



COBRA CURE™ FX2

Operations Manual 2.1

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PROPHOTONIX

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Photobiological Safety

Important Safety Message for COBRA Cure™ FX2 users:

Your COBRA Cure™ FX2 Lamp is a LED-based radiation source, intended to be used as an OEM component. It must only be used inside a system such as, for example, a printing machine, and must never be used as a stand-alone product outside of the intended OEM system without proper safety precautions.

ProPhotonix light sources include protective guards to fully enclose electrical mechanisms that may cause operator harm during normal use. These fixed guards adhere to the appropriate international safety standards.

Caution: Do not operate the light sources or the machine in which they are installed while any safety guards are open, loose, damaged, or missing.

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

ProPhotonix light sources are classified as Risk Group 3 under IEC 62471 at a distance of 200mm.

Risk groups defined in IEC 62471:

Exempt means there is no photo-biological hazard for the end points in this standard.

Risk Group 1 – Low Risk. Does not pose a hazard due to normal behavioral limitations on exposure.

Risk Group 2 – Moderate Risk. Does not pose a hazard due to aversion response to very bright light sources or due to thermal discomfort.

Risk Group 3 – High Risk. May pose a hazard even for momentary or brief exposure.

Warning: DO NOT LOOK DIRECTLY AT THE UV LIGHT SOURCE. ALWAYS WEAR GOGGLES WHEN USING THIS PRODUCT.

Minimum requirement: UVEX SCT-orange lens which reduces eye fatigue by absorbing blue and green light and allows the operator to clearly view components during curing and inspection processes while absorbing 99.9% of UV radiation and visible light up to 532nm.

Note: ProPhotonix UV LED products emit 90% or more of the total UV light energy in a narrow wavelength band.

Wavelength	Band
365nm	350-390nm
385nm	370-410nm
395nm	380-420nm
405nm	390-430nm

Caution: A portion of the UV light will be visible and will be a strong visual stimulus.

For the FX2 395 nm divergent product, the hazard distance is 1.0 meter and the power output is 172% of the Risk Group 2 limit. Specifically the UV-A hazard is Risk Group 3, the Actinic UV hazard is Risk Group 2, and the Blue Light hazard is Risk Group 1.

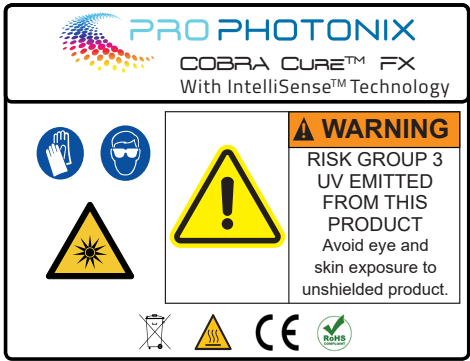
Warning Labels

Below are the contents of warning labels that must be affixed to COBRA Cure™ FX2 Lamp devices.

UV Safety Standards
IEC Class

ANSI Risk Group 3
3B

Warning: UV radiation emitted from this lamp. Skin or eye damage could result. Avoid exposure of eyes and skin to unshielded lamp.



Symbol	Description
	Obey all safety messages that follow this symbol to avoid possible injury or death
	Warning indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury
	Wear protective gloves and use appropriate shielding
	Wear approved ultraviolet resistant eyewear and use appropriate shielding
	ULTRAVIOLET LIGHT hazard
	Hot surface hazard
	Must not be disposed of in the trash

General Characteristics

UV LED Module input Voltage	48±2	V
UV LED Module Maximum input Current	10	A
Thermal Safety Switch	Thermal safety sensor is mounted on the substrate. The LED junction is never exposed to over temperature	

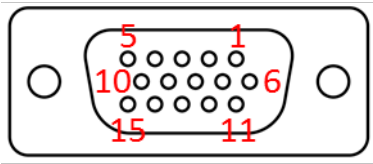
Connector Pin Functions

Pin	Function	Type	Detailed Function Description
1	Do Not Use		Do Not Use
2	Input power	Input 0.5V to +10.0V Zin=100k Ω	Sets LED Lamp intensity where 1.0V = 10% and 10V = 100% . A minimum voltage of 1.0V is required. If the user inputs a voltage below 0.5V, the intensity defaults to 5%. Connect directly to Pin 6 for constant 100% intensity. Do not use pin 6 for any other purpose. Input is ignored when LED Lamp is under RS485 control.
3	Enable High	Input 0.0V or +24.0V Zin=125k Ω	PLC Compatible Logic Input: 0.0V to +6V = OFF (Open input will default to OFF) +16V to +24V = ON Input is ignored when LED Lamp is under RS485 control.
4	Do not use		Do not use
5	Lamp Ready	Output 0V or +24V Zout=1.3k Ω	PLC Compatible Logic: 0.0V to +6V (ground) = Not Ready +16V to +24V (open) = Lamp Ready Sink Current Maximum = 6mA. Connect only to high impedance input.
6	Do not use		Do not use
7	Interlock	Input 0.0V or +24V Zin=20k Ω	For use with external customer defined interlock circuit, if no interlock is present, connect Pin 7 to Ground. If interlock circuit is present, connect interlock to Pin 7 only. PLC Compatible Logic Input: 0.0V to +6V = UV Emission Allowed +16V to +24V = UV Emission Stopped (Open input will default to UV Emission Stopped) Connect to Pin 7 to Ground if no interlock is used.
8 9 10 14		Ground	Ground
11	Do Not Use		Do Not Use
12	RS485	Serial -	Access to LED Lamp configuration and log via RS485.
13	RS485	Serial +	Access to LED Lamp configuration and log via RS485.
15	Temperature Monitor	Output 0V to +10.5V	The maximum temperature between the PCB and LED substrate is measured and the output is a voltage proportional to the maximum temperature.

The data & DC power connector on LED Lamp is an FCI PN (type 98417-G61-14LF). The pin out information is shown in Figure 2 (a) and table above.

RS485 Protocol

RS485 is a robust communication protocol solution for transmitting data over long distances and noisy environments. It allows multiple lamps to communicate at distances up to 1200 meters (4000 feet). Both the length of the network and the number of nodes can easily be extended. Lamps are addressable, allowing each node to be communicated to independently. The female HD-DB15 connector is used to control the LED Lamp via PLC or laptop. The RS485 protocols implemented in the COBRA Cure™ FX2 are shown in below.



