LED Fyto-Panels

Instruction Manual

Please read this Manual carefully before operating the device.

CONTENTS

INSTRUCTION MANUAL

WARNINGS AND SAFETY PRECAUTIONS

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE TURNING THE LED Fyto-Panel ON:

- Remove all packaging and transport protectors before connecting the LED panel to the power supply.

- Use only cables supplied by the manufacturer.

- Keep the device dry outside and avoid working in high humidity environment!

- The manufacturer is not responsible for any damage due to improper operation!

- The device has a built-in temperature control and safety temperature fuse. The Light Panel switches off automatically when the Power Supply (control unit) gets heated above 70 ºC and/or the Light Panel gets heated above 60 ºC. After cooling, the panel switches on again.

- Even if the temperature fuse switches the device off, the manufacturer strongly recommends to switch off the device manually and to allow its sufficient cooling.

- Never cover the Power Supply (control unit) or the Light Panel! Low ventilation can cause an irreversible damage to the device.

- When connecting the device modules, use only the cables supplied by the manufacturer. The only exception may be the mains cable that differs from the DIN or CZ standard in some countries.

GENERAL ELECTRICAL SAFETY GUIDELINES:

- Perform a routine check of the devices and their wiring.

- Replace worn or damaged cords immediately.

- Use appropriate electrical extension cords/power bars and do not overload them.

- Place the device on a flat and firm surface. Keep away from wet floors and counters.

- Avoid touching the device, socket outlets or switches if your hands are wet.

- Do not perform any alterations to the electrical parts of the device or its components.

WARNING:

The LED Fyto-Panel is considered Class 1M* LED Product. LED radiation may be harmful to eye. Avoid direct and strongly reflected exposure. Use protective glasses.

Class 1M: Laser and LED equipment that is safe for the naked eye under foreseeable conditions of operation. Looking directly into the source of radiation by employing optics within the beam, such as magnifying glass, telescope or microscope, can be potentially hazardous.

GENERAL DESCRIPTION

LED Fyto-Panels are primarily intended for installation in growth chambers, or for other similar applications where controlled, large-area illumination is of high importance. The Fyto-Panels provide high-intensity light with uniform light distribution. They are manufactured as single color and optionally also multi-color series with each color being separately controllable in intensity Infrared LEDs (735 nm) are added in some panel versions so as to ensure optimal conditions for plant growth. Infrared LEDs can also be controlled separately.

LED Fyto-Panel dimension is 270 x 810 mm; it consists of two joined units 270 x 405 mm. The panel is delivered with a mechanical rack and a power supply, which is positioned on the panel top side. LED Fyto-Panel can be mounted inside the growth chamber or on a self-built construction system.

New Fyto-Panels (versions from year 2012 on) need a PC for their operation. The basic control - ON/OFF and intensity setting - is performed through a PC program which is provided together with the Fyto-Panel. Optionally, Fyto-Panels can be supplied with the Light Controller or Light Studio Software; they both enable precise control of the light mode, timing and intensity via user-defined protocols. In addition, special protocols for daylight mimicking or cloudy sky simulation may be provided.

DEVICE DESCRIPTION AND INSTALLATION

DEVICE DESCRIPTION

LED Fyto-Panel dimension is 270 x 810 mm; it consists of two joined units 270 x 405 mm. The panel is delivered with a mechanical rack and a power supply, which is positioned on the panel top side.

The panels are manufactured in three versions differing in power input and maximum reachable intensity (measured in 1 meter distance from the light source):

Version A: maximum reachable intensity 200 µmol(photon).m^{-2}.s^{-1} (cool white; measured for one panel)
Version A: maximum reachable intensity 500 µmol(photon).m^{-2}.s^{-1} (cool white; measured for two or more joint panels)

Version B: maximum reachable intensity 700 µmol(photon). m^{-2}.s^{-1} (cool white; measured for one panel)
Version B: maximum reachable intensity 1,000 µmol(photon).m^{-2}.s^{-1} (cool white; measured for two or more joint panels)

