1	1	Wave 2: Pulse start delay with timebase 2	[a.u.]	UI_Consts [11]
TaW2RDly1	1	Wave 2: Ramp start delay with timebase 2	[a.u.]	UI_Consts [11]
TaW2SDly1	1	Wave 2: Wave stop delay with timebase 2	[a.u.]	UI_Consts [11]

Table Name	***Col.***	***Content***	***Unit(s)***	***Table Length***
TaPmlDly2	1	UI argument for DAC values (tb_idx==2)	[‰]	UI_Consts [12]
TaW1PDly2	1	Wave 1: Pulse start delay with timebase 3	[a.u.]	UI_Consts [12]
TaW1RDly2	1	Wave 1: Ramp start delay with timebase 3	[a.u.]	UI_Consts [12]
TaW1SDly2	1	Wave 1: Wave stop delay with timebase 3	[a.u.]	UI_Consts [12]
TaW2PDly2	1	Wave 2: Pulse start delay with timebase 3	[a.u.]	UI_Consts [12]
TaW2RDly2	1	Wave 2: Ramp start delay with timebase 3	[a.u.]	UI_Consts [12]
TaW2SDly2	1	Wave 2: Wave stop delay with timebase 3	[a.u.]	UI_Consts [12]

```
/* C/C++ */  int  SEPIA2_SWM_GetExtAtten          (int             iDevIdx,
                                                   int             iSlotId,
                                                   float*          pfExtAtt );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SWM module
pfExtAtt O : external attenuation (pointer to a float) in dB

description: This function returns the value of an external attenuation of the SWM output as set by the SWM function **SetExtAtten**. This function is only used for informational purposes. The GUI software uses this value to provide the user with a close to reality visualisation of the output signals.

```
/* C/C++ */  int  SEPIA2_SWM_SetExtAtten          (int             iDevIdx,
                                                   int             iSlotId,
                                                   float           pfExtAtt );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SWM module
pfExtAtt O : external attenuation (pointer to a float) in dB

description: This function writes the value of an external attenuation of the SWM output to the module. The GUI software uses this value (as read by the function **GetExtAtten**) to provide the user with a close to reality visualisation of the output signals.

2.6.2. Voltage Controlled Laser Module Functions (VCL)

The VCL 828 voltage controlled laser module is an integrated constant factor amplifier and laser modulator. The intensity of the integrated laser is shaped by the sum of the voltages applied to the modulating inputs of the VCL 828 module. In a PPL 400 device, the complete shaping magic is provided by the SWM module(s), the API of the VCL module is merely for thermal fine tuning and documentation.

```
/* C/C++ */  int  SEPIA2_VCL_GetUIConstants       (int          iDevIdx,
                                                   int          iSlotId,
                                                   int*         piMinTemp,
                                                   int*         piMaxTemp,
                                                   int*         piTempRes );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a VCL module
piMinTemp O : minimum temperature (pointer to an integer) in tenth of °C
piMaxTemp O : maximum temperature (pointer to an integer) in tenth of °C
piTempRes O : temperature resolution (pointer to an integer) in tenth of °C

description: This function returns all necessary values to initialize a GUI for legal VCL temperature adjustment entries.

```
/* C/C++ */  int  SEPIA2_VCL_GetTemperature       (int          iDevIdx,
                                                   int          iSlotId,
                                                   int*         piTemperature );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a VCL module
piTemperature O : temperature (pointer to an integer) in tenth of °C

description: This function returns the current VCL temperature adjustment setting.

```
/* C/C++ */  int  SEPIA2_VCL_SetTemperature       (int          iDevIdx,
                                                   int          iSlotId,
                                                   int          iTemperature );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a VCL module
iTemperature I : temperature (pointer to an integer) in tenth of °C

description: This function sets the new VCL temperature adjustment setting.

```
/* C/C++ */  int  SEPIA2_VCL_GetBiasVoltage       (int          iDevIdx,
                                                   int          iSlotId,
                                                   int*         piBiasVoltage );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a VCL module
piBiasVoltage O : bias voltage (pointer to an integer, 0..1000) in ‰ of the max. voltage

description: This function returns the current bias voltage adjustment setting. The function is needed for documentation of the module's calibration parameters in case of a support request, beside this, it is solely informative.

2.7. API Functions for “Solea” Specific Modules

At first glance, PicoQuant's tunable laser device “Solea” looks rather monolithic than modular, but from the engineer's point of view however, it is designed and built highly modular. In spite of a very different external look of the two devices, the Solea is based on the same modular structure as the PDL 828 “Sepia II”, as far as device communication and controlling are concerned. In fact, Solea can even be driven as a group of external slave modules controlled by another Sepia II master.

This casts a new light on the first parameters of any module oriented function. The same Solea will be addressed by a different device index, when either driven as stand alone device or driven as a couple of slave modules of a Sepia II master. Even more, the slot identification numbers <iSlotId> of the Solea modules will differ, too, since in the first case they are calculated with respect to the Sepia II slot where the extension module is plugged in and thus will increment in tenner or even units, whilst in the later case the same modules show up as first level modules, all numbered in hundreds. A software that shall be run under both conditions therefore has to retrieve the actual slot ID for any Solea module by inspecting the device-internal list of modules, called the “map” with the firmware (FWR) function GetModuleInfoByMapIdx.

2.7.1. A Prior Note on Timing and Termination of “Solea” API Functions

In opposite to what we are used to experience from “Sepia II” API functions, some of the following function calls will return, although the desired state isn't established yet. This is due to the fact, that these functions desire computational and mechanical activities, that take much more time than a common USB vendor command is allowed to last. On the other hand we expect our API functions to return a result code on termination, telling us whether the desired state was successfully reached or not. Obviously, this is a significant, mutual contradiction.

In reaction on this conflict, we decided to modify the paradigm of the return code. For these potentially critical, time consumptive functions, the return code doesn't state on the termination and thus attendance to receive the next instruction but on the reception, error free interpretation and queueing of the command. Immediately, the internal **busy state** of the module in question is set, while the module autonomously completes the intended actions. The module will reject any further commands until this state was successfully cleared or otherwise changes on termination into a signalling **error pending** state. This state is prohibiting the reception of a new command, too. It stays active until the state and error code was read. Polling the state until not longer busy and reading an eventual error code afterwards is all done with the **GetStatusError** function of the respective module.

2.7.2. Seed Laser Module Functions (SSM)

The SSM module controls the seed laser of the Solea. For the user API, it provides functions to control the working mode with respect to the triggering of the laser. For internal calibrating use, it provides a set of abstract data, gathered in a write protected FRAM device. Anyway, it could come to the need of updating these data. For this purpose, the module provides functions to read and even alter the write protection state. Consider, that changes to this state aren't stored in the system and thus set back to protective after each power up.

```
/* C/C++ */  int  SEPIA2_SSM_DecodeFreqTrigMode    (int            iDevIdx,
                                                  int            iSlotId,
                                                  int            iFreqTrigIdx,
                                                  char*          cFreqTrig,
                                                  int*           piFreq,
                                                  byte*          pbTrigLevelEna);
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SSM module
iFreqTrigIdx I : index into the list of reference sources (integer, 0…iMaxIdx)
cFreqTrig O : string representation of the frequency / trigger mode, pointer to a buffer for at least 15 characters
piFreq O : numeric representation of the frequency / trigger mode in Hz, (pointer to an integer); 0 = off, -1 = external source
pbTrigLevelEna O : boolean (pointer to byte) denoting if a trigger level is needed

description: Returns the frequency / trigger mode properties at the list position given by <iFreqTrigIdx> for a SSM module. The properties to retrieve are:

- a string representation of the frequency / trigger mode in <cFreqTrig>,
- a numerical representation thereof in <piFreq> in Hz (0 means off, -1 means external),
- a boolean in <pbTrigLevelEna>, denoting if the trigger mode needs additional trigger level information.

This function only works “on line”, with a “Solea” running, because each SSM may carry its individual list of reference sources. To get the whole table, loop over the list position index starting with 0 until the function terminates with an error.

```
/* C/C++ */  int  SEPIA2_SSM_GetTrigLevelRange     (int            iDevIdx,
                                                  int            iSlotId,
                                                  int*           piUpperTL,
                                                  int*           piLowerTL,
                                                  int*           piResolTL );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SSM module
piUpperTL O : upper trigger level (pointer to an integer) in mV
piLowerTL O : upper trigger level (pointer to an integer) in mV
piResolTL O : trigger level resolution (pointer to an integer) in mV

description: Retrieves the range and resolution of the trigger level in mV
(needed as limits for adjustment controls, e.g. in the GUI)

```
/* C/C++ */  int  SEPIA2_SSM_GetTriggerData        (int            iDevIdx,
                                                    int            iSlotId,
                                                    int*           piFreqTrigIdx,
                                                    int*           piTrigLevel );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SSM module
piFreqTrigIdx O : index (pointer to an integer) into the list of reference sources,
piTrigLevel O : pointer to an integer, returning the current value of the trigger level in mV

description: Returns the current index into the list of reference sources in <piFreqTrigIdx>; This value can be decoded using the function DecodeFreqTrigMode. Additionally, it returns the current trigger level in mV, if <piFreqTrigIdx> contains a value representative for external triggering.

```
/* C/C++ */  int  SEPIA2_SSM_SetTriggerData        (int            iDevIdx,
                                                    int            iSlotId,
                                                    int            iFreqTrigIdx,
                                                    int            iTrigLevel );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SSM module
iFreqTrigIdx I : index into the list of reference sources (integer, 0…)
iTrigLevel I : integer, giving the desired value of the trigger level in mV

description: Sets the current index into the list of reference sources in <piFreqTrigIdx>; This value can be decoded using the function DecodeFreqTrigMode. Additionally, it sets the current trigger level in mV, if <iFreqTrigIdx> contains a value representative for external triggering.

```
/* C/C++ */  int  SEPIA2_SSM_SetFRAMWriteProtect   (int            iDevIdx,
                                                    int            iSlotId,
                                                    unsigned char  bWriteProtect );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SSM module
bWriteProtect I : enable write protection, boolean (byte, 0…1)

description: Sets the write protection for the module's FRAM to the desired value. If protection was disabled, the FRAM stays writeable until revoked or next power down. On power up, write protection is set by default.

```
/* C/C++ */  int  SEPIA2_SSM_GetFRAMWriteProtect   (int            iDevIdx,
                                                    int            iSlotId,
                                                    unsigned char* pbWriteProtect);
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SSM module
pbWriteProtect O : is write protection enabled, boolean (pointer to byte)

description: Gets the write protection state for the module's FRAM.

2.7.3. Wavelength Selector Functions (SWS)

The SWS wavelength selector module is a kind of “intelligent” module, supported by its own processor. Its tasks are more complex than other modules and changes to the state of this module may elapse much more time to take effect than usual. These functions therefore terminate and return, before the desired state is implemented. The return code then isn't a means to find out if the desired change was successfully performed. It rather states that the command itself was successfully interpreted and queued. To overcome this obstacle, the modules internal state is retrievable by the function **GetStatusError** and should be checked for being ready before and after sending a new command. In case an error occurred, the module switches into an inoperable state (error pending) until this error state was retrieved.

```
/* C/C++ */  int  SEPIA2_SWS_DecodeModuleType      (int              iSWSType,
                                                    char*            cSWSType );
```

arguments:	iSWSType	I :	SWS type number (integer, 0…255)
	cSWSType	O :	SWS type string, pointer to a buffer for at least 32 characters

description: Decodes the SWS type number as retrieved by SWS function `GetModuleType` to a string.

```
/* C/C++ */  int  SEPIA2_SWS_DecodeModuleState     (unsigned short   wState,
                                                    char*            cStatusText );
```

arguments:	wState	I :	module state (unsigned short, 0…65535)
	cStatusText	O :	module status string, pointer to a buffer for at least 148 characters

description: Decodes the module state to a string. The module state is a bit-coded word; Each bit may decode to a certain string. So, the length of the string needed is depending on the bits set in the status word. Currently, all strings added produce an output with a length of 147 characters (terminator excluded).

To be ready for future changes and enhancements, consider this: None of the parts is longer than 30 characters. (We will strictly adhere to this in future versions.) The parts are linked by the sequence “, “ (with a length of two characters); So the maximum length ever needed, calculates to 16 times 30 plus 15 times 2 plus terminator, hence 511 bytes.

```
/* C/C++ */  int  SEPIA2_SWS_GetModuleType         (int              iDevIdx,
                                                    int              iSlotId,
                                                    int*             piSWSType );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	piSWSType	O :	SWS type number (pointer to integer; 0...255)

description: There are different SWS module types due to different possible technologies used to select the wavelength. This function returns the code of the currently implemented technology. The SWS type number can be decoded by the SWS function **DecodeModuleType**.