RS485 Protocol	
BAUD Rate	57600
Data Bits	8
Parity	N
Stop Bits	1
Flow Control	None

RS485 Protocol	
RS485 Serial -	Pin 12
RS485 Serial +	Pin 13

If your system is using multiple LED lamps, the serial communication lines (Pins 12 and 13) can be tied together in a daisy-chain formation. Up to 64 LED lamps can be daisy-chained together without loss of signal integrity. No termination resistors are required for low noise environments.

Choosing the Correct ProPhotonix Power Supply

All wiring and connections must be implemented before plugging the power supply into the wall. Power supply choice depends on the number of modules required to run simultaneously. Please contact ProPhotonix to discuss options and obtain a power supply datasheet.

DIN Rail Mounting of Power Supplies

ProPhotonix offers power supplies that can be mounted on DIN rails, for example TS35/7.5 or 15.

Connecting the Wall Plug Leads to the Power Supplies

The flying leads of the power supply cable must be connected to the 3-pole screw terminal block on the power supply. Use a Philips or Pozi head screwdriver. The correct connections are shown in the tables below.

Function	Label on PSU
Live	L
Neutral	N
GND	

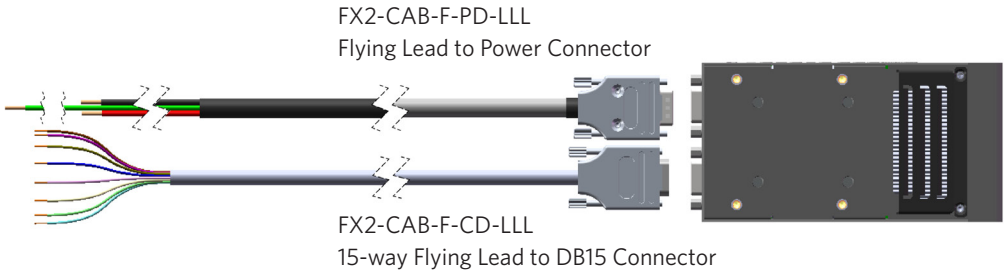
Mains or Wall Plug Connection

Power Supply connection
GND (-V)
48 V DC supply (+V)

Power Supply Output Connection

COBRA Cure™ FX2 lamps can be used in three basic configurations. All configurations allow the user to control the intensity of the modules.

FX2 Connected to Flying Lead Cables

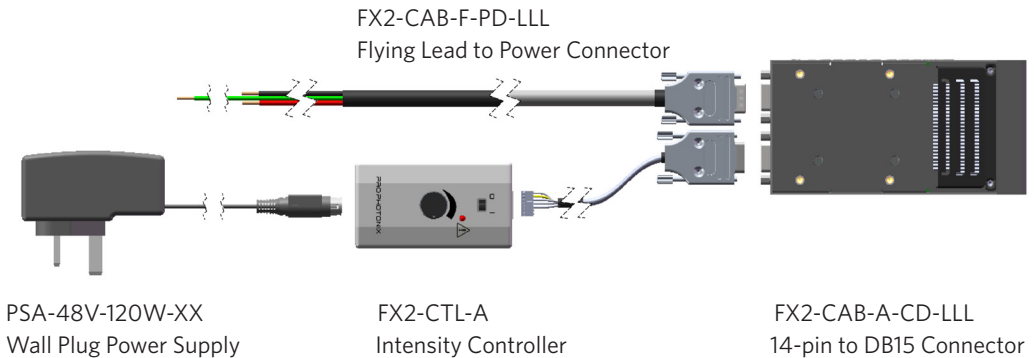


This connection scheme allows the user to configure their own power and control scheme. These cables allow the FX2 module interface to be connected to external power supplies and controllers via flying leads.

The intensity is adjusted by varying the voltage using a 1-10V control signal on the control wire. Activation/Enable is achieved by applying a 16-24V signal on the enable wire. This connection configuration also allows the user to monitor the operating status through the status wire.

Note: 2000mm are the normal stocked lengths for these cables.

FX2 Connected to Flying Lead Power Cables and Intensity Controller with PSU

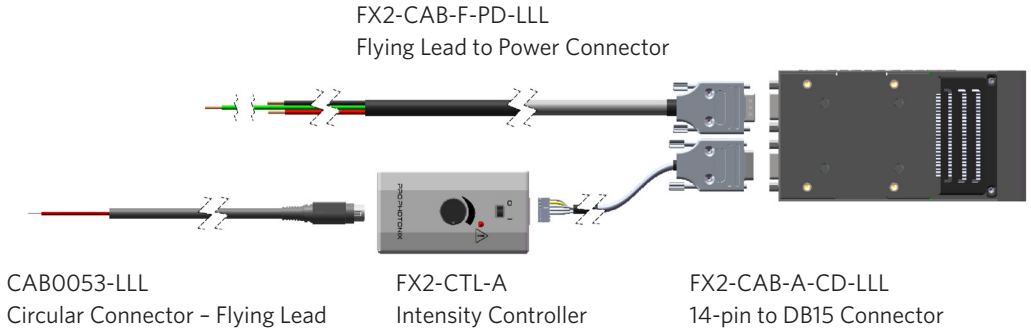


This Connection scheme allows the user to configure their own power scheme while utilizing ProPhotonix' Intensity Controller to control the intensity of the lamp. The Intensity Controller has 2 manual inputs. The slider switch is used to activate/enable the unit and there is a rotary potentiometer to adjust the intensity. The controller also incorporates a LED light that illuminates a fault when detected.

The controller is powered by a wall plug power supply (ProPhotonix Part Number: PSA-48V- 220W-XX, where XX is the country of use).

Note: 2000mm are the normal stocked lengths for Flying Lead to Power Connector cables. The Wall Plug Power Supply and 14-pin to DB15 Connector cables are normally stocked in 500mm lengths.

FX2 Connected to Flying Lead Power Cables and Intensity Controller without PSU



This Connection scheme allows the user to configure their own power scheme while utilizing ProPhotonix' Intensity Controller to control the intensity of the lamp. The Intensity Controller has 2 manual inputs. The slider switch is used to activate/enable the unit and there is a rotary potentiometer to adjust the intensity. The controller also incorporates a LED light that illuminates a fault when detected. The controller is connected to a flying lead cable (ProPhotonix Part Number: CAB0053-LLL, where LLL is the length of the cable).

Note: 2000mm are the normal stocked lengths for Flying Lead to Power Connector cables. The Circular Connector - Flying Lead and 14-pin to DB15 Connector cables are normally stocked in 500mm lengths.

Addressability

There are 4 levels of control in a COBRA Cure™ FX2 LED Lamp based system.

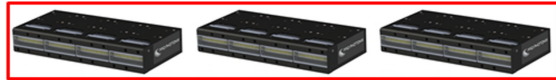
First, multiple LED Lamps can be controlled simultaneously via Global commands (See figure below). These commands allow the user to carry out basic functions such as poll and enable functions.