Version C: maximum reachable intensity 1,200 µmol(photon). m^{-2}.s^{-1} (cool white; measured for one panel)
Version C: maximum reachable intensity 1,500 µmol(photon).m^{-2}.s^{-1} (cool white; measured for two or more joint panels)
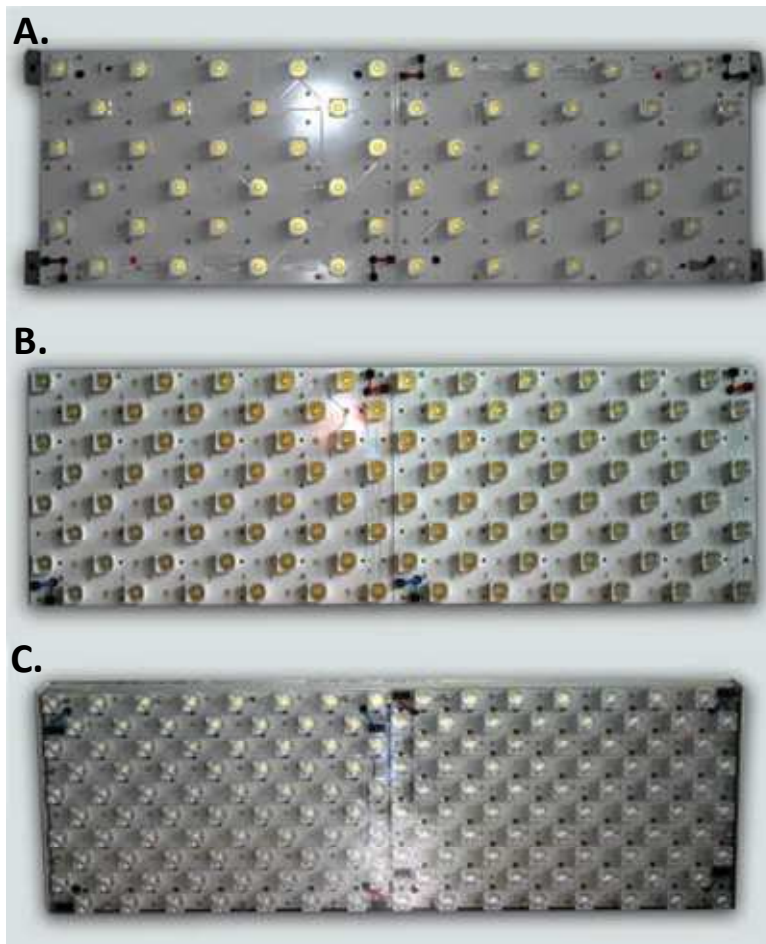

Fig 1. Three different versions of standard LED Fyto-Panels.

LED Fyto-Panels consist of high-performance light emitting diodes (LEDs) that are easily controllable in timing - from seconds to hours - and intensity - from 1 % to 100 % of total output. If supplemented with the Light Controller LC 100 or Light Studio software, they can operate in multiple regimes: flash, continuous light, harmonically modulated light, or they can work with user-defined modulation. Both the Light Controller and Light Studio software (to obtain detail description and specifications please refer to available information on: www.psi.cz) offer the possibility to create user-defined protocols with light/dark phases and precise control over the light mode, intensity and timing. LED-based light panels provide high-intensity illumination that is controllable in its power, spectral composition and temporal modulation.

Different light colors of the LED´s are provided for the Fyto-Panels that allow user to select and combine different lights with various spectral compositions.

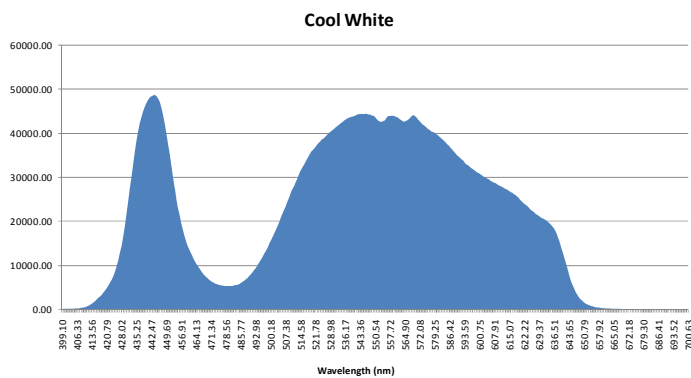Standard version of LED Fyto-Panel is: Cool white color (Fig. 2) with added IR LED´s (735 nm)

Fig 2. Spectrum of the cool white type of the LED Fyto-Panel.