```
/* C/C++ */  int  SEPIA2_SWS_GetStatusError        (int              iDevIdx,
                                                    int              iSlotId,
                                                    unsigned short*  pwState,
                                                    short*           piErrorCode );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	pwState	O :	state of the SWS module, (pointer to an unsigned short; 0...65535)
	piErrorCode	O :	error code (pointer to a short integer)

description: The state is bit coded and can be decoded by the SWS function `DecodeModuleState`. If the error state bit (0x0010) is set, the error code <piErrorCode> is transmitted as well, else this variable is zero. As a side effect, error state bit and error code are cleared, if there are no further errors pending. Decode the error codes received with the LIB function `DecodeError.`

The SWS states are listed in the following table:

Symbol	Value	DescriptionSymbol
SEPIA2_SWS_STATE_READY	0x0000	Module ready
SEPIA2_SWS_STATE_INIT	0x0001	Module initialising
SEPIA2_SWS_STATE_BUSY	0x0002	Motors running or calculating on update data
SEPIA2_SWS_STATE_WAVELENGTH	0x0004	Wavelength received, waiting for bandwidth
SEPIA2_SWS_STATE_BANDWIDTH	0x0008	Bandwidth received, waiting for wavelength
SEPIA2_SWS_STATE_HARDWAREERROR	0x0010	Error code pending
SEPIA2_SWS_STATE_FWUPDATERUNNING	0x0020	Firmware update running
SEPIA2_SWS_STATE_FRAM_WRITEPROTECTED	0x0040	FRAM write protected: set, write enabled: cleared
SEPIA2_SWS_STATE_CALIBRATING	0x0080	Calibration mode: set, normal operation: cleared
SEPIA2_SWS_STATE_GUIRANGES	0x0100	GUI Ranges known: set, unknown: cleared

```
/* C/C++ */  int  SEPIA2_SWS_GetParamRanges        (int             iDevIdx,
                                                    int             iSlotId,
                                                    unsigned long*  pulUpperWL,
                                                    unsigned long*  pulLowerWL,
                                                    unsigned long*  pulIncrWL,
                                                    unsigned long*  pulPMToggleWL,
                                                    unsigned long*  pulUpperBW,
                                                    unsigned long*  pulLowerBW,
                                                    unsigned long*  pulIncrBW,
                                                    int*            piUpperBPos,
                                                    int*            piLowerBPos,
                                                    int*            piIncrBPos );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SWS module
pulUpperWL O : Upper limit of the wavelength (pointer to an unsigned long) given in pm
pulLowerWL O : Lower limit of the wavelength (pointer to an unsigned long) given in pm
pulIncrWL O : Stepwidth of the wavelength (pointer to an unsigned long) given in pm
pulPMToggleWL O : Power mode toggle wavelength (pointer to an unsigned long) in pm
pulUpperBW O : Upper limit of the bandwidth (pointer to an unsigned long) given in pm
pulLowerBW O : Lower limit of the bandwidth (pointer to an unsigned long) given in pm
pulIncrBW O : Stepwidth of the bandwidth (pointer to an unsigned long) given in pm
piUpperBPos O : Upper beam shifter position (+90°) (pointer to an integer) in motor steps
piLowerBPos O : Lower beam shifter position (-90°) (pointer to an integer) in motor steps
piIncrBPos O : Stepwidth of the beam shifter pos. (pointer to an integer) in motor steps

description: Gets ranges for the parameter values of the wavelength selector: These are the wavelength, the bandwidth and the beam shifter positions. Although there are two independent shifters (one per axis, i.e. x/y), the same range for the both of them is used. Additionally the function returns the wavelength at which (in dynamic power mode) the power state of the pump module should switch from ECO mode to BOOST mode or vice versa in <pulPMToggleWL>.

```
/* C/C++ */  int  SEPIA2_SWS_GetParameters         (int              iDevIdx,
                                                    int              iSlotId,
                                                    unsigned long*   pulWaveLength,
                                                    unsigned long*   pulBandWidth );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	pulWaveLength	O :	current wavelength, (pointer to an unsigned long) in pm
	pulBandWidth	O :	current bandwidth (pointer to an unsigned long) in pm

description: Returns the adjusted values of wavelength and bandwidth.

```
/* C/C++ */  int  SEPIA2_SWS_SetParameters         (int              iDevIdx,
                                                    int              iSlotId,
                                                    unsigned long    ulWaveLength,
                                                    unsigned long    ulBandWidth );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	ulWaveLength	I :	wavelength (unsigned long) in pm
	ulBandWidth	I :	bandwidth (unsigned long) in pm

description: Sets the values for wavelength and bandwidth. As a side effect, the beam shifter positions are also set to (nearly) optimal values for this very wavelength / bandwidth combination as are defined by an internal calibration table. Refer also to the SWS functions **Get/SetCalTableSize**, **GetCalPointInfo** and **SetCalPointValues**.

```
/* C/C++ */  int  SEPIA2_SWS_GetIntensity          (int              iDevIdx,
                                                    int              iSlotId,
                                                    unsigned long*   pulIntensityRaw,
                                                    float*           pfIntensity );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	pulIntensityRaw	O :	intensity (pointer to unsigned long)
	pfIntensity	O :	intensity (pointer to float)

description: Gives a measure of the intensity of the beam after it has passed the SWS filters. The function returns two different values: <pulIntensityRaw> contains the read-out of the logarithmic amplifier boosting the photo diode current, while <pfIntensity> gives a linearly equalized calculation thereof. Although the readout of <pfIntensity> is neither equal nor even directly proportional to the absolute optical power of the beam coupled into the fiber, it is, however, a qualified measure for its relative intensity as long as you don't vary the wavelength or bandwidth once set. It then even allows for calibration on the optimal output coupling or for controlled attenuation relative to this optimum by use of the beam shifters.

```
/* C/C++ */  int  SEPIA2_SWS_GetFWVersion          (int              iDevIdx,
                                                    int              iSlotId,
                                                    unsigned long*   pulFWVersion );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	pulFWVersion	O :	firmware version (pointer to unsigned long)

description: Firmware Version is coded (byte[3] = major-nr., byte[2] = minor-nr., byte[1] + byte[0] as word = build-nr.)

```
/* C/C++ */  int  SEPIA2_SWS_UpdateFirmware        (int              iDevIdx,
                                                    int              iSlotId,
                                                    char*            pcFWFileName );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	pcFWFileName	I :	name of the firmware file, pointer to a character buffer

description: Updates the firmware of the SWS module. The system must be restarted (power down) after updating.

```
/* C/C++ */  int  SEPIA2_SWS_SetFRAMWriteProtect  (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char  bWriteProtect );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	bWriteProtect	I :	boolean: true/false stands for enable/disable write protection

description: To write a *.bin file with new DCL-settings to the FRAM, the FRAM write protection must be disabled. For secure reasons it is enabled by default. The write protection state of the FRAM is coded in the module state. The module state can be read out by the SWS function **GetStatusError**.

```
/* C/C++ */  int  SEPIA2_SWS_GetBeamPos           (int            iDevIdx,
                                                   int            iSlotId,
                                                   short*         piBeamVPos,
                                                   short*         piBeamHPos );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	piBeamVPos	O :	position of the vertical beam shifter (pointer to a short int) in steps
	piBeamHPos	O :	position of the horizontal beam shifter (pointer to a short int) in steps

description: Returns the current positions of the beam shifters, correcting the vertical as well as the horizontal beam deviation for maximal intensity.

```
/* C/C++ */  int  SEPIA2_SWS_SetBeamPos           (int            iDevIdx,
                                                   int            iSlotId,
                                                   short          iBeamVPos,
                                                   short          iBeamHPos );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	iBeamVPos	I :	position of vertical beam shifter in steps
	iBeamHPos	I :	position in steps of horizontal beam shifter in steps

description: Sets the new position of the beam shifters, changing the vertical as well as the horizontal beam deviation for maximal intensity.

```
/* C/C++ */  int  SEPIA2_SWS_SetCalibrationMode   (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned char  bCalMode );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	bCalMode	I :	boolean: true/false, enable/disable calibration mode

description: To calibrate the SWS module, calibration mode must be enabled. Calibration mode is coded in the module state. The module state can be read out by the SWS function **GetStatusError**.

```
/* C/C++ */  int  SEPIA2_SWS_GetCalTableSize      (int            iDevIdx,
                                                   int            iSlotId,
                                                   unsigned short* pwWLIdxCount,
                                                   unsigned short* pwBWIdxCount );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SWS module
	pwWLIdxCount	O :	wavelength index count (pointer to unsigned short)
	pwBWIdxCount	O :	bandwidth index count (pointer to unsigned short)

description: Reads out the current calibration table size.

```
/* C/C++ */  int  SEPIA2_SWS_SetCalTableSize       (int            iDevIdx,
                                                  int            iSlotId,
                                                  unsigned short wWLIdxCount,
                                                  unsigned short wBWIdxCount,
                                                  byte           bInit );
```

arguments:

iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I :	slot number of a SWS module
wWLIdxCount	I :	wavelength index count
wBWIdxCount	I :	bandwidth index count
bInit	I :	boolean: true/false, reset calibration table values / keep current values

description: Number of calibration points for the wavelength and bandwidth must be given. If the new calibration table size differs from the current, the calibration table values will always be cleared. With equal size, it depends on the value given with the <bInit> flag, whether the table will be re-initialized (true) or the calibration values will be preserved (false). For robust and near to optimal interpolation of the table values, the function grants for a sufficient size to set. If there aren't enough values to grant for stable interpolations on all of the independent VersaChrome® filter sets, the function returns an appropriate error code (-7119). The former table size and its content is then preserved.

```
/* C/C++ */  int  SEPIA2_SWS_GetCalPointInfo       (int            iDevIdx,
                                                  int            iSlotId,
                                                  short          iWLIdx,
                                                  short          iBWIdx,
                                                  unsigned long* pulWaveLength,
                                                  unsigned long* pulBandWidth,
                                                  short*         piBeamVPos,
                                                  short*         piBeamHPos );
```

arguments:

iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I :	slot number of a SWS module
iWLIdx	I :	wavelength index
iBWIdx	I :	bandwidth index
pulWaveLength	O :	wavelength (pointer to an unsigned long) in pm
pulBandWidth	O :	bandwidth (pointer to an unsigned long) in pm
piBeamVPos	O :	position of the vertical beam shifter (pointer to a short integer) in steps
piBeamHPos	O :	position of the horizontal beam shifter (pointer to a short integer) in steps

description: Gets the values of the wavelength, bandwidth and the positions of the vertical and horizontal beam shifter for a given calibration point, defined by the wavelength and bandwidth indices in the calibration table.

```
/* C/C++ */  int  SEPIA2_SWS_SetCalPointValues     (int            iDevIdx,
                                                  int            iSlotId,
                                                  short          iWLIdx,
                                                  short          iBWIdx,
                                                  short          iBeamVPos,
                                                  short          iBeamHPos );
```

arguments:

iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I :	slot number of a SWS module
iWLIdx	I :	wavelength index
iBWIdx	I :	bandwidth index
iBeamVPos	I :	position of vertical beam shifter in steps
iBeamHPos	I :	position of horizontal beam shifter in steps

description: Sets new values of the vertical and horizontal beam shifter positions for the given calibration point, defined by the wavelength and bandwidth indices in the calibration table.

2.7.4. Pump Control Module (SPM)

The SPM pump control module is a kind of “intelligent” module, supported by its own processor, too. Alike the SWS module, the user has to check for the internal state by means of the **GetStatusError** function. In case an error occurred, the module switches into an inoperable state (error pending) until this error state was retrieved.

```
/* C/C++ */  int  SEPIA2_SPM_DecodeModuleState     (unsigned short  wState,
                                                    char*           cStatusText );
```

arguments:
wState I : module state number (unsigned short, 0…65535)
cStatusText O : module status string, pointer to a buffer for at least 79 characters

description: Decodes the module state to a string. The module state is a bit-coded word; Each bit may decode to a certain string. So, the length of the string needed is depending on the bits set in the status word. Currently, all strings added produce an output with a length of 78 characters (terminator excluded).
To be ready for future changes and enhancements, consider this: None of the parts is longer than 30 characters. (We will strictly adhere to this in future versions.) The parts are linked by the sequence “, “ (with a length of two characters); So the maximum length ever needed, calculates to 16 times 30 plus 15 times 2 plus terminator, hence 511 bytes..

```
/* C/C++ */  int  SEPIA2_SPM_GetStatusError        (int             iDevIdx,
                                                    int             iSlotId,
                                                    unsigned short* pwState,
                                                    short*          piErrorCode );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
pwState O : state of the SPM module, (pointer to an unsigned short integer)
piErrorCode O : error code (pointer to a short integer)

description: The state is bit coded and can be decoded by the SPM function **DecodeModuleState**. If the error state bit (0x0010) is set, the error code <piErrorCode> is transmitted as well, else this variable is zero. As a side effect, error state bit and error code are cleared, if there are no further errors pending. Decode the error codes received with the LIB function **DecodeError**.