Second, the next level allows the user to control a single LED Lamp which may have a number of FX2 modules. In this case the suffix 'mn' is used in the command syntax, for example, turn on LED Lamp function.

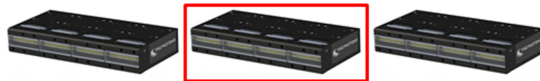
Third, the module level adds a higher-level address indicating a specific module in the LED Lamp.

Finally, the individual segments within the module are addressed.

Global System
Addressability



Lamp
Addressability



Module
Addressability



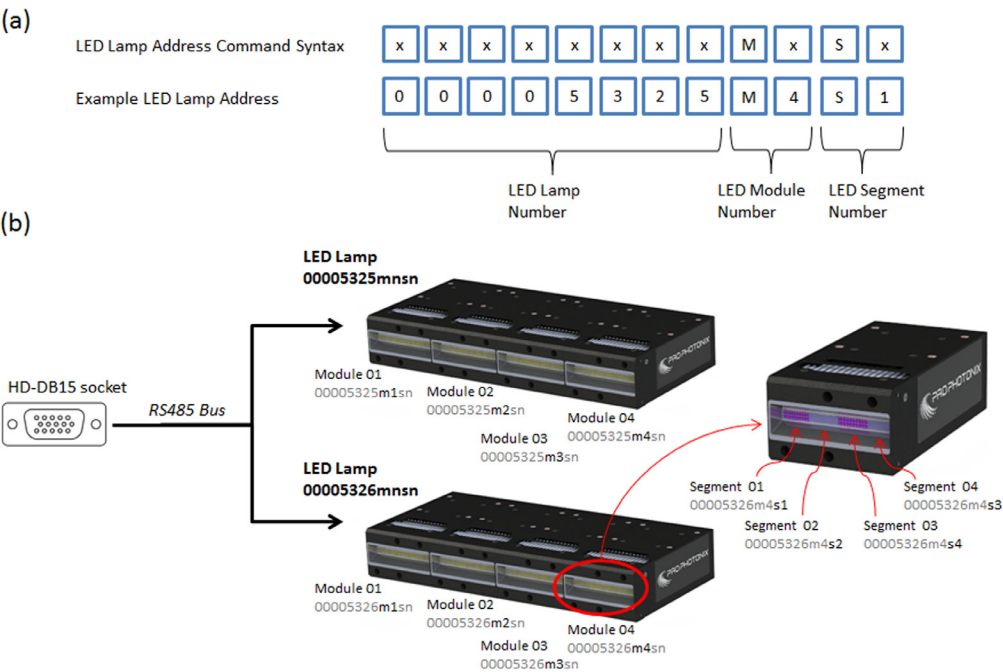
LED Segment
Addressability



Command Syntax

Control Level	Control Level Description	Example	Example Description
Global	Multiple lamps	genable	Enables all the lamps
Lamp	Single lamp	xxxxxxmn 00555325mn	Calls lamp "00555325"
Module	Individual module in a single lamp	xxxxxxmx 00555325m4	Calls Module 4 of lamp "00555325"
Segment	Individual segment in an individual module	xxxxxxmxny 00555325m4s1	Calls LED segment 1 of Module 4 in lamp "00555325"

RS485 Bus, Lamps, Modules and LED Segments



Version Number

Function	Function Description	Command Syntax	Example Syntax	Example Response
Read Module Firmware Version Number	Query the software version number of a single module.	r xxxxxxxmx version	r 302023m1 version	Response: "1.2" → The module uses the software version 1.2

System Status (On/Off)

Function	Function Description	Command Syntax	Example Syntax	Example Response
Poll LED Lamp	Serial number which will be repeated 25 times or until given another command. Last entry will display operating mode which should always be "Customer Mode". NOTE: It should only be used when a single module is on the RS485 bus.	poll	poll	poll 860001m1 860001m1 ... 860001m1 860001m1 Customer Mode..... ==>ON<==
System Status Control	Turn on the module. The interlock must be closed (OV on Pin 7) in order for the LED Lamp to be enabled. NOTE: Light won't be emitted if the interlock is open or if the light is disabled. However, if you use this command to enable the light, and the interlock is open, light will not be emitted but "ok" is returned and a subsequent "r xxxxxxxmn ledenabled" command will report "On". NOTE: This command causes RS485 to take control.	genable	genable	Nothing is returned
System Status Control	Turn off ALL LED Lamps in communication chain. NOTE: This command causes RS485 to take control.	gdisable	gdisable	Nothing is returned
Reset Module	Reboots the module.	w xxxxxxxmx reset	w 302023m1 reset	Response: "Ok" → The module has been reset

Function	Function Description	Command Syntax	Example Syntax	Example Response
Poll LED Lamp	Serial number which will be repeated 25 times or until given another command. Last entry will display operating mode which should always be “Customer Mode”. NOTE: It should only be used when a single module is on the RS485 bus.	poll	poll	poll 860001m1 860001m1 ... 860001m1 860001m1 Customer Mode..... ==>ON<==
System Status Control	Turn on the module. The interlock must be closed (0V on Pin 7) in order for the LED Lamp to be enabled. NOTE: Light won't be emitted if the interlock is open or if the light is disabled. However, if you use this command to enable the light, and the interlock is open, light will not be emitted but “ok” is returned and a subsequent “r xxxxxmn ledenabled” command will report “On”. NOTE: This command causes RS485 to take control.	genable	genable	Nothing is returned
System Status Control	Turn off ALL LED Lamps in communication chain. NOTE: This command causes RS485 to take control.	genable	genable	Nothing is returned
Reset Module	Reboots the module.	w xxxxxmx reset	w 302023m1 reset	Response: “Ok” → The module has been reset
Display Status	The command outputs status summary for a module. The command response displays: - Product and serial number - Firmware version - Number of events recorded in the log - Status of the individual LED segments in the selected module. - Is interlock is enabled? - Is the module enabled or disabled? - How the LED Lamp is controlled – RS485 or analogue? - What is the intensity set to? - What is the current Heat Sink temperature (°C)? (highest value from 2 sensors located on the LED substrate and PCB board respectively) - What is the DC power voltage?	r xxxxxmx ds Where xxxxxx = product se- rial number And Where mx = module number	r 302023m1 ds	Response: Product: COBRA FX2, s/n 302023m1 Firmware Ver.: 0.0.5 Log Entries: 23 LED Segment En- ables.: 1=ON 2=ON 3=ON 4=ON SW-Interlock: Enabled SW-Enable High: Disabled Global Control:RS485 Intensity: 200 Temperature: 40 Input volt: 48

