



Enhanced Exlaser ActiveX DLL User Guide

4/2/2014

What's new

More properties, methods and events are added to Exlaser class to control the GAM enhanced laser. The enhanced laser has continuous blower speed control and measurement for better laser performance. And a function is added to turn down the voltage of the thyatron when the laser is idle for a long time to increase the lifetime of the thyatron.

The “*new*” marks are used to identify the name of those new properties, methods and events in this user guide.

Exlaser Class

Copy ExlaserE.dll to “C:\WINDOWS\System32”

Add ExlaserE.dll as reference

Save files “counter”, “Industrial”, “Paramdata” and “Typedata” in running directory

Declare a variable EX10 (or any other name) as Exlaser class in general declarations

Public WithEvents **EX10** As ExLaser

Generate Exlaser instance when the startup form loads and then setup the PCI card.

Set **EX10** = New ExLaser

If EX10.StandardCard() = False Then

Set EX10 = Nothing

End

End If

Terminate Exlaser instance in the Timer after ExlaserStatus (see Methods) subroutine when software receives a signal of termination (e.g. ExlaserExit = True) from a button (e.g. Exit) or startup form unload

If ExlaserExit Then

Set EX10 = Nothing

End

End If



Properties

LaserTypeFlag, GasFlag, PCICard, mode, ThyTime, temp, Pressure, Energy, Hvoltage, RepRate, ExtRepRate, TrigMode, ChMode, LaserStandby, PowerOK, InterlockActive, Popupmessage, ^{new}EH_sys, ^{new}Voffset, ^{new}Vfactor, ^{new}ThyStandby

Name	Type	Description
LaserTypeFlag	Integer	<i>laser type number (1-61)</i>
GasFlag	Integer	<i>gas type number (1-7)</i>
PCICard	Integer	<i>PCI card type number (1711, 1712)</i>
Mode	Integer	<i>Laser running at constant voltage mode: 0 Laser running at constant energy mode: 1</i>
ThyTime	Integer	<i>Thyratron warming time (minimum 240 seconds)</i>
Temp	Single	<i>temperature of laser chamber</i>
Pressure	Single	<i>gas pressure</i>
Energy	Single	<i>energy of laser pulse</i>
Hvoltage	Single	<i>high voltage</i>
RepRate	Integer	<i>repetition rate of internal trigger</i>
ExtRepRate	Integer	<i>repetition rate of external trigger</i>
TrigMode	Integer	<i>Triggering mode: 0(internal), 1(external)</i>
ChMode	Integer	<i>Charging mode: 0 or Unchecked (command charge), 1 or Checked (DC charge)</i>
LaserStandby	Integer	<i>0 or Unchecked: start laser not firing 1 or Checked: start laser firing</i>
PowerOK	Boolean	<i>Power supply status</i>
InterlockActive	Boolean	<i>Interlock status</i>
Popupmessage	Boolean	<i>With popup message (Popupmessage = True) Without popup message (Popupmessage = False)</i>
^{new} EH_sys	Boolean	<i>True(Enhanced system), False(Standard system)</i>
^{new} Voffset	Single	<i>Parameters determine blower control voltage: = Voffset + Vfactor * (Ext)RepRate / 500</i>
^{new} Vfactor	Single	
^{new} ThyStandby	Integer	



Methods

StandardCard, ExlaserStatus, ThySkip, GasPartialRefill, GasAutoRefill, RepRateSet, MaxNumSet, LaserRun, LaserStop, LaserPause, LaserRestart, SetLaserAndGasType, GetGasList, GetLaserList, TempMes, PressMes, VoltageMes, EnergyMes, PopupSet, ExtRepRateMes, Slider_to_EV, EV_to_Slider, ExtStart, SetChargeMode, ^{new}MotorVStart, ^{new}MotorRpmMes, ^{new}ThyStandbySet

Public Function StandardCard() As Boolean

Name	StandardCard
Parameters	
Use	Use it to setup the PCI card
Return Value	True if it succeeds or False if it fails

Public Sub ExlaserStatus(CheckState As Boolean)

Name	ExlaserStatus
Parameters	CheckState As Boolean
Use	Use it in a Timer to monitor laser's status, control warm-up. Set Timer.Enabled = False or CheckState = False in any valve operations
Return Value	

Public Sub ThySkip()

Name	ThySkip
Parameters	
Use	Skip the thyatron warming up
Return Value	

Public Sub GasPartialRefill()

Name	GasPartialRefill
Parameters	
Use	Partial Gas Refill (Pump down to 1600 Torr and then fill to operating pressure with premixed gas) Set PopupMessage = False to disable the popup message.
Return Value	

Public Sub GasAutoRefill()

Name	GasAutoRefill
Parameters	
Use	Automatic Gas Refill (Pump out completely and then fill to operating pressure with premixed gas). Set PopupMessage = False to disable the popup message.
Return Value	