The SPM states are listed in the following table:

Symbol	Value	DescriptionSymbol
SEPIA2_SPM_STATE_READY	0x0000	Module ready
SEPIA2_SPM_STATE_INIT	0x0001	Module initialising
SEPIA2_SPM_STATE_HARDWAREERROR	0x0010	Error code pending
SEPIA2_SPM_STATE_FWUPDATERUNNING	0x0020	Firmware update running
SEPIA2_SPM_STATE_FRAM_WRITEPROTECTED	0x0040	FRAM write protected: set, write enabled: cleared

```
/* C/C++ */  int  SEPIA2_SPM_GetFWVersion          (int             iDevIdx,
                                                    int             iSlotId,
                                                    unsigned long*  pulFWVersion );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
pulFWVersion O : firmware version (pointer to unsigned long)

description: Firmware Version is coded (byte[3] = major-nr., byte[2] = minor-nr., byte[1] + byte[0] = word = build-nr.)

```
/* C/C++ */  int  SEPIA2_SPM_GetFiberAmplifierFail (int          iDevIdx,
                                                    int          iSlotId,
                                                    byte*        pbFbrAmpFail );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
pbFbrAmpFail O : fiber amplifier failure (pointer to byte; 0/1 → amp OK / amp failure)

description: The value of <pbFbrAmpFail> states, whether the fiber amplifier is working OK (0) or a failure was detected (1).

```
/* C/C++ */  int  SEPIA2_SPM_ResetFiberAmplifierFail (int       iDevIdx,
                                                      int       iSlotId,
                                                      byte      bFbrAmpFail );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
bFbrAmpFail I : fiber amplifier failure (byte; 0/1 → amp OK / amp failure)

description: With this function the value of <bFbrAmpFail> can be reset to 0 (amp OK) after repair.

```
/* C/C++ */  int  SEPIA2_SPM_GetPumpPowerState     (int          iDevIdx,
                                                    int          iSlotId,
                                                    byte*        pbPumpState,
                                                    byte*        pbPumpMode );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
pbPumpState O : pump state, boolean (pointer to a byte; 0/1 → BOOST / ECO state)
pbPumpMode O : pump mode, boolean (pointer to a byte; 0/1 → manual / dynamic)

description: Gets current pump mode and state. If the mode is set to "dynamic", the state is controlled by the firmware, staying as long as appropriate in ECO mode and only changing to BOOST mode, where otherwise the output power would be too low. This mode is recommended to reduce the influence of fiber degradation.

```
/* C/C++ */  int  SEPIA2_SPM_SetPumpPowerState     (int          iDevIdx,
                                                    int          iSlotId,
                                                    byte         bPumpState,
                                                    byte         bPumpMode );
```

arguments: iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
bPumpState O : pump state, boolean (byte; 0/1 → BOOST / ECO state)
bPumpMode O : pump mode, boolean (byte); 0/1 → manual / dynamic)

description: Sets pump mode and state. If the mode is set to "dynamic", the state is controlled by the firmware, staying as long as appropriate in ECO mode and only changing to BOOST mode, where otherwise the output power would be too low. This mode is recommended to reduce the influence of fiber degradation.

```
/* C/C++ */  int  SEPIA2_SPM_GetOperationTimers    (int             iDevIdx,
                                                  int             iSlotId,
                                                  unsigned long*  pMainPwrSwitch,
                                                  unsigned long*  pUTOverAll,
                                                  unsigned long*  pUTDelivery,
                                                  unsigned long*  pUTFiberChg );
```

arguments:

iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I	:	slot number of a SPM module
pMainPwrSwitch	O	:	main power switched on (pointer to unsigned long)
pUTOverAll	O	:	uptime over all (pointer to unsigned long) in seconds
pUTDelivery	O	:	uptime since delivery (pointer to unsigned long) in seconds
pUTFiberChg	O	:	uptime since fiber change (pointer to unsigned long) in seconds

description: Gets the operation timers.

pMainPwrSwitch:	counts how many times the SPM module was switched on
pUTOverAll:	shows the uptime in seconds
pUTDelivery	shows the uptime since delivery in seconds
pUTFiberChg	shows the uptime since fiber change in seconds

```
/* C/C++ */  int  SEPIA2_SPM_SetFRAMWriteProtect   (int             iDevIdx,
                                                  int             iSlotId,
                                                  unsigned char   bWriteProtect );
```

arguments:

iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I	:	slot number of a SPM module
bWriteProtect	I	:	boolean: true/false, enable/disable write protection

description: To write a *.bin file with new DCL-settings to the FRAM, the FRAM write protection must be disabled. For secure reasons it is be enabled by default. The write protection state of the FRAM is coded in the module state. The module state can be read out by the SPM function **GetStatusError**.

```
/* C/C++ */  int  SEPIA2_SPM_UpdateFirmware        (int             iDevIdx,
                                                  int             iSlotId,
                                                  char*           pcFWFileName );
```

arguments:

iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I	:	slot number of a SPM module
pcFWFileName	I	:	firmware file

description: Updates the firmware of the SPM module. The system must be restarted (power down) after updating.

```
/* C/C++ */  int  SEPIA2_SPM_GetSensorData         (int             iDevIdx,
                                                  int             iSlotId,
                                                  T_pSensorData   pSensorData );
```

arguments:

iDevIdx	I	:	PQ Laser Device index (USB channel number, 0…7)
iSlotId	I	:	slot number of a SPM module
pSensorData	O	:	temperatures of pump stages and over all current (pointer to an array of 9 unsigned short integer)

description: Gets the current sensor data of all pump control stages. <pSensorData> points to an array, that could also be read as a struct, containing the following data:

- temperature of pump 1
- temperature of pump 2
- temperature of pump 3
- temperature of pump 4
- temperature of the fiber stacker
- temperature of an auxiliary control point (reserved)
- resulting over all current
- auxiliary sensor 1 (reserved)
- auxiliary sensor 2 (reserved)

The temperatures are given as ADC values and have to be calculated as follows

$$\frac{\vartheta\%}{{}^\circ C} = \frac{1}{\frac{1}{3988} * \ln\left(\frac{4700}{10000 * \left(\frac{1.5 * 1024}{2.5 * value} - 1\right)}\right) + \frac{1}{298.15}} - 273.15$$

while the sensed currents are given as

$$\frac{I}{A} = \frac{25}{1024} \cdot value$$

```
/* C/C++ */  int  SEPIA2_SPM_GetTemperatureAdjust  (int             iDevIdx,
                                                    int             iSlotId,
                                                    T_pTemperature  pTempAdjust );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SPM module
	pTempAdjust	O :	params for temperature controlling (pointer to an array of 6 unsigned short integer)

description: Gets the temperature control parameters (legal values from 0 to 1023). Structure of the data is the same as for **GetSensorData**.

2.8. API Funtions for “VisUV / VisIR” Specific Modules

PicoQuant's VisUV / VisIR laser modules can be connected to and controlled by the Sepia PDL 828 laser driver via an extension module (SEM 828). Thus a VisUV or VisIR module can be integrated, along with other PicoQuant laser heads into pulse sequences generated by the Sepia PDL 828’s SOM 828 or SOM 828-D. The VisUV / VisIR modules can also be directly connected to a PC via a USB 3.0 connection and controlled by software, such as the generic laser driver software. The following functions (belonging to the **VUV_VIR** category) allow querying and setting parameters of a VisUV or VisIR module.

```
/* C/C++ */  int  SEPIA2_VUV_VIR_GetDeviceType     (int            iDevIdx,
                                                    int            iSlotId,
                                                    char*          pcDeviceType,
                                                    unsigned char* pbOptCW,
                                                    unsigned char* pbOptFanSwitch );
```

arguments:

iDevIdx	I	: PQ Laser Device index (USB channel number, 0…7)
iSlotId	I	: slot number of a SEM module
pcDeviceType	O	: device type string, pointer to a buffer for at least 32 characters
pbOptCW	O	: boolean (pointer to a byte); true, if device has CW option
pbOptFanSwitch	O	: boolean (pointer to a byte); true, if device has fan switch option

description: Use this function to obtain information from a VisUV or VisIR laser module. This includes the module’s designation along with its emission wavelength(s), whether the module supports Continuous Wave (CW) mode, and whether it supports switching the fan on and off.

```
/* C/C++ */  int  SEPIA2_VUV_VIR_DecodeFreqTrigMode (int          iDevIdx,
                                                     int          iSlotId,
                                                     int          iMainTrigSrcIdx,
                                                     int          iMainFreqDivIdx,
                                                     char*        pcMainFreqTrig,
                                                     int*         piMainFreq,
                                            unsigned char*        pbTrigDividerEnabled,
                                            unsigned char*        pbTrigLevelEnabled );
```

arguments:

iDevIdx	I	: PQ Laser Device index (USB channel number, 0…7)
iSlotId	I	: slot number of a SEM module
iMainTrigSrcIdx	I	: index of the selected trigger source entry (0..4)
iMainFreqDivIdx	I	: frequency divider index k (2^k with k = 0..5); -1 if only the tigger source is to be decoded
pcMainFreqTrig	O	: trigger source as a string, pointer to a buffer for at least 16 characters
pbTrigDividerEnabled	O	: boolean (pointer to a byte); true, if divider list is to be shown
pbTrigLevelEnabled	O	: boolean (pointer to a byte); true, if trigger level field is to be shown

description: Decodes the module’s current trigger mode. The function returns the trigger source as a string as well as two boolean values that control whether the divider list (`pbTrigDividerEnabled == true`) or the trigger level field (`pbTrigLevelEnabled == true`) should be displayed in a GUI, for example.

```
/* C/C++ */  int  SEPIA2_VUV_VIR_GetTrigLevelRange (int          iDevIdx,
                                                   int          iSlotId,
                                                   int*         piUpperTL,
                                                   int*         piLowerTL,
                                                   int*         piResolTL );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
piUpperTL O : pointer to an integer; upper voltage limit of the trigger signal (in mV)
piLowerTL O : pointer to an integer; lower voltage limit of the trigger signal (in mV)
piResolTL O : pointer to an integer; step width (resolution) in which changes to the trigger level can occur (in mV)

description: This function reads out the upper and lower limits for the tigger signal supported by a VisUV / VisIR module as well as the step width (resolution) in which the trigger level can be changed. Note that all returned values are in mV.

```
/* C/C++ */  int  SEPIA2_VUV_VIR_GetTriggerData    (int          iDevIdx,
                                                   int          iSlotId,
                                                   int*         piMainTrigSrcIdx,
                                                   int*         piMainFreqDivIdx,
                                                   int*         piTrigLevel );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
piMainTrigSrcIdx O : pointer to an integer; index for current trigger source
piMainFreqDivIdx O : pointer to an integer; index for current trigger frequency divider (retuns -1 if divider is undefined or invalid)
piTrigLevel O : pointer to an integer; current trigger level in mV

description: This function retuns the currently selected trigger source as well as the frequency divider and trigger voltage level (in mV). Note that the function returns a value of -1 for the divider if the latter is invalid or undefined (e.g., when using an external trigger signal).

```
/* C/C++ */  int  SEPIA2_VUV_VIR_SetTriggerData    (int          iDevIdx,
                                                   int          iSlotId,
                                                   int          iMainTrigSrcIdx,
                                                   int          iMainFreqDivIdx,
                                                   int          iTrigLevel );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a SPM module
iMainTrigSrcIdx I : integer; index for desired trigger source
iMainFreqDivIdx I : integer; index for desired trigger frequency divider
iTrigLevel I : integer; desired trigger level in mV

description: Use this function to set the desired trigger parameters, e.g., the trigger source, frequency divider and trigger voltage level (in mV)

```
/* C/C++ */  int  SEPIA2_VUV_VIR_GetIntensityRange (int            iDevIdx,
                                                    int            iSlotId,
                                                    int*           piUpperIntens,
                                                    int*           piLowerIntens,
                                                    int*           piResolIntens );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SPM module
	piUpperIntens	O :	pointer to an integer; upper intensity limit (in per mille)
	piLowerIntens	O :	pointer to an integer; lower intensity limit (in per mille)
	piResolIntens	O :	pointer to an integer; step width (resolution) in which changes to the intensity can occur (in per mille)

description: This function allows querying the upper and lower limits (im per mille) of the intensity settings at which the VisUV / VisIR module can emit laser light. It also returns the step width (resolution) in which the intensity setting can be adjusted (also in per mille).

```
/* C/C++ */  int  SEPIA2_VUV_VIR_GetIntensity      (int            iDevIdx,
                                                    int            iSlotId,
                                                    char*          piIntensity );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SPM module
	piIntensity	O :	pointer to an integer; returns current intensity setting (in per mille)

description: Reads out the current intensity setting of the VisUV / VisIR laser module. Note that the value is in per mille of the pump current.

```
/* C/C++ */  int  SEPIA2_VUV_VIR_SetIntensity      (int            iDevIdx,
                                                    int            iSlotId,
                                                    int            iIntensity );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SPM module
	iIntensity	I :	integer value of desired intensity setting (in per mille)

description: Use this function to set the desired intensity setting (in per mille of the pump current) for the VisUV / VisIR laser module.