Optional versions offer colors of the LED´s with spectral qualities as described in Fig.3:

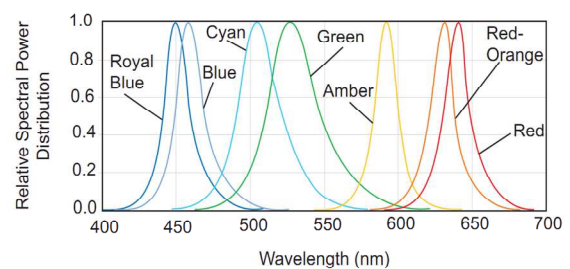| Color	Min.	Typ.	Max.
Green [7]	520.0 nm	530.0 nm	550.0 nm
Cyan [7]	490.0 nm	505.0 nm	520.0 nm
Blue [7]	460.0 nm	470.0 nm	490.0 nm
Royal-Blue [3] [7]	440.0 nm	447.5 nm	460.0 nm
Red [8]	620.0 nm	627.0 nm	645.0 nm
Red-Orange [8]	610.0 nm	617.0 nm	620.0 nm
Amber [8]	584.5 nm	590.0 nm	597.0 nm

Figure 4. Relative intensity vs. wavelength.

Fig.3: Spectral specifications of the color LED´s available for the LED Fyto-Panel.

LIST OF STANDARD COMPONENTS

Standard LED Fyto-Panel package contains these items:

- **LED Light Panel**

- **FTP Cable**

- **Power cable**

- **Device Bus Convertor RS422**

- **Fyto-Panel Control Unit Software**

- **Instruction Manual** *(on a CD or a printed version).*

- **Optional accessories** *(connecting cables in case other panels are interconnected).*

NOTE

If any item is missing, please, contact the manufacturer. Also check the carton for any visible external damage. If you find any damage, notify the carrier and the manufacturer immediately. The carton and all packing materials should be retained for inspection by the carrier or insurer.

OPTIONAL COMPONENTS

LIGHT STUDIO SOFTWARE

 Light Studio Software is a PC solution for precise control over the light mode, intensity and timing - (seconds to hours). It supports up to 4 lights or 4 colors; each light (color) can be configured and programmed independently. Light modulation is allowed according to a predefined function (continuous, pulse, sine, triangle) or user programmed function. Optionally, the Light Studio software may be supplied with a trigger for external protocol start.

LIGHT CONTROLLER LC 100

 Light Controller LC 100 is hardware, stand-alone solution for precise control of light characteristics and day/night simulation. It provides precise control over the light mode, intensity and timing (microseconds to hours). It can control up to 4 lights/colors in SL 3500 and up to 8 lights/colors in LED Fyto-Panels. Each light /color can be configured and controlled independently. Light Controller supports also generation of very short - 200 microseconds - pulses (in SL 3500 only), light modulation according to a predefined function (continuous, pulse, sine, triangle), user-programmed function (optional), or daylight simulation (optional). No PC is needed for this device operation.

USER-DEFINED CUSTOM PROTOCOL

 Optional feature to the Light Controller LC 100: when uploaded to Light Controller, this Protocol can support up to 224 light phase intervals, each defined by light intensity and duration.

DAYLIGHT PROTOCOL

 Optional feature to the Light Controller LC 100: when uploaded to Light Controller, the Daylight Protocol serves for cloudy skies simulations - several adjustable parameters. It includes also an additional program for "cloud visualization" on a PC.

DEVICE INSTALLATION

To install the device properly, it is necessary to follow the proper sequence of the assembly instructions as described below:

- LED Fyto-Panel should be placed on a flat, firm and dry surface.

- Make sure that the power supply is switched OFF.

- Connect the power supply cable to the connecter on the side of the LED Fyto-Panel (Fig. 4)

- If more Fyto-Panels are used, connect them between each other by the FTP data cable

- Data cables are plugged into the "light triggers in-out" connector (Fig.5)

- If you use Light Controller LC100 for operation of the LED Fyto-Panel connect the cables according to the fig.5

- If you use PC and the Fyto-Panel Control Unit Software for operation of the LED Fyto-Panel connect the cables according to the fig.6

- Switch ON the LED Fyto-Panel with main switch (Fig.1)

Fig. 4 Side of the LED Fyto-panel with main switch and power connecter, where the power supply cord is plugged.

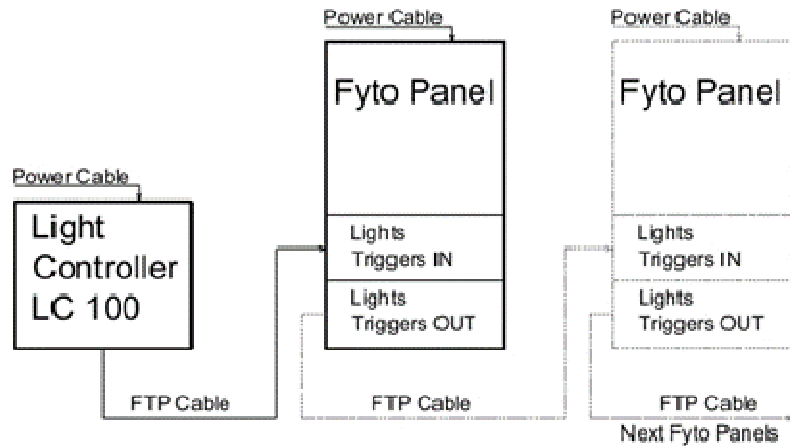Fig. 5 Data connecter *in* and *output* for FTP cable.