Function	Function Description	Command Syntax	Example Syntax	Example Response
Read Lamp Ready Signal	Returns the state of the Lamp Ready signal (Yes = Ready, No = Not Ready).	r xxxxxxmx ready	r 302023m1 ready	Response: "Yes" → No fault has been detected in the lamp Response: "No" → If the software detects a fault in the lamp "No" is returned
Check if UV is Enabled	Returns the enable/disable state of the LED Lamp module. (On = UV enabled, Off = UV disabled).	r xxxxxxmx ledenabled	r 302023m1 ledenabled	Response: "On" → The module is enabled Response: "Off" → The module is disabled
Read Intensity Control Setting	Returns the intensity setting of the module if all LED segments are set. The displayed value will have a range of 0-255 of the maximum output intensity.	r xxxxxxmx intensity r xxxxxxmsy intensity	r 302023m1 intensity	Response: "50" → 50/255 of the maximum output intensity Response: "N/A" → Different intensities in the LED Segments
Read Control Status	Returns communication status (analogue or RS485 control).	r xxxxxxmx analogue	r 302023m1 analogue	Response: "RS485" → The module is RS485 controlled Response: "Analogue" → The module is Analogue controlled
Return Control to Analogue	Analogue input controls are non-functional (Pins 2 and 3) while talking to module via RS485. Use this command to allow control via the analogue interface. Note: There is auto switch over to RS485 but not to analogue. In order to switch back to analogue you need this command.	w xxxxxxmx analogue	w 302023m1 analogue	Response: "ok" → The modules control has been switched to analogue

Function	Function Description	Command Syntax	Example Syntax	Example Response
Turn On LED Lamp (Enable)	Turn on module. The interlock must be closed (OV on Pin 7). NOTE: Light won't be emitted if the interlock is open or if LED Lamp is disabled. However, if you use this command to enable the light, and the interlock is open, light will not be emitted but "ok" is returned and a subsequent "r xxxxxmn ledenabled" command will report "On". NOTE: "mn" can be used with the command to address ALL modules within the LED Lamp. NOTE: RS485 takes control.	w xxxxxmx enable w xxxxxmn enable	w 302023m1 enable	Response: "ok" → The module is enabled
Turn Off LED Lamp (Disable)	Turn Off Module. NOTE: "mn" can be used with the command to address ALL modules within the LED Lamp. NOTE: RS485 takes control.	w xxxxxmx disable w xxxxxmn disable	w 302023m1 disable	Response: "ok" → The module is disabled
Write Intensity	Use to set percent intensity. NOTE: "mn" can be used with the command to address ALL modules within the LED Lamp. NOTE: RS485 takes control. NOTE: The user can enter any write intensity command regardless of the existing override mode and the override mode will change to accommodate it. For example, if Output Override Mode is reported, a subsequent "w xxxxxmn intensity <val>" command will alter the intensity across all LED segments as required and change the override mode back to "None".	w xxxxxmx intensity <val> w xxxxxmn intensity <val> w xxxxxmx- sy intensity <val> val = 26 (10%) to 255 (100%)	w 302023m1 intensity 51	Response: "ok" → The module intensity has been set to 51

Function	Function Description	Command Syntax	Example Syntax	Example Response
Read Counters	Returns a triple value representing: ▪ Number of minutes the light has been activated. ▪ Estimated remaining lifespan of the lights in watt-hours (Wh). ▪ Number of On/Off cycles. On/Off cycles are defined as the number of times light has been emitted by the unit. This number is incremented anytime the unit changes from a state where no light at all is being emitted to one where at least some light is being emitted.	r xxxxxxmx counters	r 302023m1 counters	Response "134,7999984,12" → The module has been active for 134 minutes, the expected remaining lifespan of the light is 7999984 Watt-hours (Wh) and the light has been switched on and off 12 times
Read Fan Speed	Returns the speed of a fan in revolutions per minute. The fan is specified by the <val> argument and should be either 1 or 2.	r xxxxxxmx fan <val>	r 302023m1 fan 1	Response: "3750"
Read Action Below Low Intensity Threshold	Reports how light will behave when intensity is less than a minimum threshold. Possible responses are sustain , linear or off . ▪ Sustain: When the specified intensity is less than the minimum threshold then the actual intensity will be set to the minimum threshold. ▪ Linear: Intensity below the threshold will be calculated in the same way that intensities are calculated above the threshold. ▪ Off: Light will be switched off when the intensity is below the minimum threshold.	r xxxxxxmx minact	r 302023m1 minact	Response "sustain" Response "linear" Response "off"

Function	Function Description	Command Syntax	Example Syntax	Example Response
Set Action Below Intensity Threshold	Configures behavior of light when intensity is below the minimum threshold. The <arg> argument can be one of the following: ▪ sustain ▪ linear ▪ off The meaning of these values is described above for the "Read action below low intensity threshold" command.	w xxxxxxmx minact <arg>	w 302023m1 minact sustain	Response: If the command succeeds "ok" is returned.
Read Low Intensity Threshold	Reports the extant value for the minimum intensity threshold. The displayed value will have a range of 0-255.	r xxxxxxmx minint	r 302023m1 minint	Response "13"
Write Low Intensity Threshold	Sets the value for the minimum intensity threshold. The <val> argument has a range of 0-255.	w xxxxxxmx minint <val>	w 302023m1 minint 23	Response: "ok "
Read Power	Reports the current power in mV to either the 12V or the 48V pin. The provided argument is either 12 or 48.	r xxxxxxmx pwr <arg>	r 302023m1 pwr 12	Response "12955"
Report Interlock State	Reports the interlock state. ▪ If "Interlock On" is returned the interlock is closed. ▪ If "Interlock Off" is returned the interlock is opened and no light will be emitted.	r xxxxxxmx lock	r 302023m1 lock Interlock On	Response: "Interlock On" → Interlock is closed Response: "Interlock Off" → Interlock is open
Read Photodiode	Reports either the direct photodiode or the window photodiode response respectively.	r xxxxxxmx photo <1 2>	r 302023m1 photo 1	Response: "184"