```
/* C/C++ */  int  SEPIA2_VUV_VIR_GetFan            (int            iDevIdx,
                                                    int            iSlotId,
                                                    unsigned char* pbFanRunning );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a SPM module
	pbFanRunning	O :	boolean (pointer to a byte) current fan state (!= 0: max. speed; == 0: min. speed)

description: This function returns a boolean value that indicates the current fan state. If different from 0, then the fan runs at maximum speed. A value of 0 indicates that the fan is running at minimal speed.

Note that due to thermal safety considerations, the fan may have a different minimal speed depending on the VisUV / VisIR laser module type. This minimal speed is set by PicoQuant during manufacturing and cannot be changed by the end user.

```
/* C/C++ */  int  SEPIA2_VUV_VIR_SetFan            (int            iDevIdx,
                                                    int            iSlotId,
                                                    unsigned char* pbFanRunning );
```

arguments:

iDevIdx	**I**	:	PQ Laser Device index (USB channel number, 0…7)
iSlotId	**I**	:	slot number of a SPM module
bFanRunning	**I**	:	boolean (byte); desired fan state (!= 0: max. speed; == 0: min. speed)

description: Use this function to set the desired fan state of the VisUV / VisIR module (either maximum or minimum speed).

Note that due to thermal safety considerations, the fan may have a different minimal speed depending on the VisUV / VisIR laser module type. This minimal speed is set by PicoQuant during manufacturing and cannot be changed by the end user.

2.9. API Funtions for “Prima” Laser Devices

Prima is a multi color laser device based on the Sepia II technology. However, it is not used as a Sepia II module but as a stand alone device. A Prima laser device combines all components necessary for operating a Sepia laser driver in a compact, non-modular form factor:

- A power supply (external, due to space constrains)
- A backplane with the frame type *small* (FRMS)
- A Sepia Controller Module (SCM)
- The actual Prima module (PRI) instead of a Sepia Laser Module (SLM)

A Prima laser device can offer up 3 individual emission wavelengths, which can be operated in either picosecond pulsed or continuous wave (CW) mode. Note that laser light from only one wavelength can be emitted at a time. The picosecond pulses can be triggered over a broad range of repetition rates (up to 200 MHz) and the intensity of each wavelength can be set individually.

Additionally, the laser’s optical output (both in CW and pulsed modes) can be modulated by either an external gating signal or by a programmable internal gating circuit. This enables the generation of macro pulses (when applied to the CW mode) or of bursts of picosecond pulses with durations ranging from a few ns to one millisecond (internally gated) or up to arbitrary length when gated externally.

Different models of the Prima laser device can house various laser diodes, which feature different emission wavelengths and pulse properties. Thus, operation modes are not codified with labels that would be valid for the entire Prima line-up. As a consequence, each operation mode is labelled according to the specific laser diodes incorporated into each Prima. This means that some Prima devices may not support every operation mode or feature. To keep the API consistent over the entire model range, certain settings will not directly refer to the corresponding feature but use an index that refers to the list of features supported by that individual Prima model.

The following example uses the Prima’s operation modes to illustrate this (note that the same principle holds true for the trigger source setting and wavelength selection). In the ideal case, all three laser diodes included in a Prima support all operation mode. Thus the index table will look like this:

Operation Mode	Index
Off	0
Narrow Pulse	1
Broad Pulse	2
CW	3

Some Prima models might also contain laser diodes that do not support CW mode or whose pulse shape cannot be broadened to gain more optical output power. In these cases, the labels for the unsupported modes will generally not be enumerated in the list:

Prima without CW mode support		Prima without Broad Pulse mode support	
Operation Mode	**Index**	**Operation Mode**	**Index**
Off	0	Off	0
Narrow Pulse	1	Narrow Pulse	1
Broad Pulse	2	CW	2

The remainder of this section summarizes all available functions related to the Prima laser device.

```
/* C/C++ */  int  SEPIA2_PRI_GetDeviceInfo         (int            iDevIdx,
                                                    int            iSlotId,
                                                    char*          pcDeviceID,
                                                    char*          pcDeviceType,
                                                    char*          pcFW_Version,
                                                    int*           piWL_Count );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	pcDeviceID	O :	internal ID string, pointer to a buffer for at least 7 characters
	pcDeviceType	O :	device type string, pointer to a buffer for at least 32 characters
	pFW_Version	O :	firmware version string, pointer to a buffer for at least 9 characters
	piWL_Count	O :	wavelengths count, pointer to an integer

description: This function is solely used for informational purposes. It acquires information from the specified Prima device and returns the firmware version and number of wavelengths (i.e. laser diodes) present in the queried Prima device.

```
/* C/C++ */  int  SEPIA2_PRI_DecodeOperationMode   (int            iDevIdx,
                                                    int            iSlotId,
                                                    int            iOpModeIdx,
                                                    char*          pcOpMode );,
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	iOpModeIdx	I :	index into the list of operational modes (zero-based)
	pcOpMode	O :	operational modes string, pointer to a buffer for at least 13 characters

description: This function decodes the index of the given operational mode into human readable text. Since Prima is a very versatile and flexible family of laser devices, the list's length and order may vary from device to device (see introductory text of this section). Call this function e.g., in a zero-started loop to get a complete list of all supported operation modes. Exit the loop on the first return value that equals to SEPIA2_ERR_PRI_ILLEGAL_OPERATION_MODE_INDEX. Use this list e.g., in the GUI to assign it to a combo box to directly use the ItemIndex for iOpModeIdx in API calls.

```
/* C/C++ */  int  SEPIA2_PRI_GetOperationMode      (int            iDevIdx,
                                                    int            iSlotId,
                                                    int*           piOpModeIdx );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	piOpModeIdx	O :	index of the current operational mode, pointer to an integer

description: This function returns the index of the current operational mode. Use the PRI function **SEPIA2_PRI_DecodeOperationMode** to decode it to human readable text.

```
/* C/C++ */  int  SEPIA2_PRI_SetOperationMode      (int            iDevIdx,
                                                    int            iSlotId,
                                                    int            iOpModeIdx );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	iOpModeIdx	I :	index of the desired operational mode

description: This function sets the operational mode of the Prima device by using an index from the list of all supported modes.

```
/* C/C++ */  int  SEPIA2_PRI_DecodeTriggerSource   (int            iDevIdx,
                                                    int            iSlotId,
                                                    int            iTrgSrcIdx,
                                                    char*          pcTrgSrc,
                                                    unsigned char* pbFreqEnable,
                                                    unsigned char* pbTLvlEnable );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	iTrgSrcIdx	I :	index of the desired trigger source
	pcTrgSrc	O :	trigger sources string, pointer to a buffer for at least 15 characters
	pbFreqEnable	O :	frequency enabled in GUI (boolean), pointer to an unsigned char (byte)
	pbTLvlEnable	O :	trigger level enabled in GUI (boolean), pointer to unsigned char (byte)

description: This function decodes the index of the given trigger source to human readable text. Since Prima is a very versatile and flexible family of laser devices, the list's length and order may vary from device to device (see introductory text of this section). Call this function e.g. in a zero-started loop to get a complete list of all supported trigger sources. Exit the loop on the first return value, that equals **`SEPIA2_ERR_PRI_ILLEGAL_TRIGGER_SOURCE_INDEX`**. Use this list e.g., in the GUI to assign it to a combo box to directly use the ItemIndex for iTrgSrcIdx in API calls. Furthermore, this function returns two bytes containing boolean values useful for GUI control.

```
/* C/C++ */  int  SEPIA2_PRI_GetTriggerSource      (int            iDevIdx,
                                                    int            iSlotId,
                                                    int*           piTrgSrcIdx );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	piTrgSrcIdx	O :	returns the index of the current trigger source, pointer to an integer

description: This function gets the index of the current trigger source. Use the PRI function **`SEPIA2_PRI_DecodeTriggerSource`** to decode it to human readable text.

```
/* C/C++ */  int  SEPIA2_PRI_SetTriggerSource      (int            iDevIdx,
                                                    int            iSlotId,
                                                    int            iTrgSrcIdx );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	iTrgSrcIdx	I :	index of the desired trigger source

description: This function sets the trigger source of the Prima module by an index from the list of all supported sources.

```
/* C/C++ */  int  SEPIA2_PRI_GetTriggerLevelLimits (int            iDevIdx,
                                                    int            iSlotId,
                                                    int*           piTrg_MinLvl,
                                                    int*           piTrg_MaxLvl,
                                                    int*           piTrg_LvlRes );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	piTrg_MinLvl	O :	returns the minimum trigger level [mV], pointer to an integer
	piTrg_MaxLvl	O :	returns the maximum trigger level [mV], pointer to an integer
	piTrg_LvlRes	O :	returns the trigger level resolution [mV], pointer to an integer

description: This function queries and returns the range and resolution (step width) of the trigger level in mVolt.

```
/* C/C++ */  int  SEPIA2_PRI_GetTriggerLevel       (int             iDevIdx,
                                                    int             iSlotId,
                                                    int*            piTrgLevel );
```

arguments:			
	iDevIdx	I	: PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	: slot number of a PRI module
	piTrgLevel	O	: returns the current trigger level [mV], pointer to an integer

description: This function reads out the current trigger level in mV.

```
/* C/C++ */  int  SEPIA2_PRI_SetTriggerLevel       (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iTrgLevel );
```

arguments:			
	iDevIdx	I	: PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	: slot number of a PRI module
	iTrgLevel	I	: value of the desired trigger level [mV]

description: This function sets the desired trigger level in mV. To obtain the valid range of trigger levels for the used Prima device, use the PRI function **SEPIA2_PRI_GetTriggerLevelLimits**.

```
/* C/C++ */  int  SEPIA2_PRI_GetFrequencyLimits    (int             iDevIdx,
                                                    int             iSlotId,
                                                    int*            piMinFreq,
                                                    int*            piMaxFreq );
```

arguments:			
	iDevIdx	I	: PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	: slot number of a PRI module
	piMinFreq	O	: returns the minimum frequency [Hz], pointer to an integer
	piMaxFreq	O	: returns the maximum frequency [Hz], pointer to an integer

description: This function returns the range of laser pulse frequencies supported by the device in Hertz.

```
/* C/C++ */  int  SEPIA2_PRI_GetFrequency          (int             iDevIdx,
                                                    int             iSlotId,
                                                    int*            piFrequency );
```

arguments:			
	iDevIdx	I	: PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	: slot number of a PRI module
	piFrequency	O	: returns the current frequency [Hz], pointer to an integer

description: This function reads out the currently set laser pulse frequency in Hertz.

```
/* C/C++ */  int  SEPIA2_PRI_SetFrequency          (int             iDevIdx,
                                                    int             iSlotId,
                                                    int             iFrequency );
```

arguments:			
	iDevIdx	I	: PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I	: slot number of a PRI module
	iFrequency	I	: device type string, pointer to a buffer for at least 32 characters

description: This function sets the laser pulse frequency to the given value in Hertz. Note that these values are rounded to only up to three significant digits of mantissa without any decimals, followed by a prefixed unit, e.g. an entry with a value of 123456789 Hz will be rounded to 123000000 Hz = 123 MHz, while an entry with a value of 12345 Hz results in 12000 Hz = 12 kHz. Use the PRI function **SEPIA2_PRI_GetFrequencyLimits** to retrieve its valid range, and the PRI function **SEPIA2_PRI_GetFrequency** to check for the value currently set.

```
/* C/C++ */  int  SEPIA2_PRI_GetGatingLimits        (int              iDevIdx,
                                                     int              iSlotId,
                                                     int*             piMinOnTime,
                                                     int*             piMaxOnTime,
                                                     int*             piMinOffTimeF,
                                                     int*             piMaxOffTimeF );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	piMinOnTime	O :	returns the minimum on time [ns], pointer to an integer
	piMaxOnTime	O :	returns the maximum on time [ns], pointer to an integer
	piMinOffTimeF	O :	returns the minimum off time factor, pointer to an integer
	piMaxOffTimeF	O :	returns the maximum off time factor, pointer to an integer

description: This function gets the range of the gating on time in nano seconds and the range of the off time factor (as unitless values).

```
/* C/C++ */  int  SEPIA2_PRI_GetGatingData          (int              iDevIdx,
                                                     int              iSlotId,
                                                     int*             piOnTime,
                                                     int*             piOffTimeF );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	piOnTime	O :	returns the current gating on time [ns], pointer to an integer
	piOffTimeF	O :	returns the current gating off time factor, pointer to an integer

description: This function returns the currently set gating on time in nano seconds as well as the off time as a unitless factor thereof.

```
/* C/C++ */  int  SEPIA2_PRI_SetGatingData          (int              iDevIdx,
                                                     int              iSlotId,
                                                     int              iOnTime,
                                                     int              iOffTimeF );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	iOnTime	I :	desired gating on time [ns]
	iOffTimeF	I :	desired gating off time factor thereof

description: This function sets the desired gating on time in nanoseconds and the off time as a unitless factor thereof. Note that the on time values are rounded to only up to four significant digits of mantissa with one fixed decimal, followed by a prefixed unit, e.g. an entry with a value of 123456789 ns will be rounded to 123400000 ns = 123.4 ms, while an entry with a value of 12345 ns results in 12300 ns = 12.3 µs. Use the function **SEPIA2_PRI_GetGatingLimits** to retrieve the ranges of valid values for the connected Prima device and the function **SEPIA2_PRI_GetGatingData** to check for the values actually set.