Public Sub RepRateSet()

Name	RepRateSet
Parameters	
Use	Set the Repetition Rate of laser
Return Value	

**Public Sub MaxNumSet()**

Name	MaxNumSet
Parameters	
Use	Set Maximum Number of Pulses or 'c' for continuous
Return Value	

Public Sub LaserRun(mTrigMode As Integer)

Name	LaserRun
Parameters	TriggerMode As Integer
Use	Start Laser (for Internal Trigger mTrigMode = 0; for External Trigger mTrigMode = 1)
Return Value	

Public Sub LaserStop()

Name	LaserStop
Parameters	
Use	Stop Laser
Return Value	

Public Sub LaserPause(Disabled As Boolean)

Name	LaserPause
Parameters	Disabled As Boolean
Use	Pause Laser (If Disabled = True or in external trigger mode, pause the laser by turn off Enable; otherwise pause the laser by turn off internal trigger.)
Return Value	

Public Sub LaserRestart(Disabled As Boolean)

Name	LaserRestart
Parameters	Disabled As Boolean
Use	Restart Paused Laser (If Disabled = True or in external trigger mode, restart the laser by turn on Enable; otherwise restart the laser by turn on internal trigger.)
Return Value	

Public Sub GetGasList(ByRef GasList As Object)

Name	GetGasList
Parameters	ByRef GasList As Object
Use	Pass a ListBox as object to get the gas type list in that ListBox
Return Value	

Public Sub GetLaserList(ByRef LaserList As Object)

Name	GetLaserList
Parameters	ByRef LaserList As Object
Use	Pass a ListBox as object to get the laser type list in that ListBox
Return Value	


Public Sub SetLaserAndGasType(ByRef GasList As Object, ByRef LaserList As Object)

Name	SetLaserAndGasType
Parameters	ByRef GasList As Object, ByRef LaserList As Object
Use	Select gas type and lasertype from ListBox of gas type and ListBox of laser type Pass ListBox of gas type and ListBox of laser type to set the gas type and laser type ListBox of gas type is previously initialized by GetGasList subroutine ListBox of laser type is previously initialized by GetLaserList subroutine
Return Value	

Public Function TempMes() As Single

Name	TempMes
Parameters	
Use	Measure the temperature
Return Value	Temperature in Single Type

Public Function PressMes () As Single

Name	PressMes
Parameters	
Use	Measure the Pressure
Return Value	Pressure in Single Type

Public Function VoltageMes() As Single

Name	VoltageMes
Parameters	
Use	Measure the High Voltage in %
Return Value	High Voltage % in Single Type

Public Function EnergyMes() As Single

Name	EnergyMes
Parameters	
Use	Measure the Average Energy of Laser Pulses
Return Value	Energy in Single Type

Public Sub PopupSet(PopupSetting as Boolean)

Name	PopupSet
Parameters	PopupSetting as Boolean
Use	Set Value of Popupmessage = PopupSetting If PopupSetting = False, no popup message
Return Value	

Public Function ExtRepRateMes(interval As Single) As Single *for 1712 card*

Name	ExtRepRateMes
Parameters	interval As Single
Use	Measure Repetition Rate of external trigger,
Return Value	



Public Function Slider_to_EV(SetValue As Single) As String

Name	Slider_to_EV
Parameters	SetValue As Single
Use	Get the operating energy or high voltage from a slider control, SetValue=Slider.Value/Slider.Max
Return Value	The formatted string of operating energy or high voltage

Public Function EV_to_Slider() As Single

Name	EV_to_Slider
Parameters	
Use	Get slider value from operating energy or high voltage
Return Value	= Slider.Value/Slider.Max

Public Function ExtStart() As Boolean

Name	ExtStart
Parameters	
Use	Check whether the “External Start Switch” is ON or OFF
Return Value	= True if “External Start Switch” is ON (“External Start Voltage” > 4V) = False if “External Start Switch” is OFF (“External Start Voltage” < 1V)

Need special cable to measure the “External Start Voltage”

Public Sub SetChargeMode(mChmode as Integer)

Name	SetChargeMode
Parameters	mChMode as Integer
Use	Set laser charge mode: mChMode = 0 or Unchecked for command charge; mChMode = 1 or Checked for DC charge
Return Value	

^{new} Public Sub MotorVStart(mReprate As Long)

Name	MotorVStart
Parameters	mReprate As Long
Use	Set the rotating speed of the blower motor for a pulse repetition rate
Return Value	

^{new} Public Function MotorRpmMes() As Double

Name	MotorRpmMes
Parameters	
Use	Measure the rotating speed of the blower motor
Return Value	= motor speed in RPM

^{new} Public Function ThyStandbySet(StandbyState As Integer) As Boolean

Name	ThyStandbySet
Parameters	StandbyState As Integer
Use	Switch the laser thyatron to active mode or sleep mode
Return Value	= 0 (Switch the laser to active mode with normal thyatron voltage) = 1 (Switch the laser to sleep mode with lower thyatron voltage)