Log Commands

Function	Function Description	Command Syntax	Example Syntax	Example Response
Download Log	Displays all log entries, in order, from last to first. The time value is the cumulative number of minutes the light source has been powered on. NOTE: The maximum number of log entries is 1020. When the maximum is reached, the next log entry will restart at 1. If there are no entries, the Download Log command will return a "Log is empty" statement. For additional information related to the log entry codes, please see Event Recording Table see page 19	r xxxxxxmx dl	r 302023m1 dl	Response → "134,7999984,12" The module has been active for 134 minutes, the expected remaining lifespan of the light is 7999984 Watt-hours (Wh) and the light has been switched on and off 12 times
Read Log Size	Returns number of log entries. If the log < 1020, returns nnnn/nnnn. If the log > 1020, returns nnnn/1020.	r xxxxxxmx logsiz r xxxxxxmx logsiz	r 302023m1 logsiz r 302023m1 logsiz	Response: "211/211" Response: "61/1020"
Read Log Entry	Read an individual log entry where val is the log entry value to be reported. <val> argument is log entry value. NOTE: If a value of 0 is entered, the most recent log entry and number is displayed. NOTE: If no value or an invalid value is entered, the light source will respond with 'Error' followed by the most recent log entry.	r xxxxxxmx log <val>	r 302023m1 log r 302023m1 log 222	Response: "Log:0211 Time:0000004619 Msg:128 156 EVT-Power_On (POR)" Response: "Error Log:0211 Time:0000004619 Msg:128 156 EVT-Power_On (POR)"

Fault Status

Function	Function Description	Command Syntax	Example Syntax	Example Response
Write Fault Status	The <val> argument: - Val=0 Clears fault status. NOTE: Will not clear if fault still exists. - Val=1, 2 or 3. Asserts an module fault status. The status <val> is captured in the log.	w xxxxxxmx ledfault <val>	w 302023m1 ledfault 0 ok	Response: "ok"
Read last Status	Returns last fault status: 0 - No fault 2 - FLT-PCB_Temp 3 - FLT-Substrate_Temp 4 - FLT-False_I 5 - FLT-InputV_Hi 6 - FLT-InputV_Lo 7 - FLT-Cmd_Asserted 8 - FLT-VLED 9 - FLT-Incorrect_I 11 - FLT-Flexi 13 - FLT-Power V 128 - EVT-Power_On (POR) 132 - EVT-Substrate_Temp_Recovery 133 - EVT-Cmd_Clr_Faults Each of the fault codes is followed by a status code that provides additional information: 0,0 - no status info applicable 2,0 - no status info applicable 3,0 - no status info applicable 4,n - the segment number at fault 5,n - n=1 is 12V pin and n=2 is 48V pin 6,n - n=1 is 12V pin and n=2 is 48V pin 7,n - n is 1, 2 or 3 and matches the status <val> sent in the Write Fault Status command. 8,n - n is the segment number at fault 9,n - n is the segment number at fault 11,0- Flexi Cable disconnected 13,0- 12V pin is not high. 128, 156 - Every time the module is switched on 132,0 - LED Lamp Recovered 133,0 - Fault Status has been cleared by the Write Fault Status Command. The example at right shows a blown fuse on Segment 2. See Event Recording Table for additional event code information that is captured in the log file.	r xxxxxxmx ledfault	r 302023m1 ledfault	Response: "1,2"

Substrate Temperature

Function	Function Description	Command Syntax	Example Syntax	Example Response
Module Temperature Value Query	Query the temperature of a specific module taking the value from 2 sensors located on the LED substrate and PCB board respectively. 3 possible values can be reported: - Temp=0: reports the larger value from 2 sensors located on the LED substrate and PCB board respectively. - Temp=1: reports the LED substrate temperature. - Temp=2: reports the PCB board temperature.	r xxxxxxmx temp <0 1 2>	r 3020234m1 temp 0	Response: "77.00" → The larger temperature between LED substrate and PCB board is 77°C Response: "Error" → The substrate temperature could not be read

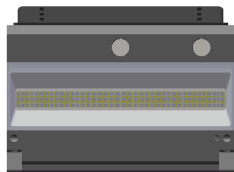
Event Recording

Event Code (Msg)	Event Code Log Text	Notes	Action
2	FLT-PCB_Temp ttt	Thermal fault triggered by PCB board thermal switch, ttt=thermal switch temperature with units of °C*10. NOTE: For temperatures of 100.0°C and above, ttt will show only the last three digits. Examples: ttt = 894 = 89.4°C. ttt = 105 = 110.5°C.	Unit will recover after it has cooled down. Check clearance for air inlet and exhaust and ambient air <50°C.
3	FLT-Substrate_Temp ttt	Thermal fault triggered by LED substrate thermal sensor, ttt=thermal sensor temperature with units of °C*10. NOTE: For temperatures of 100.0°C and above, ttt will show only the last three digits. Examples: ttt = 894 = 89.4°C. ttt = 105 = 110.5°C.	Unit will recover after it has cooled down. Check clearance for air inlet and exhaust and ambient air < 50°C.
4	FLT-False_I ttt	Current detected when unit is disabled, ttt=current at time of fault with units of 100mA. Example: ttt = 065 = 6.5A.	Contact ProPhotonix.
5	FLT-InputV_Hi vvv	DC input voltage over maximum limit vvv=input voltage in V*10. Example: vvv = 535 = 53.5Vdc.	Check input voltage and adjust it so that it is within spec.

Event Recording

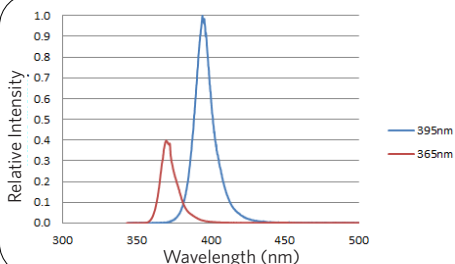
Event Code (Msg)	Event Code Log Text	Notes	Action
6	FLT-InputV_Lo vvv	DC input voltage under minimum limit vvv=input voltage in V*10. Example: vvv = 408 = 40.8Vdc. NOTE: This fault may occur when the DC power supply is turned on, due to the time it takes to reach full voltage output. A clear fault status command will clear the buffer.	Check input voltage and adjust it so that it is within spec.
7	FLT-Cmd_Asserted	Fault forced through RS485 for testing purposes when fault <1, 2 or 3> command is sent through RS485.	No action required.
8	FLT-VLED vvv	A short or open circuit has been detected across a LED segment. vvv=voltage across LED segment in V*10.	Contact ProPhotonix.
9	FLT-Incorrect_I	Feedback current is not within the expected range.	Contact ProPhotonix.
11	FLT-Flexi	Flexi cable connecting head to PCB is disconnected.	Contact ProPhotonix.
13	FLT-Power V	12V pin is not high.	Contact ProPhotonix.
128	EVT-Power_On (POR)	DC Power turned on.	No action required.
132	EVT-Substrate_temp_Recovery	LED Lamp recovered from thermal fault when temperature dropped below recovery threshold.	Check clearance for air inlet and exhaust and ambient air < 50°C.
133	EVT-Cmd_Clr_Faults	Faults cleared through RS485.	No action required.