```
/* C/C++ */  int  SEPIA2_PRI_GetGatingEnabled       (int              iDevIdx,
                                                     int              iSlotId,
                                                     unsigned char* pbGatingEna );
```

arguments:	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	pbGatingEna	O :	returns the current gating enable state (boolean), pointer to a byte

description: This function reads out and returns the current gating enable state.

```
/* C/C++ */  int  SEPIA2_PRI_SetGatingEnabled      (int             iDevIdx,
                                                   int             iSlotId,
                                                   unsigned char  bGatingEna );
```

arguments:			
	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	bGatingEna	I :	sets the desired gating enable state (boolean)

description: This function sets the desired gating enable state.

```
/* C/C++ */  int  SEPIA2_PRI_GetGateHighImpedance  (int             iDevIdx,
                                                   int             iSlotId,
                                                   unsigned char* pbHighImp );
```

arguments:			
	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	pbHighImp	O :	returns the current high impedance state (boolean) of the gating port, pointer to a byte

description: This function returns the current high impedance state of the gate.

```
/* C/C++ */  int  SEPIA2_PRI_SetGateHighImpedance  (int             iDevIdx,
                                                   int             iSlotId,
                                                   unsigned char  bHighImp );
```

arguments:			
	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	bHighImp	I :	sets the desired high impedance state (boolean) of the gating port

description: This function sets the desired high impedance state of the gate.

```
/* C/C++ */  int  SEPIA2_PRI_DecodeWavelength      (int             iDevIdx,
                                                   int             iSlotId,
                                                   int             iWLIdx,
                                                   int*            piWL );
```

arguments:			
	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	iWLIdx	I :	wavelength index (zero-based) to be decoded
	piWL	O :	retruns the wavelength value in nm, pointer to an integer

description: This function decodes the given wavelength index (zero-based) to the corresponding wavelength in nano meters.

```
/* C/C++ */  int  SEPIA2_PRI_GetWavelengthIdx      (int             iDevIdx,
                                                   int             iSlotId,
                                                   int*            piWLIdx );
```

arguments:			
	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	piWLIdx	O :	returns the wavelength index currently set

description: This function queries and returns the index of the wavelength currently set.

```
/* C/C++ */  int  SEPIA2_PRI_SetWavelengthIdx      (int             iDevIdx,
                                                   int             iSlotId,
                                                   int             iWLIdx );
```

arguments:			
	iDevIdx	I :	PQ Laser Device index (USB channel number, 0…7)
	iSlotId	I :	slot number of a PRI module
	iWLIdx	I :	desired wavelength index

description: This function sets the desired index from the list of the laser wavelengths. Since Prima is a very versatile and flexible family of laser devices, the list's length and order may vary from device to device (see introductory text of this section). Use the PRI function **`SEPIA2_PRI_GetDeviceInfo`** to obtain the number of different wavelengths installed in your device and the PRI function **`SEPIA2_PRI_DecodeWavelength`** to get the respective wavelength for a given index.

```
/* C/C++ */  int  SEPIA2_PRI_GetIntensity           (int          iDevIdx,
                                                      int          iSlotId,
                                                      int          iWLIdx,
                                                      word*        pwIntensity );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a PRI module
iWLIdx I : wavelength index
pwIntensity O : returns current intensity setting (in per mille) for the wavelength given by the index iWLIdx; pointer to a word

description: Reads out the intensity currently set for the indexed wavelength of the Prima laser device. Note that the value is given in per mille of the pump current.

```
/* C/C++ */  int  SEPIA2_PRI_SetIntensity           (int          iDevIdx,
                                                      int          iSlotId,
                                                      int          iWLIdx,
                                                      word         wIntensity );
```

arguments:
iDevIdx I : PQ Laser Device index (USB channel number, 0…7)
iSlotId I : slot number of a PRI module
iWLIdx I : wavelength index
wIntensity I : desired intensity setting (in per mille) for the wavelength given by the index iWLIdx

description: Sets the desired intensity for the indexed wavelength of the Prima laser device. Note that the value is given in per mille of the pump current. The wavelength index doesn't have to be the one currently set. In this case, the new intensity will in fact be stored but yet not be set before changing the currently active index to iWLIdx using the PRI function **`SEPIA2_PRI_SetWavelengthIdx`**.

3. PQ Laser Device – Demo Programs

Please note that all demo code provided is correct to our best knowledge, however, we must disclaim all warranties as to fitness for a particular purpose of this code. It is provided ‘as is’ for no more than explanatory purposes.

The demos are kept as simple as possible to maintain focus on the key issues of accessing the PQ Laser Device. It is neither their task, to show all degrees of freedom of your PQ Laser Device nor to illustrate the functionality of all modules possibly installed. This is why most of the demos have a minimalistic user interface and/or run from a simple DOS box (console). For the same reason, the parameter settings are mostly hard-coded and thereby fixed at compile time. It may therefore be necessary to change the source code and re-compile the demos in order to run them in a way that is matched to your individual system setup. Running them unmodified may result in useless settings because of inappropriate trigger levels etc. and although it should be taken as most extreme unlikely it might even cause damage to your laser equipment.

There are demos for MS Visual Studio C/C++ and Delphi provided in their language specific subfolder; Other languages may join the collection by and by without explicit mentioning it in this manual. We tried to implement the respective demos as close to identical behaviour in the different languages as could be, yet we don't guarantee for this. For each of these programming languages/systems there are different demo programs for at least two dedicated tasks: system – wide inquiry of the actual settings (named “ReadAllData…”) and exemplarily change some settings (named “SetSomeData…”). Note that the latter needs to be executed in an directory in which write access is granted. It tries to write a data recovery file before altering the PQ Laser Device's working parameters. Invoked twice it restores the original data from this file removing it afterwards. Furthermore it expects to find at least a SOM 828 in slot 100 and a SLM 828 in slot 200.

All demos have in common, that they presume to find a PQ Laser Device at USB – channel 0. If you are running other PicoQuant products, that use the same hardware driver, the PQ Laser Device might get other channel numbers during USB enumeration. There are two different strategies to overcome this situation: You might

a) alter the device– resp. channel–index variable iDevIdx (set to 0 by default) to the actual value and recompile the demo or
b) force PQ Laser Device to be the first device enumerated by your computer. This is done by drawing off **all** devices from the USB port for a few ten seconds and putting them all back online, **but the PQ Laser Device first**.

The demo programs commonly illustrate the typical structure of PQ Laser Device sessions:

- Get library version and check it comparing to system constant LIB_VERSION_REFERENCE
  (optional)
- Open PQ Laser Device on the desired USB channels
  (mandatory)
- Get firmware version and USB string descriptors (just for information and service purposes)
  (optional)
- Get current module map from firmware
  (mandatory)
- Get last error detected by firmware and decode it if necessary
  (optional)
- Insert implementation of your desired behaviour here
  …
  …
- Free module map
  (recommended)
- Close PQ Laser Device
  (mandatory)

4. Appendix: Tables Concerning the PQ Laser Device – API

4.1. Table of Data Types

The Sepia2_Lib.dll is written in C and its data types correspond to standard C/C++ data types on 32 bit platforms as follows:

used data types (C/C++)	bits	remarks
`char`	8	character
`char*`	?	pointer to char; pointer to string (0–terminated)
`unsigned char`	8	byte
`short int`	16	signed integer
`unsigned short`	16	unsigned integer (word)
`int`	32	signed integer
`long`	32	signed integer
`float`	32	floating point number (7 to 8 significant digits)
`double`	64	floating point number (15 to 16 significant digits)
`__int64`	64	signed integer

These types are supported by most of the major programming languages…

4.2. Table of Error Codes

Symbol	Nr.	Error Text
SEPIA2_ERR_NO_ERROR	0	no error
SEPIA2_ERR_FW_MEMORY_ALLOCATION_ERROR	-1001	FW: memory allocation error
SEPIA2_ERR_FW_CRC_ERROR_WHILE_CHECKING_SCM_828_MODULE	-1002	FW: CRC error while checking SCM 828 module
SEPIA2_ERR_FW_CRC_ERROR_WHILE_CHECKING_BACKPLANE	-1003	FW: CRC error while checking backplane
SEPIA2_ERR_FW_CRC_ERROR_WHILE_CHECKING_MODULE	-1004	FW: CRC error while checking module
SEPIA2_ERR_FW_MAPSIZE_ERROR	-1005	FW: map size error
SEPIA2_ERR_FW_UNKNOWN_ERROR_PHASE	-1006	FW: unknown FW error phase
SEPIA2_ERR_FW_ILLEGAL_MODULE_CHANGE	-1111	FW: illegal module change
SEPIA2_ERR_USB_WRONG_DRIVER_VERSION	-2001	USB: wrong driver version
SEPIA2_ERR_USB_OPEN_DEVICE_ERROR	-2002	USB: open device error
SEPIA2_ERR_USB_DEVICE_BUSY	-2003	USB: device busy
SEPIA2_ERR_USB_CLOSE_DEVICE_ERROR	-2005	USB: close device error
SEPIA2_ERR_USB_DEVICE_CHANGED	-2006	USB: device changed
SEPIA2_ERR_I2C_ADDRESS_ERROR	-2010	I2C: address error
SEPIA2_ERR_DEVICE_INDEX_ERROR	-2011	USB: device index error
SEPIA2_ERR_ILLEGAL_MULTIPLEXER_PATH	-2012	I2C: illegal multiplexer path
SEPIA2_ERR_ILLEGAL_MULTIPLEXER_LEVEL	-2013	I2C: illegal multiplexer level
SEPIA2_ERR_ILLEGAL_SLOT_ID	-2014	I2C: illegal slot id
SEPIA2_ERR_NO_UPTIMECOUNTER	-2015	FRAM: no uptime counter
SEPIA2_ERR_FRAM_BLOCKWRITE_ERROR	-2020	FRAM: blockwrite error
SEPIA2_ERR_FRAM_BLOCKREAD_ERROR	-2021	FRAM: blockread error
SEPIA2_ERR_FRAM_CRC_BLOCKCHECK_ERROR	-2022	FRAM: CRC blockcheck error
SEPIA2_ERR_RAM_BLOCK_ALLOCATION_ERROR	-2023	RAM: block allocation error
SEPIA2_ERR_RAM_SECURE_MEMORY_HANDLING_ERROR	-2024	RAM: secure memory handling error
SEPIA2_ERR_I2C_INITIALISING_COMMAND_EXECUTION_ERROR	-2100	I2C: initialising command execution error
SEPIA2_ERR_I2C_FETCHING_INITIALISING_COMMANDS_ERROR	-2101	I2C: fetching initialising commands error
SEPIA2_ERR_I2C_WRITING_INITIALISING_COMMANDS_ERROR	-2102	I2C: writing initialising commands error
SEPIA2_ERR_I2C_MODULE_CALIBRATING_ERROR	-2200	I2C: module calibrating error
SEPIA2_ERR_I2C_FETCHING_CALIBRATING_COMMANDS_ERROR	-2201	I2C: fetching calibrating commands error
SEPIA2_ERR_I2C_WRITING_CALIBRATING_COMMANDS_ERROR	-2202	I2C: writing calibrating commands error
SEPIA2_ERR_DCL_FILE_OPEN_ERROR	-2301	DCL: file open error
SEPIA2_ERR_DCL_WRONG_FILE_LENGTH	-2302	DCL: wrong file length
SEPIA2_ERR_DCL_FILE_READ_ERROR	-2303	DCL: file read error
SEPIA2_ERR_FRAM_IS_WRITE_PROTECTED	-2304	FRAM: is write protected
SEPIA2_ERR_DCL_FILE_SPECIFIES_DIFFERENT_MODULETYPE	-2305	DCL: file specifies different moduletype
SEPIA2_ERR_DCL_FILE_SPECIFIES_DIFFERENT_SERIAL_NUMBER	-2306	DCL: file specifies different serial number
SEPIA2_ERR_I2C_INVALID_ARGUMENT	-3001	I2C: invalid argument
SEPIA2_ERR_I2C_NO_ACKNOWLEDGE_ON_WRITE_ADRESSBYTE	-3002	I2C: no acknowledge on write adressbyte
SEPIA2_ERR_I2C_NO_ACKNOWLEDGE_ON_READ_ADRESSBYTE	-3003	I2C: no acknowledge on read adressbyte
SEPIA2_ERR_I2C_NO_ACKNOWLEDGE_ON_WRITE_DATABYTE	-3004	I2C: no acknowledge on write databyte
SEPIA2_ERR_I2C_READ_BACK_ERROR	-3005	I2C: read back error
SEPIA2_ERR_I2C_READ_ERROR	-3006	I2C: read error
SEPIA2_ERR_I2C_WRITE_ERROR	-3007	I2C: write error
SEPIA2_ERR_I_O_FILE_ERROR	-3009	I/O: file error
SEPIA2_ERR_I2C_MULTIPLEXER_ERROR	-3014	I2C: multiplexer error