Events

Warmingup, LaserRunning, LaserMessenger, Measurements, ValveStatus, ExtRepRateRead, ^{new}MotorRpmRead

'Events definitions in Exlaser.dll, ByVal parameters are passed from ActiveX DLL, ByRef parameters are passed to ActiveX DLL

Public Event Warmingup(ByVal WarmingTime As Single, ByRef Cancel As Boolean)

Public Event LaserRunning(ByVal mPulseNum As Long, ByVal mEnergy As Single)

Public Event LaserMessenger(ByVal mLaserMessage As String)

Public Event Measurements(ByVal mtemp As Single, ByVal mPressure As Single, ByVal mHVoltage As Single, ByVal mFillVolts As Single, ByVal mVoltTest As Single)

Public Event ValveStatus(ByVal mValveState As Integer, ByVal mValveString As String)

Public Event ExtRepRateRead(ByVal mExtRepRate As Long, ByVal Msg As String)

Public Event ExtStartState(ByVal mExtStartFlag As Boolean)

Public Event MotorSelect(ByVal mMotorMode As Integer, ByVal mID As Integer)

^{new} Public Event MotorRpmRead(ByVal mMotorRPM As Double, ByVal mMotorV As Single, ByVal mMotorV24 As Single)

'Handle events raised in Exlaser.dll class in the following subroutines

Private Sub EX10_Warmingup(ByVal WarmingTime As Single, Cancel As Boolean)

Name	EX10_Warmingup
Parameters	ByVal WarmingTime As Single, Cancel As Boolean
Use	Handle the Warmingup event raised in ExlaserStatus when thyatron warms up. Set Cancel = True to skip the warming up.
Return Value	

Private Sub EX10_LaserMessenger(ByVal mLaserMessage As String)

Name	EX10_LaserMessenger
Parameters	ByVal mLaserMessage As String
Use	Handle the LaserMessenger event raised in LaserRun
Return Value	

Private Sub EX10_Measurements(ByVal temp As Single, ByVal Pressure As Single, ByVal HVoltage As Single, ByVal FillVolts As Single, ByVal VoltTest As Single)

Name	EX10_Measurements
Parameters	ByVal temp As Single, ByVal Pressure As Single, ByVal HVoltage As Single, ByVal FillVolts As Single, ByVal VoltTest As Single
Use	Handle Measurements event raised in ExlaserStatus and LaserRun
Return Value	



Private Sub [EX10_LaserRunning](#)(ByVal mPulseNum As Long, ByVal mEnergy As Single)

Name	EX10_LaserRunning
Parameters	ByVal mPulseNum As Long, ByVal mEnergy As Single
Use	Handle the LaserRunning event raised in LaserRun
Return Value	

Private Sub [EX10_ValveStatus](#)(ByVal mValveState As Integer, ByVal mValveString As String)

Name	EX10_ValveStatus
Parameters	ValveStatus(ByVal mValveState As Integer, ByVal mValveString As String)
Use	Handle the ValveStatus event raised when one or more valves are open
Return Value	

Private Sub [EX10_ExtRepRateRead](#)(ByVal mExtRepRate As Long, ByVal Msg As String)

Name	EX10_ExtRepRateRead
Parameters	ByVal ExtRepRate As Long, ByVal Msg As String
Use	Handle the ExtRepRateRead event raised when a measurement of external trigger is made
Return Value	

Private Sub [EX10_ExtStartState](#)(ByVal mExtStartFlag As Boolean)

Name	EX10_ExtStartState
Parameters	ByVal mExtStartFlag As Boolean
Use	Handle the ExtStartState event raised when a measurement of external start voltage is made when laser is running
Return Value	

Private Sub [EX10_MotorSelect](#)(ByVal mMotorMode As Integer, ByVal mID As Integer)

Name	EX10_MotorSelect
Parameters	ByVal mMotorMode As Integer, ByVal mID As Integer
Use	Handle the MotorSelect event raised when blower motor is setting or changing mMotorMode - current motor setting: 0(off), 1(slow), 2(medium), 3(fast) mID – current motor event: 0(failure), 1(call Motor), 2(call DCmotorOn), 3(laser start), 4(motor change running external trigger), 5(motor change running internal trigger), 6(periodic motor report when laser running)
Return Value	

^{new} Private Sub [EX10_MotorRpmRead](#)(ByVal mMotorRPM As Double, ByVal mMotorV As Single, ByVal mMotorV24 As Single)

Name	EX10_MotorRpmRead
Parameters	ByVal mMotorRPM As Double, ByVal mMotorV As Single, ByVal mMotorV24 As Single
Use	Handle the MotorRpmRead event raised when blower motor speed is measured mMotorRPM - current motor speed in rpm mMotorV – current motor control voltage mMotorV24 – current motor voltage
Return Value	