Divergent

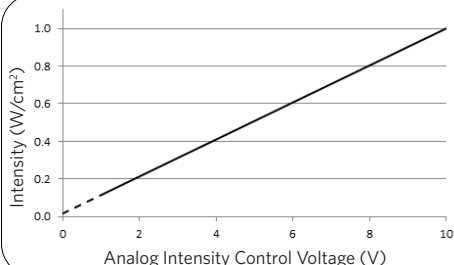


COBRA Cure™ FX2

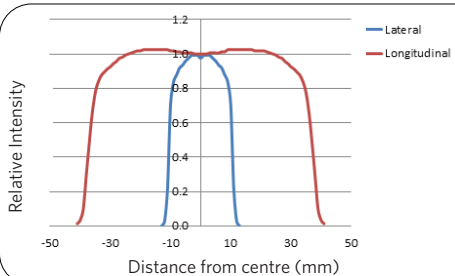
Relative Intensity versus Wavelength



Intensity response to Analog Intensity Control

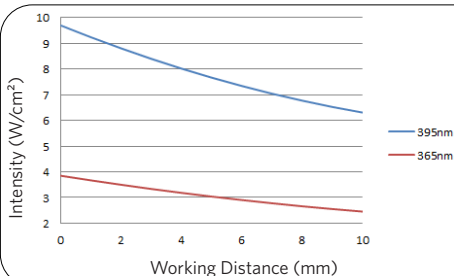


Lateral & longitudinal intensity profiles for the FX2



Measured at 0mm. Linewidth (FWHM) approx. - 20mm.

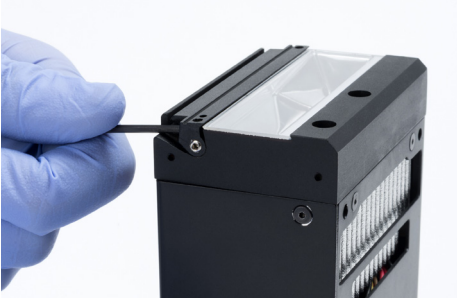
Intensity versus Working Distance



Measured at 2mm.

Linewidth (FWHM) approx. - 20mm.

Field Replaceable Window

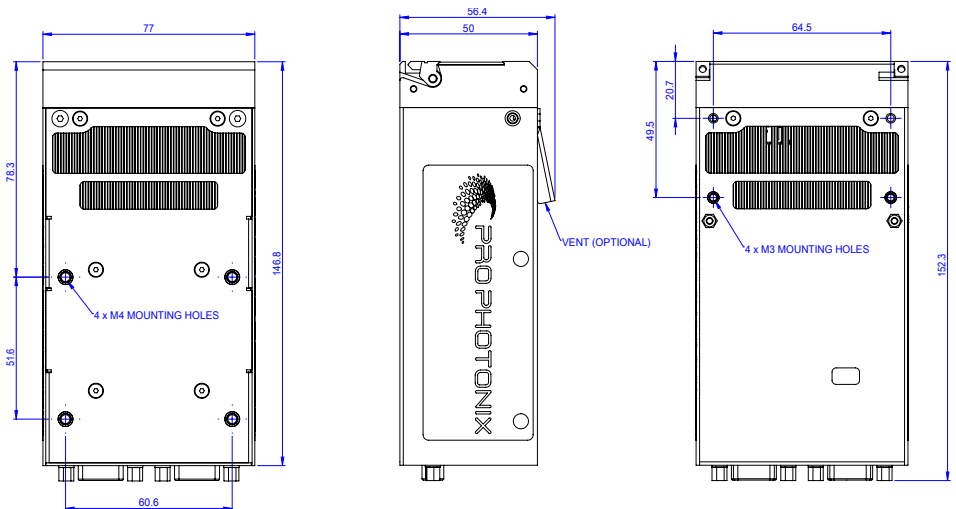


The window retainer can be rotated back to allow removal of the window. There is an alternative opening on the side of the retainer if this side is more desirable.

1. Wear glasses and gloves when replacing window.
2. Disconnect the lamp from the power supply.
3. Insert a cylindrical tool with a diameter up to 2.5mm into opening provided on the top-side of the hinge and tilt the hinge backwards.
4. Slide the window out and replace with a new window.
5. The original window can be cleaned and reused when required following cleaning. ProPhotonix recommends using a chemical based cleaning method rather than using blades or similar methods that use abrasive force on the window. These abrasive methods can scratch the window affecting the optical beam quality emitting from the lamp.