Symbol	Nr.	Error Text
SEPIA2_ERR_I2C_MULTIPLEXER_PATH_ERROR	-3015	I2C: multiplexer path error
SEPIA2_ERR_USB_INIT_FAILED	-3200	USB: init failed
SEPIA2_ERR_USB_INVALID_ARGUMENT	-3201	USB: invalid argument
SEPIA2_ERR_USB_DEVICE_STILL_OPEN	-3202	USB: device still open
SEPIA2_ERR_USB_NO_MEMORY	-3203	USB: no memory
SEPIA2_ERR_USB_OPEN_FAILED	-3204	USB: open failed
SEPIA2_ERR_USB_GET_DESCRIPTOR_FAILED	-3205	USB: get descriptor failed
SEPIA2_ERR_USB_INAPPROPRIATE_DEVICE	-3206	USB: inappropriate device
SEPIA2_ERR_USB_BUSY_DEVICE	-3207	USB: busy device
SEPIA2_ERR_USB_INVALID_HANDLE	-3208	USB: invalid handle
SEPIA2_ERR_USB_INVALID_DESCRIPTOR_BUFFER	-3209	USB: invalid descriptor buffer
SEPIA2_ERR_USB_IOCTRL_FAILED	-3210	USB: IOCTRL failed
SEPIA2_ERR_USB_VCMD_FAILED	-3211	USB: vcmd failed
SEPIA2_ERR_USB_NO_SUCH_PIPE	-3212	USB: no such pipe
SEPIA2_ERR_USB_REGISTER_NOTIFICATION_FAILED	-3213	USB: register notification failed
SEPIA2_ERR_USB_UNKNOWN_DEVICE	-3214	USB: unknown device
SEPIA2_ERR_USB_WRONG_DRIVER	-3215	USB: wrong driver
SEPIA2_ERR_USB_WINDOWS_ERROR	-3216	USB: windows error
SEPIA2_ERR_USB_DEVICE_NOT_OPEN	-3217	USB: device not open
SEPIA2_ERR_I2C_DEVICE_ERROR	-3256	I2C: device error
SEPIA2_ERR_LMP_ADC_TABLES_NOT_FOUND	-3501	LMP: ADC tables not found
SEPIA2_ERR_LMP_ADC_OVERFLOW	-3502	LMP: ADC overflow
SEPIA2_ERR_LMP_ADC_UNDERFLOW	-3503	LMP: ADC underflow
SEPIA2_ERR_SCM_VOLTAGE_LIMITS_TABLE_NOT_FOUND	-4001	SCM: voltage limits table not found
SEPIA2_ERR_SCM_VOLTAGE_SCALING_LIST_NOT_FOUND	-4002	SCM: voltage scaling list not found
SEPIA2_ERR_SCM_REPEATEDLY_MEASURED_VOLTAGE_FAILURE	-4003	SCM: repeatedly measured voltage failure
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_0_VOLTAGE_TOO_LOW	-4010	SCM: power supply line 0: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_1_VOLTAGE_TOO_LOW	-4011	SCM: power supply line 1: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_2_VOLTAGE_TOO_LOW	-4012	SCM: power supply line 2: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_3_VOLTAGE_TOO_LOW	-4013	SCM: power supply line 3: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_4_VOLTAGE_TOO_LOW	-4014	SCM: power supply line 4: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_5_VOLTAGE_TOO_LOW	-4015	SCM: power supply line 5: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_6_VOLTAGE_TOO_LOW	-4016	SCM: power supply line 6: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_7_VOLTAGE_TOO_LOW	-4017	SCM: power supply line 7: voltage too low
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_0_VOLTAGE_TOO_HIGH	-4020	SCM: power supply line 0: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_1_VOLTAGE_TOO_HIGH	-4021	SCM: power supply line 1: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_2_VOLTAGE_TOO_HIGH	-4022	SCM: power supply line 2: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_3_VOLTAGE_TOO_HIGH	-4023	SCM: power supply line 3: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_4_VOLTAGE_TOO_HIGH	-4024	SCM: power supply line 4: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_5_VOLTAGE_TOO_HIGH	-4025	SCM: power supply line 5: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_6_VOLTAGE_TOO_HIGH	-4026	SCM: power supply line 6: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LINE_7_VOLTAGE_TOO_HIGH	-4027	SCM: power supply line 7: voltage too high
SEPIA2_ERR_SCM_POWER_SUPPLY_LASER_TURNING_OFF_VOLTAGE_TOO_HIGH	-4030	SCM: power supply laser turn-off-voltage too high
SEPIA2_ERR_SCM_INVALID_TEMPERATURE_TABLE_COUNT	-4040	SCM: invalid temperature table count
SEPIA2_ERR_SCM_TCONFG_TABLE_READ_FAILED	-4041	SCM: tconfg table read failed
SEPIA2_ERR_SCM_INVALID_NUMBER_OF_TABLE_ENTRIES	-4042	SCM: invalid number of table entries
SEPIA2_ERR_SCM_INVALID_TIMERTICK_VALUE	-4043	SCM: invalid timertick value
SEPIA2_ERR_SCM_INVALID_TEMPERATURE_VALUE_TABLE	-4044	SCM: invalid temperature value table
SEPIA2_ERR_SCM_INVALID_DAC_CONTROL_TABLE_A	-4045	SCM: invalid DAC control table A

Symbol	Nr.	Error Text
SEPIA2_ERR_SCM_INVALID_DAC_CONTROL_TABLE_B	-4046	SCM: invalid DAC control table B
SEPIA2_ERR_SCM_TEMPERATURE_TABLE_READ_FAILED	-4047	SCM: temperature table read failed
SEPIA2_ERR_SOM_INT_OSCILLATOR_S_FREQ_LIST_NOT_FOUND	-5001	SOM: int. oscillator's freq.-list not found
SEPIA2_ERR_SOM_TRIGGER_MODE_LIST_NOT_FOUND	-5002	SOM: trigger mode list not found
SEPIA2_ERR_SOM_TRIGGER_LEVEL_NOT_FOUND	-5003	SOM: trigger level not found
SEPIA2_ERR_SOM_PREDIVIDER_PRETRIGGER_OR_TRIGGERMASK_NOT_FOUND	-5004	SOM: predivider, pretrigger, triggermask not found
SEPIA2_ERR_SOM_BURSTLENGTH_NOT_FOUND	-5005	SOM: burstlength not found
SEPIA2_ERR_SOM_OUTPUT_AND_SYNC_ENABLE_NOT_FOUND	-5006	SOM: output and sync enable not found
SEPIA2_ERR_SOM_TRIGGER_LEVEL_OUT_OF_BOUNDS	-5007	SOM: trigger level out of bounds
SEPIA2_ERR_SOM_ILLEGAL_FREQUENCY_TRIGGERMODE	-5008	SOM: illegal frequency / triggermode
SEPIA2_ERR_SOM_ILLEGAL_FREQUENCY_DIVIDER	-5009	SOM: illegal frequency divider (equal 0)
SEPIA2_ERR_SOM_ILLEGAL_PRESYNC	-5010	SOM: illegal presync (greater than divider)
SEPIA2_ERR_SOM_ILLEGAL_BURST_LENGTH	-5011	SOM: illegal burst length (>/= 2^24 or < 0)
SEPIA2_ERR_SOM_AUX_IO_CTRL_NOT_FOUND	-5012	SOM: AUX I/O control data not found
SEPIA2_ERR_SOM_ILLEGAL_AUX_OUT_CTRL	-5013	SOM: illegal AUX output control data
SEPIA2_ERR_SOM_ILLEGAL_AUX_IN_CTRL	-5014	SOM: illegal AUX input control data
SEPIA2_ERR_SOMD_INT_OSCILLATOR_S_FREQ_LIST_NOT_FOUND	-5051	SOMD: int. oscillator's freq.-list not found
SEPIA2_ERR_SOMD_TRIGGER_MODE_LIST_NOT_FOUND	-5052	SOMD: trigger mode list not found
SEPIA2_ERR_SOMD_TRIGGER_LEVEL_NOT_FOUND	-5053	SOMD: trigger level not found
SEPIA2_ERR_SOMD_PREDIVIDER_PRETRIGGER_OR_TRIGGERMASK_NOT_FOUND	-5054	SOMD: predivider,pretrigger or trig.mask not found
SEPIA2_ERR_SOMD_BURSTLENGTH_NOT_FOUND	-5055	SOMD: burstlength not found
SEPIA2_ERR_SOMD_OUTPUT_AND_SYNC_ENABLE_NOT_FOUND	-5056	SOMD: output and sync enable not found
SEPIA2_ERR_SOMD_TRIGGER_LEVEL_OUT_OF_BOUNDS	-5057	SOMD: trigger level out of bounds
SEPIA2_ERR_SOMD_ILLEGAL_FREQUENCY_TRIGGERMODE	-5058	SOMD: illegal frequency / triggermode
SEPIA2_ERR_SOMD_ILLEGAL_FREQUENCY_DIVIDER	-5059	SOMD: illegal frequency divider (equal 0)
SEPIA2_ERR_SOMD_ILLEGAL_PRESYNC	-5060	SOMD: illegal presync (greater than divider)
SEPIA2_ERR_SOMD_ILLEGAL_BURST_LENGTH	-5061	SOMD: illegal burst length (>/= 2^24 or < 0)
SEPIA2_ERR_SOMD_AUX_IO_CTRL_NOT_FOUND	-5062	SOMD: AUX I/O control data not found
SEPIA2_ERR_SOMD_ILLEGAL_AUX_OUT_CTRL	-5063	SOMD: illegal AUX output control data
SEPIA2_ERR_SOMD_ILLEGAL_AUX_IN_CTRL	-5064	SOMD: illegal AUX input control data
SEPIA2_ERR_SOMD_ILLEGAL_OUT_MUX_CTRL	-5071	SOMD: illegal output multiplexer control data
SEPIA2_ERR_SOMD_OUTPUT_DELAY_DATA_NOT_FOUND	-5072	SOMD: output delay data not found
SEPIA2_ERR_SOMD_ILLEGAL_OUTPUT_DELAY_DATA	-5073	SOMD: illegal output delay data
SEPIA2_ERR_SOMD_DELAY_NOT_ALLOWED_IN_TRIGGER_MODE	-5074	SOMD: delay not allowed in current trigger mode
SEPIA2_ERR_SOMD_DEVICE_INITIALIZING	-5075	SOMD: device initializing
SEPIA2_ERR_SOMD_DEVICE_BUSY	-5076	SOMD: device busy
SEPIA2_ERR_SOMD_PLL_NOT_LOCKED	-5077	SOMD: PLL not locked
SEPIA2_ERR_SOMD_FW_UPDATE_FAILED	-5080	SOMD: firmware update failed
SEPIA2_ERR_SOMD_FW_CRC_CHECK_FAILED	-5081	SOMD: firmware CRC check failed
SEPIA2_ERR_SOMD_HW_TRIGGERSOURCE_ERROR	-5101	SOMD HW: triggersource error
SEPIA2_ERR_SOMD_HW_SYCHRONIZE_NOW_ERROR	-5102	SOMD HW: sychronize now error
SEPIA2_ERR_SOMD_HW_SYNC_RANGE_ERROR	-5103	SOMD HW: SYNC range error
SEPIA2_ERR_SOMD_HW_ILLEGAL_OUT_MUX_CTRL	-5104	SOMD HW: illegal output multiplexer control data
SEPIA2_ERR_SOMD_HW_SET_DELAY_ERROR	-5105	SOMD HW: set delay error
SEPIA2_ERR_SOMD_HW_AUX_IO_COMMAND_ERROR	-5106	SOMD HW: AUX I/O command error
SEPIA2_ERR_SOMD_HW_PLL_NOT_STABLE	-5107	SOMD HW: PLL not stable
SEPIA2_ERR_SOMD_HW_BURST_LENGTH_ERROR	-5108	SOMD HW: burst length error
SEPIA2_ERR_SOMD_HW_OUT_MUX_COMMAND_ERROR	-5109	SOMD HW: output multiplexer command error
SEPIA2_ERR_SOMD_HW_COARSE_DELAY_SET_ERROR	-5110	SOMD HW: coarse delay set error