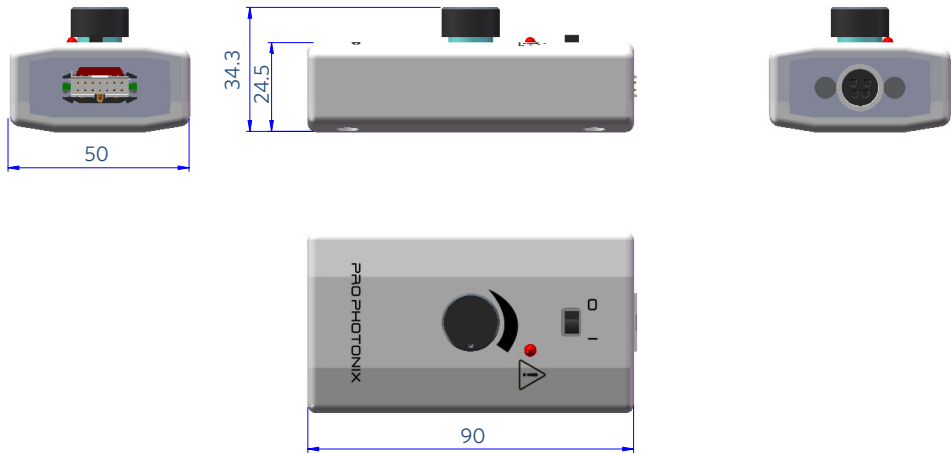
Mechanical Characteristics

Dimensional Diagram

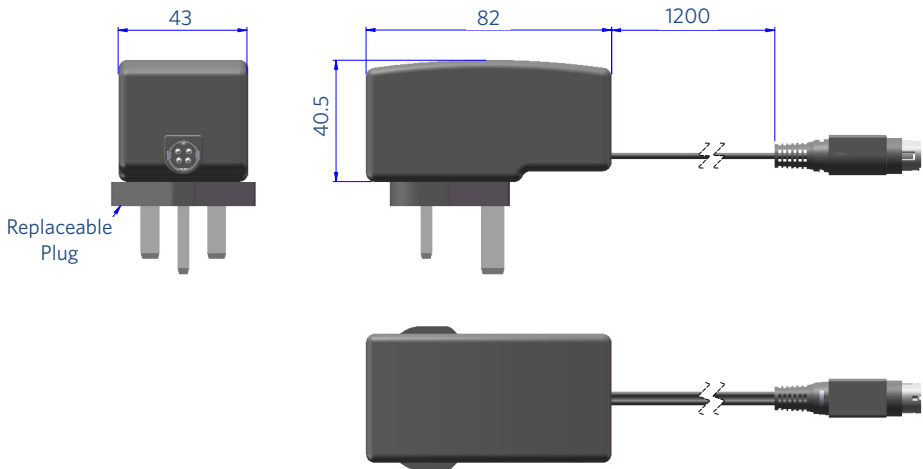


The COBRA Cure™ FX2 has two mounting hole options. It can be mounted using M3 metric threaded holes on one side or M4 metric threaded holes on the other side. The positions of these holes are shown in the drawings. There are different mounting hole position configurations on both sides of the units. One mounting hole configuration is positioned towards the front of the module head. The alternative mounting hole configuration is located on the opposite face toward the back end of the module. All dimensions are given in millimetres.

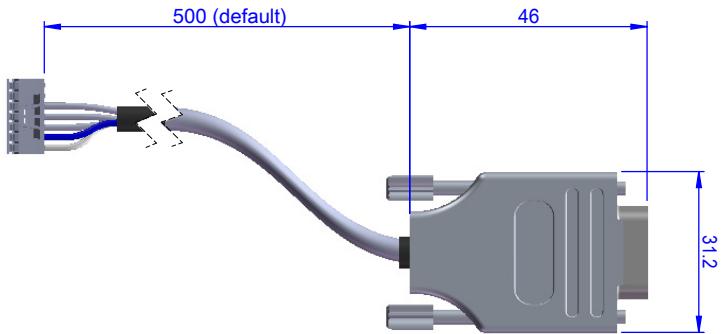
Intensity Controller (FX2-CTL-A)



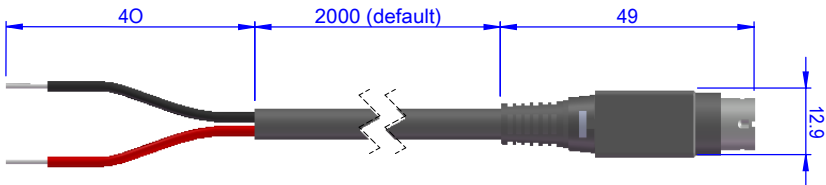
Wall Plug Power Supply (PSA-48V-030W)



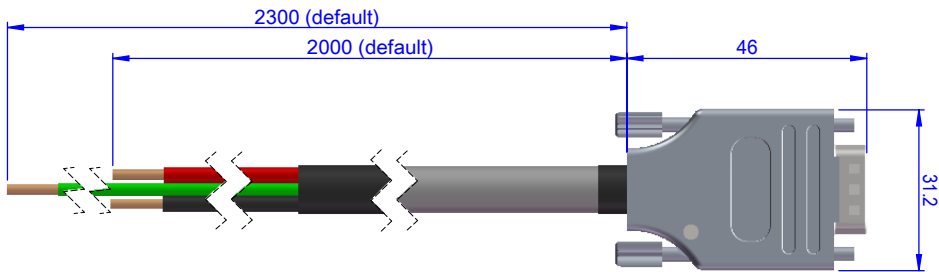
14-pin to DB15 Connector (FX2-CAB-A-CD-XX)



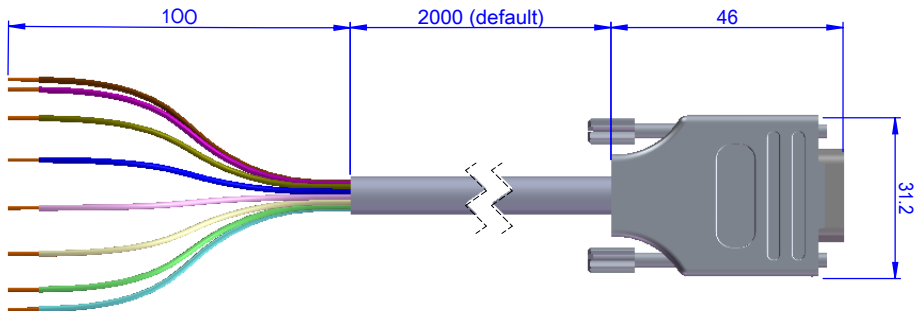
2-way Flying Lead to Circular Connector (CAB0053-XX)



Flying Lead to Power Connector (FX2-CAB-F-PD-02)



15-way Flying Lead to DB15 Connector (FX2-CAB-F-CD-02)



LED Lifetime

The LED-based COBRA Cure™ FX2 Lamps are designed so that, if they are operated at an ambient temperature of 35°C, the LED lifetime is 20,000 hours. LED lifetime is defined as the time that it takes for optical intensity to drop from its initial value to one half of that initial value. Running the units in environments having temperatures higher than 35°C will result in the accelerated aging of the LED sources.

Warranty

Do not attempt to disassemble your COBRA Cure™ FX2 Lamp. Any such action will void the warranty.

COBRA Cure™ FX2 Lamps and accessories are guaranteed by ProPhotonix to be free from material and manufacturing defects for a period of 12 months from the date of shipment. Should a product fail during this period, ProPhotonix will, at its discretion, either repair or replace the damaged unit. Repaired units or replacement units will be covered for the remainder of the original warranty period. The warranty does not apply to units that have failed due to abuse, acts of God, mishandling, alteration, improper installation, or negligence.

Declaration

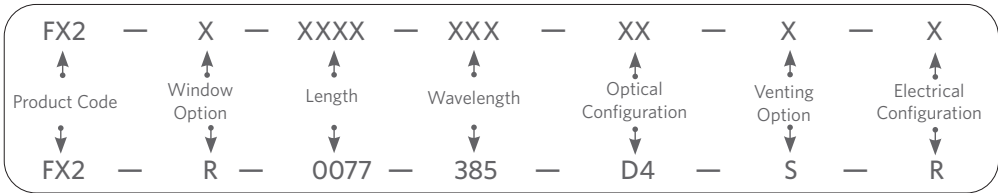
All COBRA Cure™ FX lamps are shipped with a Declaration of Conformity.