Symbol	Nr.	Error Text
SEPIA2_ERR_SOMD_HW_FINE_DELAY_SET_ERROR	-5111	SOMD HW: fine delay set error
SEPIA2_ERR_SOMD_HW_FW_EPROM_ERROR	-5112	SOMD HW: firmware EPROM error
SEPIA2_ERR_SOMD_HW_CRC_ERROR_ON_WRITING_FIRMWARE	-5113	SOMD HW: CRC error on writing firmware
SEPIA2_ERR_SOMD_HW_CALIBRATION_DATA_NOT_FOUND	-5114	SOMD HW: calibration data not found
SEPIA2_ERR_SOMD_HW_WRONG_EXTERNAL_FREQUENCY	-5115	SOMD HW: wrong external frequency
SEPIA2_ERR_SOMD_HW_EXTERNAL_FREQUENCY_NOT_STABLE	-5116	SOMD HW: external frequency not stable
SEPIA2_ERR_SLM_ILLEGAL_FREQUENCY_TRIGGERMODE	-6001	SLM: illegal frequency / triggermode
SEPIA2_ERR_SLM_ILLEGAL_INTENSITY	-6002	SLM: illegal intensity (> 100% or < 0%)
SEPIA2_ERR_SLM_ILLEGAL_HEAD_TYPE	-6003	SLM: illegal head type
SEPIA2_ERR_SML_ILLEGAL_INTENSITY	-6501	SML: illegal intensity (> 100% or < 0%)
SEPIA2_ERR_SML_POWER_SCALE_TABLES_NOT_FOUND	-6502	SML: power scale tables not found
SEPIA2_ERR_SML_ILLEGAL_HEAD_TYPE	-6503	SML: illegal head type
SEPIA2_ERR_VUV_VIR_SCALING_TABLES_NOT_FOUND	-6511	VUV/VIR: scaling tables not found
SEPIA2_ERR_VUV_VIR_DEVICE_TYPE_NOT_FOUND	-6512	VUV/VIR: device type not found
SEPIA2_ERR_VUV_VIR_ILLEGAL_TRIGGER_SOURCE_INDEX	-6513	VUV/VIR: illegal trigger source index
SEPIA2_ERR_VUV_VIR_ILLEGAL_FREQUENCY_DIVIDER_INDEX	-6514	VUV/VIR: illegal frequency divider index
SEPIA2_ERR_VUV_VIR_ILLEGAL_TRIGGER_LEVEL_VALUE	-6515	VUV/VIR: illegal trigger level value
SEPIA2_ERR_VUV_VIR_TRIGGER_DATA_NOT_FOUND	-6516	VUV/VIR: trigger data not found
SEPIA2_ERR_VUV_VIR_ILLEGAL_PUMP_REGISTER_READ_INDEX	-6517	VUV/VIR: illegal pump register read index
SEPIA2_ERR_VUV_VIR_ILLEGAL_PUMP_REGISTER_WRITE_INDEX	-6518	VUV/VIR: illegal pump register write index
SEPIA2_ERR_VUV_VIR_INTENSITY_DATA_NOT_FOUND	-6519	VUV/VIR: intensity data not found
SEPIA2_ERR_VUV_VIR_ILLEGAL_INTENSITY_DATA	-6520	VUV/VIR: illegal intensity data
SEPIA2_ERR_VUV_VIR_UNSUPPORTED_OPTION	-6521	VUV/VIR: unsupported option
SEPIA2_ERR_PRI_UI_CONSTSTABLES_NOT_FOUND	-6531	PRI: UI-constants tables not found
SEPIA2_ERR_PRI_WAVELENGTHS_TABLE_NOT_FOUND	-6532	PRI: wavelengths table not found
SEPIA2_ERR_PRI_ILLEGAL_WAVELENGTH_INDEX	-6533	PRI: illegal wavelength index
SEPIA2_ERR_PRI_OPERATION_MODE_TEXTS_NOT_FOUND	-6534	PRI: operation mode texts not found
SEPIA2_ERR_PRI_OPERATION_MODE_COMMANDS_NOT_FOUND	-6535	PRI: operation mode commands not found
SEPIA2_ERR_PRI_ILLEGAL_OPERATION_MODE_INDEX	-6536	PRI: illegal operation mode index
SEPIA2_ERR_PRI_ERROR_ON_WRITING_OPERATION_MODE_INDEX	-6537	PRI: error on writing operation mode index
SEPIA2_ERR_PRI_TRIGGER_SOURCE_TEXTS_NOT_FOUND	-6538	PRI: trigger source texts not found
SEPIA2_ERR_PRI_TRIGGER_SOURCE_COMMANDS_NOT_FOUND	-6539	PRI: trigger source commands not found
SEPIA2_ERR_PRI_ILLEGAL_TRIGGER_SOURCE_INDEX	-6540	PRI: illegal trigger source index
SEPIA2_ERR_PRI_ERROR_ON_WRITING_TRIGGER_SOURCE_INDEX	-6541	PRI: error on writing trigger source index
SEPIA2_ERR_PRI_ILLEGAL_TRIGGER_LEVEL	-6542	PRI: illegal trigger level
SEPIA2_ERR_PRI_ERROR_ON_WRITING_TRIGGER_LEVEL	-6543	PRI: error on writing trigger level
SEPIA2_ERR_PRI_ILLEGAL_INTENSITY_DATA	-6544	PRI: illegal intensity data
SEPIA2_ERR_PRI_ERROR_ON_WRITING_INTENSITY_DATA	-6545	PRI: error on writing intensity data
SEPIA2_ERR_PRI_ILLEGAL_FREQUENCY_DATA	-6546	PRI: illegal frequency data
SEPIA2_ERR_PRI_ERROR_ON_WRITING_FREQUENCY_DATA	-6547	PRI: error on writing frequency data
SEPIA2_ERR_PRI_ILLEGAL_GATING_DATA	-6548	PRI: illegal gating data
SEPIA2_ERR_PRI_ERROR_ON_WRITING_GATING_DATA	-6549	PRI: error on writing gating data
SEPIA2_ERR_SWM_CALIBRATION_TABLES_NOT_FOUND	-6701	SWM: calibration tables not found
SEPIA2_ERR_SWM_ILLEGAL_CURVE_INDEX	-6702	SWM: illegal curve index
SEPIA2_ERR_SWM_ILLEGAL_TIMBASE_RANGE_INDEX	-6703	SWM: illegal timebase range index
SEPIA2_ERR_SWM_ILLEGAL_PULSE_AMPLITUDE	-6704	SWM: illegal pulse amplitude
SEPIA2_ERR_SWM_ILLEGAL_RAMP_SLEW_RATE	-6705	SWM: illegal ramp slew rate
SEPIA2_ERR_SWM_ILLEGAL_PULSE_START_DELAY	-6706	SWM: illegal pulse start delay
SEPIA2_ERR_SWM_ILLEGAL_RAMP_START_DELAY	-6707	SWM: illegal ramp start delay

Symbol	Nr.	Error Text
SEPIA2_ERR_SWM_ILLEGAL_WAVE_STOP_DELAY	-6708	SWM: illegal wave stop delay
SEPIA2_ERR_SWM_ILLEGAL_TABLENAME	-6709	SWM: illegal tablename
SEPIA2_ERR_SWM_ILLEGAL_TABLE_INDEX	-6710	SWM: illegal table index
SEPIA2_ERR_SWM_ILLEGAL_TABLE_FIELD	-6711	SWM: illegal table field
SEPIA2_ERR_SPM_ILLEGAL_INPUT_VALUE	-7001	Solea SPM: illegal input value
SEPIA2_ERR_SPM_VALUE_OUT_OF_BOUNDS	-7006	Solea SPM: value out of bounds
SEPIA2_ERR_SPM_FW_OUT_OF_MEMORY	-7011	Solea SPM FW: out of memory
SEPIA2_ERR_SPM_FW_UPDATE_FAILED	-7013	Solea SPM FW: update failed
SEPIA2_ERR_SPM_FW_CRC_CHECK_FAILED	-7014	Solea SPM FW: CRC check failed
SEPIA2_ERR_SPM_FW_ERROR_ON_FLASH_DELETION	-7015	Solea SPM FW: error on flash deletion
SEPIA2_ERR_SPM_FW_FILE_OPEN_ERROR	-7021	Solea SPM FW: file open error
SEPIA2_ERR_SPM_FW_FILE_READ_ERROR	-7022	Solea SPM FW: file read error
SEPIA2_ERR_SSM_SCALING_TABLES_NOT_FOUND	-7051	Solea SSM: scaling tables not found
SEPIA2_ERR_SSM_ILLEGAL_TRIGGER_MODE	-7052	Solea SSM: illegal trigger mode
SEPIA2_ERR_SSM_ILLEGAL_TRIGGER_LEVEL_VALUE	-7053	Solea SSM: illegal trigger level value
SEPIA2_ERR_SSM_ILLEGAL_CORRECTION_VALUE	-7054	Solea SSM: illegal correction value
SEPIA2_ERR_SSM_TRIGGER_DATA_NOT_FOUND	-7055	Solea SSM: trigger data not found
SEPIA2_ERR_SSM_CORRECTION_DATA_COMMAND_NOT_FOUND	-7056	Solea SSM: correction data command not found
SEPIA2_ERR_SWS_SCALING_TABLES_NOT_FOUND	-7101	Solea SWS: scaling tables not found
SEPIA2_ERR_SWS_ILLEGAL_HW_MODULETYPE	-7102	Solea SWS: illegal HW moduletype
SEPIA2_ERR_SWS_MODULE_NOT_FUNCTIONAL	-7103	Solea SWS: module not functional
SEPIA2_ERR_SWS_ILLEGAL_CENTER_WAVELENGTH	-7104	Solea SWS: illegal center wavelength
SEPIA2_ERR_SWS_ILLEGAL_BANDWIDTH	-7105	Solea SWS: illegal bandwidth
SEPIA2_ERR_SWS_VALUE_OUT_OF_BOUNDS	-7106	Solea SWS: value out of bounds
SEPIA2_ERR_SWS_MODULE_BUSY	-7107	Solea SWS: module busy
SEPIA2_ERR_SWS_FW_WRONG_COMPONENT_ANSWERING	-7109	Solea SWS FW: wrong component answering
SEPIA2_ERR_SWS_FW_UNKNOWN_HW_MODULETYPE	-7110	Solea SWS FW: unknown HW moduletype
SEPIA2_ERR_SWS_FW_OUT_OF_MEMORY	-7111	Solea SWS FW: out of memory
SEPIA2_ERR_SWS_FW_VERSION_CONFLICT	-7112	Solea SWS FW: version conflict
SEPIA2_ERR_SWS_FW_UPDATE_FAILED	-7113	Solea SWS FW: update failed
SEPIA2_ERR_SWS_FW_CRC_CHECK_FAILED	-7114	Solea SWS FW: CRC check failed
SEPIA2_ERR_SWS_FW_ERROR_ON_FLASH_DELETION	-7115	Solea SWS FW: error on flash deletion
SEPIA2_ERR_SWS_FW_CALIBRATION_MODE_ERROR	-7116	Solea SWS FW: calibration mode error
SEPIA2_ERR_SWS_FW_FUNCTION_NOT_IMPLEMENTED_YET	-7117	Solea SWS FW: function not implemented yet
SEPIA2_ERR_SWS_FW_WRONG_CALIBRATION_TABLE_ENTRY	-7118	Solea SWS FW: wrong calibration table entry
SEPIA2_ERR_SWS_FW_INSUFFICIENT_CALIBRATION_TABLE_SIZE	-7119	Solea SWS FW: insufficient calibration table size
SEPIA2_ERR_SWS_FW_FILE_OPEN_ERROR	-7151	Solea SWS FW: file open error
SEPIA2_ERR_SWS_FW_FILE_READ_ERROR	-7152	Solea SWS FW: file read error
SEPIA2_ERR_SWS_HW_MODULE_0_ALL_MOTORS_INIT_TIMEOUT	-7201	Solea SWS HW: module 0, all motors: init timeout
SEPIA2_ERR_SWS_HW_MODULE_0_ALL_MOTORS_PLAUSI_CHECK	-7202	Solea SWS HW: module 0, all motors: plausi check
SEPIA2_ERR_SWS_HW_MODULE_0_ALL_MOTORS_DAC_SET_CURRENT	-7203	Solea SWS HW: module 0, all motors: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_0_ALL_MOTORS_TIMEOUT	-7204	Solea SWS HW: module 0, all motors: timeout
SEPIA2_ERR_SWS_HW_MODULE_0_ALL_MOTORS_FLASH_WRITE_ERROR	-7205	Solea SWS HW: module 0, all motors: flash write error
SEPIA2_ERR_SWS_HW_MODULE_0_ALL_MOTORS_OUT_OF_BOUNDS	-7206	Solea SWS HW: module 0, all motors: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_0_I2C_FAILURE	-7207	Solea SWS HW: module 0: I2C failure
SEPIA2_ERR_SWS_HW_MODULE_0_INIT_FAILURE	-7208	Solea SWS HW: module 0: init failure
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_1_DATA_NOT_FOUND	-7210	Solea SWS HW: module 0, motor 1: data not found
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_1_INIT_TIMEOUT	-7211	Solea SWS HW: module 0, motor 1: init timeout
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_1_PLAUSI_CHECK	-7212	Solea SWS HW: module 0, motor 1: plausi check