Ordering Part Numbers

FX2 - Window - Length - Wavelength - Optical Configuration - Venting - Electrical

Product Code	Window Option	Length (mm)	Wavelength (nm)	Optical Configuration	Venting Option	Electrical Configuration
FX2	R - Replaceable	0077	405	D4 - Divergent	S-Side Vented	R
	F - Fixed		395			
			385			
			365			

To order your COBRA Cure™ FX2- Use product code (FX2) - Select Window Option (X) - Select Length (XXXX) - Select Wavelength (XXX) - Select Optical configuration (XX) - Select Venting Option (X) - Select Electrical Configuration (X)



Accessories Part Number

Accessories	Part Number
48V Power Supply	PSU-48V-480W-XX
Wall Plug Power Supply	PSA-48V-024W
Intensity Controller	FX2-CTL-A
Replaceable Window (pack of 5)	FX2-W-0077
Air Deflector	FX-B-0077
Flying Lead Power Cable	FX2-CAB-F-PD-LLL
14 PIN to DB15 Control Cable	FX2-CAB-A-CD-LLL
15 way Flying Lead to DB15 Control Cable	FX2-CAB-F-CD-LLL
Circular to Flying Lead Cable	CAB0053-LLL

LLL represents length of cable. The standard length is 2m. Example 1: Require 2m cable, the product number is then FX1-CAB-F-A-020. Example 2: Require 0.5m cable, the product number is then FX1-CAB-F-A-0.5. XX represents Region Code: US, EU, UK.

Hyper Terminal

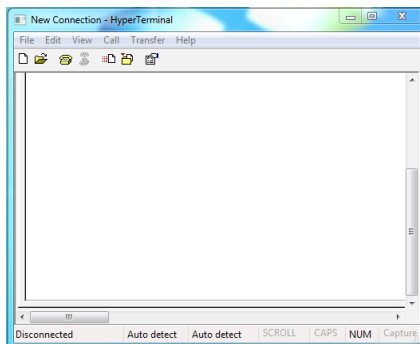
In order to communicate with the COBRA Cure™ FX2 LED Lamp, a USB-based HyperTerminal is used. It is available in most PCs running the Windows operating system. Virtual COM port (VCP) drivers cause the USB device to become visible as an additional COM port available to the PC. HyperTerminal can access the USB device in the same way as it would access a standard COM port. Drivers for the different operating systems can be downloaded from this link:

<http://www.ftdichip.com/Drivers/VCP.htm>

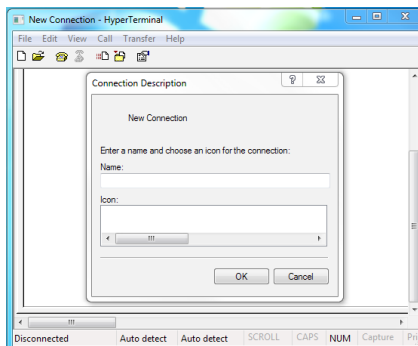
1. Connect PSU and RS485 to the LED Lamp.
 - a. RS485 Serial + wire has to be connected between the RS485 USB adapter and Pin 13 on the LED Lamp.
 - b. RS485 Serial - wire has to be connected between the RS485 USB adapter and Pin 12 on the LED Lamp.

Note: Pins 13 and 12 are labelled in the RS485 USB adapter with '+' and '-'.

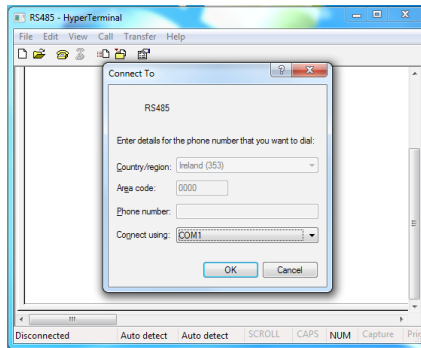
2. Plug in the RS485 USB adapter into your PC.
3. Launch HyperTerminal: Windows Vista, 7, 8 or 10 does not include this application by default. HyperTerminal 6.3 is the last free version which can be found on many download sites.



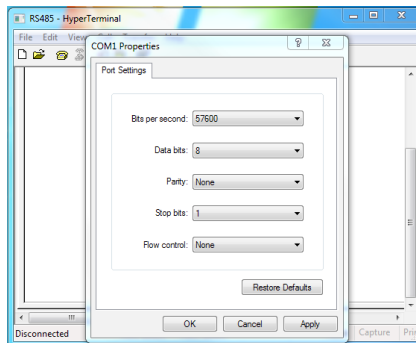
4. In the first window, HyperTerminal will prompt you to set up the connection under a file name so the file can be user later. Enter a name for your connection and click 'OK'.



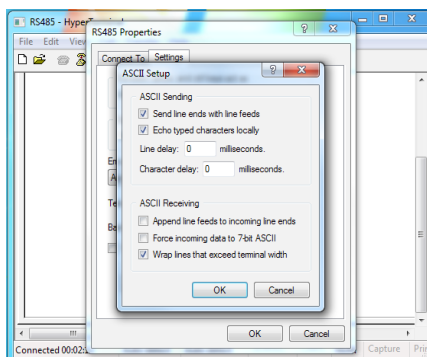
5. In the next window select the communication port where the RS485 USB adapter is connected. To check the communication port go to: 'Control Panel->System and Security->System->Device Manager'. Expand the Ports (COM & LPT) and find your RS485 USB adapter on the list.



6. The last window shows the port settings. Fill the values into the tabs and click 'OK'.



7. Next configure the ASCII options. To do this go to 'File->Properties', select the settings tab inside 'Properties' and click the ASCII Setup.
8. Activate the check box 'Send line ends with line feeds'.
9. Activate the check box 'Echo typed characters locally'.



10. HyperTerminal is set up to communicate with the LED Lamp. Every time you open the HyperTerminal, close the 'Connection Description' window and go to 'File->Open...' and select the name of your connection to load the required settings of the LED Lamp. The connection description is saved in 'Start->Programs->Accessories->communications->HyperTerminal'.

RS485 USB Adaptor

Any generic RS485 USB adaptor can be used to communicate between the PC and the LED Lamp. This adaptor requires a FTDI USB driver in order to appear as a virtual COM port. The FTDI USB driver is available in:

<http://www.ftdichip.com/Drivers/VCP.htm>



The pins in the RS485 USB adaptor are labelled with '+' and '-' which correspond respectively to 'RS485 Serial +' and 'RS485 Serial -' in the serial communications line.



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