Symbol	Nr.	Error Text
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_1_DAC_SET_CURRENT	-7213	Solea SWS HW: module 0, motor 1: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_1_TIMEOUT	-7214	Solea SWS HW: module 0, motor 1: timeout
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_1_FLASH_WRITE_ERROR	-7215	Solea SWS HW: module 0, motor 1: flash write error
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_1_OUT_OF_BOUNDS	-7216	Solea SWS HW: module 0, motor 1: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_2_DATA_NOT_FOUND	-7220	Solea SWS HW: module 0, motor 2: data not found
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_2_INIT_TIMEOUT	-7221	Solea SWS HW: module 0, motor 2: init timeout
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_2_PLAUSI_CHECK	-7222	Solea SWS HW: module 0, motor 2: plausi check
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_2_DAC_SET_CURRENT	-7223	Solea SWS HW: module 0, motor 2: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_2_TIMEOUT	-7224	Solea SWS HW: module 0, motor 2: timeout
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_2_FLASH_WRITE_ERROR	-7225	Solea SWS HW: module 0, motor 2: flash write error
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_2_OUT_OF_BOUNDS	-7226	Solea SWS HW: module 0, motor 2: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_3_DATA_NOT_FOUND	-7230	Solea SWS HW: module 0, motor 3: data not found
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_3_INIT_TIMEOUT	-7231	Solea SWS HW: module 0, motor 3: init timeout
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_3_PLAUSI_CHECK	-7232	Solea SWS HW: module 0, motor 3: plausi check
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_3_DAC_SET_CURRENT	-7233	Solea SWS HW: module 0, motor 3: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_3_TIMEOUT	-7234	Solea SWS HW: module 0, motor 3: timeout
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_3_FLASH_WRITE_ERROR	-7235	Solea SWS HW: module 0, motor 3: flash write error
SEPIA2_ERR_SWS_HW_MODULE_0_MOTOR_3_OUT_OF_BOUNDS	-7236	Solea SWS HW: module 0, motor 3: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_1_ALL_MOTORS_INIT_TIMEOUT	-7301	Solea SWS HW: module 1, all motors: init timeout
SEPIA2_ERR_SWS_HW_MODULE_1_ALL_MOTORS_PLAUSI_CHECK	-7302	Solea SWS HW: module 1, all motors: plausi check
SEPIA2_ERR_SWS_HW_MODULE_1_ALL_MOTORS_DAC_SET_CURRENT	-7303	Solea SWS HW: module 1, all motors: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_1_ALL_MOTORS_TIMEOUT	-7304	Solea SWS HW: module 1, all motors: timeout
SEPIA2_ERR_SWS_HW_MODULE_1_ALL_MOTORS_FLASH_WRITE_ERROR	-7305	Solea SWS HW: module 1, all motors: flash write error
SEPIA2_ERR_SWS_HW_MODULE_1_ALL_MOTORS_OUT_OF_BOUNDS	-7306	Solea SWS HW: module 1, all motors: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_1_I2C_FAILURE	-7307	Solea SWS HW: module 1: I2C failure
SEPIA2_ERR_SWS_HW_MODULE_1_INIT_FAILURE	-7308	Solea SWS HW: module 1: init failure
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_1_DATA_NOT_FOUND	-7310	Solea SWS HW: module 1, motor 1: data not found
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_1_INIT_TIMEOUT	-7311	Solea SWS HW: module 1, motor 1: init timeout
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_1_PLAUSI_CHECK	-7312	Solea SWS HW: module 1, motor 1: plausi check
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_1_DAC_SET_CURRENT	-7313	Solea SWS HW: module 1, motor 1: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_1_TIMEOUT	-7314	Solea SWS HW: module 1, motor 1: timeout
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_1_FLASH_WRITE_ERROR	-7315	Solea SWS HW: module 1, motor 1: flash write error
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_1_OUT_OF_BOUNDS	-7316	Solea SWS HW: module 1, motor 1: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_2_DATA_NOT_FOUND	-7320	Solea SWS HW: module 1, motor 2: data not found
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_2_INIT_TIMEOUT	-7321	Solea SWS HW: module 1, motor 2: init timeout
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_2_PLAUSI_CHECK	-7322	Solea SWS HW: module 1, motor 2: plausi check
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_2_DAC_SET_CURRENT	-7323	Solea SWS HW: module 1, motor 2: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_2_TIMEOUT	-7324	Solea SWS HW: module 1, motor 2: timeout
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_2_FLASH_WRITE_ERROR	-7325	Solea SWS HW: module 1, motor 2: flash write error
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_2_OUT_OF_BOUNDS	-7326	Solea SWS HW: module 1, motor 2: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_3_DATA_NOT_FOUND	-7330	Solea SWS HW: module 1, motor 3: data not found
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_3_INIT_TIMEOUT	-7331	Solea SWS HW: module 1, motor 3: init timeout
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_3_PLAUSI_CHECK	-7332	Solea SWS HW: module 1, motor 3: plausi check
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_3_DAC_SET_CURRENT	-7333	Solea SWS HW: module 1, motor 3: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_3_TIMEOUT	-7334	Solea SWS HW: module 1, motor 3: timeout
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_3_FLASH_WRITE_ERROR	-7335	Solea SWS HW: module 1, motor 3: flash write error
SEPIA2_ERR_SWS_HW_MODULE_1_MOTOR_3_OUT_OF_BOUNDS	-7336	Solea SWS HW: module 1, motor 3: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_2_ALL_MOTORS_INIT_TIMEOUT	-7401	Solea SWS HW: module 2, all motors: init timeout
SEPIA2_ERR_SWS_HW_MODULE_2_ALL_MOTORS_PLAUSI_CHECK	-7402	Solea SWS HW: module 2, all motors: plausi check

Symbol	**Nr.**	**Error Text**
SEPIA2_ERR_SWS_HW_MODULE_2_ALL_MOTORS_DAC_SET_CURRENT	-7403	Solea SWS HW: module 2, all motors: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_2_ALL_MOTORS_TIMEOUT	-7404	Solea SWS HW: module 2, all motors: timeout
SEPIA2_ERR_SWS_HW_MODULE_2_ALL_MOTORS_FLASH_WRITE_ERROR	-7405	Solea SWS HW: module 2, all motors: flash write error
SEPIA2_ERR_SWS_HW_MODULE_2_ALL_MOTORS_OUT_OF_BOUNDS	-7406	Solea SWS HW: module 2, all motors: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_2_I2C_FAILURE	-7407	Solea SWS HW: module 2: I2C failure
SEPIA2_ERR_SWS_HW_MODULE_2_INIT_FAILURE	-7408	Solea SWS HW: module 2: init failure
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_1_DATA_NOT_FOUND	-7410	Solea SWS HW: module 2, motor 1: data not found
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_1_INIT_TIMEOUT	-7411	Solea SWS HW: module 2, motor 1: init timeout
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_1_PLAUSI_CHECK	-7412	Solea SWS HW: module 2, motor 1: plausi check
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_1_DAC_SET_CURRENT	-7413	Solea SWS HW: module 2, motor 1: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_1_TIMEOUT	-7414	Solea SWS HW: module 2, motor 1: timeout
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_1_FLASH_WRITE_ERROR	-7415	Solea SWS HW: module 2, motor 1: flash write error
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_1_OUT_OF_BOUNDS	-7416	Solea SWS HW: module 2, motor 1: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_2_DATA_NOT_FOUND	-7420	Solea SWS HW: module 2, motor 2: data not found
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_2_INIT_TIMEOUT	-7421	Solea SWS HW: module 2, motor 2: init timeout
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_2_PLAUSI_CHECK	-7422	Solea SWS HW: module 2, motor 2: plausi check
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_2_DAC_SET_CURRENT	-7423	Solea SWS HW: module 2, motor 2: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_2_TIMEOUT	-7424	Solea SWS HW: module 2, motor 2: timeout
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_2_FLASH_WRITE_ERROR	-7425	Solea SWS HW: module 2, motor 2: flash write error
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_2_OUT_OF_BOUNDS	-7426	Solea SWS HW: module 2, motor 2: out of bounds
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_3_DATA_NOT_FOUND	-7430	Solea SWS HW: module 2, motor 3: data not found
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_3_INIT_TIMEOUT	-7431	Solea SWS HW: module 2, motor 3: init timeout
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_3_PLAUSI_CHECK	-7432	Solea SWS HW: module 2, motor 3: plausi check
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_3_DAC_SET_CURRENT	-7433	Solea SWS HW: module 2, motor 3: DAC set current
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_3_TIMEOUT	-7434	Solea SWS HW: module 2, motor 3: timeout
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_3_FLASH_WRITE_ERROR	-7435	Solea SWS HW: module 2, motor 3: flash write error
SEPIA2_ERR_SWS_HW_MODULE_2_MOTOR_3_OUT_OF_BOUNDS	-7436	Solea SWS HW: module 2, motor 3: out of bounds
SEPIA2_ERR_LIB_TOO_MANY_USB_HANDLES	-9001	LIB: too many USB handles
SEPIA2_ERR_LIB_ILLEGAL_DEVICE_INDEX	-9002	LIB: illegal device index
SEPIA2_ERR_LIB_USB_DEVICE_OPEN_ERROR	-9003	LIB: USB device open error
SEPIA2_ERR_LIB_USB_DEVICE_BUSY_OR_BLOCKED	-9004	LIB: USB device busy or blocked
SEPIA2_ERR_LIB_USB_DEVICE_ALREADY_OPENED	-9005	LIB: USB device already opened
SEPIA2_ERR_LIB_UNKNOWN_USB_HANDLE	-9006	LIB: unknown USB handle
SEPIA2_ERR_LIB_SCM_828_MODULE_NOT_FOUND	-9007	LIB: SCM 828 module not found
SEPIA2_ERR_LIB_ILLEGAL_SLOT_NUMBER	-9008	LIB: illegal slot number
SEPIA2_ERR_LIB_REFERENCED_SLOT_IS_NOT_IN_USE	-9009	LIB: referenced slot is not in use
SEPIA2_ERR_LIB_THIS_IS_NO_SCM_828_MODULE	-9010	LIB: this is no SCM 828 module
SEPIA2_ERR_LIB_THIS_IS_NO_SOM_828_MODULE	-9011	LIB: this is no SOM 828 module
SEPIA2_ERR_LIB_THIS_IS_NO_SLM_828_MODULE	-9012	LIB: this is no SLM 828 module
SEPIA2_ERR_LIB_THIS_IS_NO_SML_828_MODULE	-9013	LIB: this is no SML 828 module
SEPIA2_ERR_LIB_THIS_IS_NO_SWM_828_MODULE	-9014	LIB: this is no SWM 828 module
SEPIA2_ERR_LIB_THIS_IS_NO_SOLEA_SSM_MODULE	-9015	LIB: this is no Solea SSM module
SEPIA2_ERR_LIB_THIS_IS_NO_SOLEA_SWS_MODULE	-9016	LIB: this is no Solea SWS module
SEPIA2_ERR_LIB_THIS_IS_NO_SOLEA_SPM_MODULE	-9017	LIB: this is no Solea SPM module
SEPIA2_ERR_LIB_THIS_IS_NO_LMP_828_MODULE	-9018	LIB: this is no laser test site module
SEPIA2_ERR_LIB_THIS_IS_NO_SOM_828_D_MODULE	-9019	LIB: this is no SOM 828 D module
SEPIA2_ERR_LIB_NO_MAP_FOUND	-9020	LIB: no map found
SEPIA2_ERR_LIB_DEVICE_CHANGED_RE_INITIALISE_USB_DEVICE_LIST	-9025	LIB: device changed, re-initialise USB device list
SEPIA2_ERR_LIB_INAPPROP_USBDEVICE	-9026	LIB: Inappropriate USB device

Symbol	**Nr.**	**Error Text**
SEPIA2_ERR_LIB_WRONG_USBDRIVER_VERSION	-9090	LIB: wrong USB driver version
SEPIA2_ERR_LIB_UNKNOWN_LIBFUNCTION	-9900	LIB: unknown library function
SEPIA2_ERR_LIB_ILLEGAL_PARAMETER	-9910	LIB: illegal parameter on library function call
SEPIA2_ERR_LIB_UNKNOWN_ERROR_CODE	-9999	LIB: unknown error code

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"VisUV/VisIR" Specific Functions...

1 All VUV_VIR functions..

All information given here is reliable to our best knowledge. However, no responsibility is assumed for possible inaccuracies or omissions. Specifications and external appearances are subject to change without notice.

PicoQuant GmbH
Rudower Chaussee 29 (IGZ)
12489 Berlin
Germany

P +49-(0)30-1208820-0
F +49-(0)30-1208820-90
info@picoquant.com
www.picoquant.com