Fig.5 Scheme for the connection and operation of the Fyto-Panel with PC.
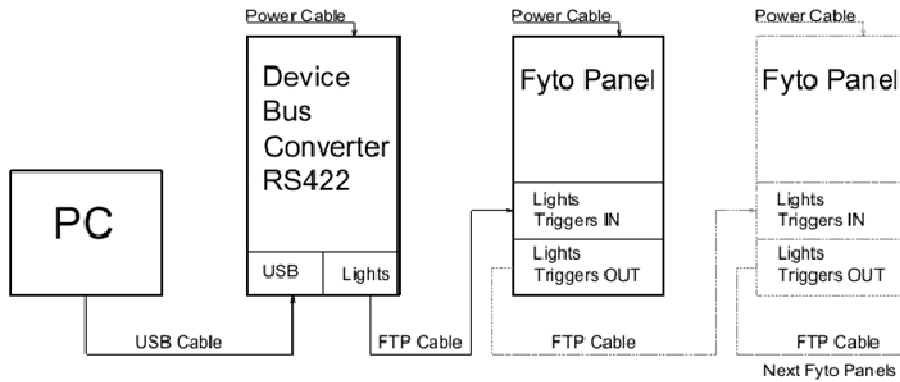

Fig.6 Scheme for the connection and operation of the Fyto-Panel with Light Controller LC100.

SOFTWARE

FytoPanelControl application purpose is to provide basic means to configure and control Fyto-Panel LED light sources.

It has ability to:

- control intensity and trigger for Channels/Devices/Groups/Ports (COM)

- set GroupID property for each physical light

- measure temperature for each physical light

- readout light errors

Below you can find user guide instructions for the Fyto-Panel Control Unit Software, which is provided as part of the standard Fyto-Panel package.

## GUI PARTS DESCRIPTION

DEVICE SCANNING

Device scanning is a process, where application tries to detect all Fyto-Panels connected to the PC. It iterates COM ports 1-32, trying to detect max MaxLightAddress devices on each port.

Max Light Address 25

Each device on the bus has its own address. This address is unique within the bus (= COM port for the PC application). *MaxLightAddress* parameter limits maximal address, which is tried to detect on each COM port. If you know your FytoPanel address range, set *MaxLightAddress* accordingly to speed-up detection. If your FytoPanels are connected and some are not detected, raising this number might help.

Start Scan

Detection of connected devices is done at the application startup. If any Fyto-Panel is connected/disconnected when application is running, rescan the bus by clicking StartScan button.

NETWORK MAP
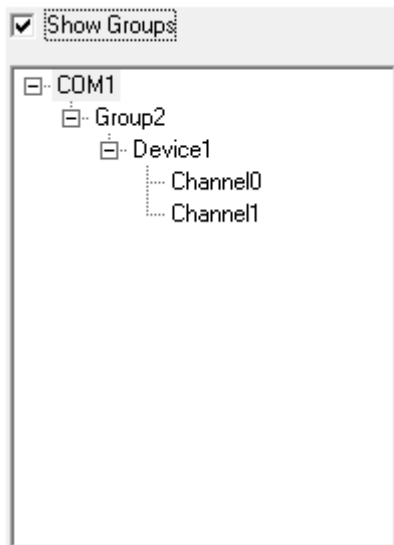
TreeView shows the current network topology. *ShowGroups* check box switches whether the groups (based on devices GroupID parameter) are displayed or not.

When clicked on any *TreeView* node - COM, Group, Device or Channel - information and parameters about selected node is displayed. Parameters are of following types:

- N/A - not available for given node

- <val> - available, value readout

- ?? - available, but value is not the same for all children Devices/Chanels

PARAMETERS READOUT
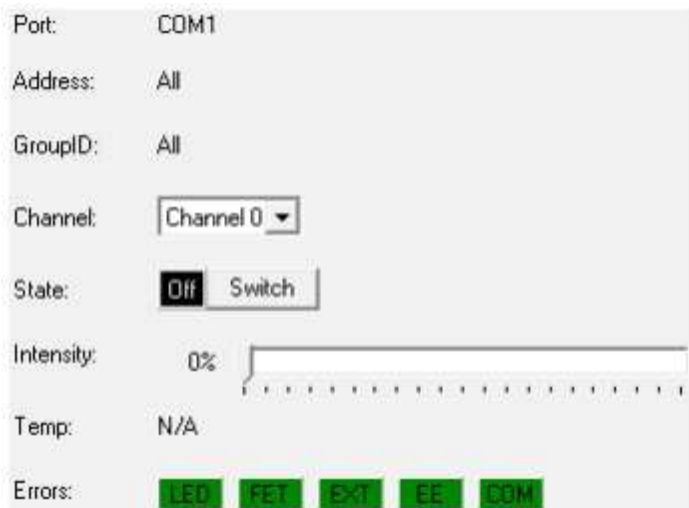
Port
- PC COM port, on which the Fyto-Panel was found
- not changeable

Address
- fixed Fyto-Panel device address
- not changeable

Group
- GroupID of the Fyto-Panel
- editable for Group or Device node

Channel
- one Fyto-Panel can have more than one channel - RGB light has three, WhiteIR panel has two
- list of available channels under given Port, Group or Device
- selection for further readout/control

State

•on/off state for selected node

Intensity

•light intensity for selected node

Temperature

•readout of on-chip temperature sensor

•available for Device nodes only

Errors

•FET, LED - overheat of light components

•EXT - external error

•EE - device EEPROM error

•COM - error during communication with device

LOG

Information passed from application to user is logged in the bottom part of the window.

GROUP ID SETTING FOR LC100

LC100 device, version for 485 lights (Fyto-Panels), uses hard-wired GroupID/channel to Light number assignment. Therefore it is necessary to configure Fyto-Panels Group IDs carefully before connecting them to LC100.

Assignment table is following:

LC100	FytoPanel	
LightNr	GroupID	Channel
1	1	1
2	1	2
3	1	3
4	2	1
5	2	2
6	3	1
7	3	2
8	4	1

LC100 Lights 1-3 are designed for use with 3-Channel RGB Fyto-Panel, as LC100 has RGB spectrum support on these 3 channels. Other Light positions do not have any special functions and can be assigned anyhow.

EXAMPLE OF RGB, WHITE AND WHITE IR PANELS SETUP

Available panels are: 3x RGB, 2x WhiteIR and 10x White. RGB panels need to be controlled separately and by color, WhiteIR as well and White panels need to be controlled in two groups.

Steps to setup the Fyto-Panels:

1. connect all the panels to PC
2. scan bus to map device network
3. change GroupID of all RGB (3 channel) devices to 1 by selecting corresponding devices in *TreeView*, changing GroupID to 1 and confirming by *Set* button
4. change GroupID of all WhiteIR panels to 2
5. change GroupID of 5 of the White panels to 3
6. change GroupID of other 5 of the White panels to 4
7. enable *DisplayGroups* check box and check if the Groups contain desired lights

When connected to the LC100, Fyto-Panel channels will be mapped to Lights in following way:

LC100	FytoPanels
LightNr	
1	RGB - Red
2	RGB - Blue
3	RGB - Green
4	WhiteIR - White
5	WhiteIR - IR
6	White
7	N/A
8	White

WARRANTY TERMS AND CONDITIONS

- This Limited Warranty applies only to the LED Fyto-Panel. It is valid for one year from the date of shipment.

- If at any time within this warranty period the instrument does not function as warranted, return it and the manufacturer will repair or replace it at no charge. The customer is responsible for shipping and insurance charges (for the full product value) to PSI. The manufacturer is responsible for shipping and insurance on return of the instrument to the customer.

- No warranty will apply to any instrument that has been (i) modified, altered, or repaired by persons unauthorized by the manufacturer; (ii) subjected to misuse, negligence, or accident; (iii) connected, installed, adjusted, or used otherwise than in accordance with the instructions supplied by the manufacturer.

- The warranty is return-to-base only, and does not include on-site repair charges such as labor, travel, or other expenses associated with the repair or installation of replacement parts at the customer's site.

- The manufacturer repairs or replaces faulty instruments as quickly as possible; the maximum time is one month.

- The manufacturer will keep spare parts or their adequate substitutes for a period of at least five years.

- Returned instruments must be packaged sufficiently so as not to assume any transit damage. If damage is caused due to insufficient packaging, the instrument will be treated as an out-of-warranty repair and charged as such.

- PSI also offers out-of-warranty repairs. These are usually returned to the customer on a cash-on-delivery basis.

- WEAR & TEAR ITEMS (such as sealing, tubing, padding, etc.) are excluded from this warranty. The term WEAR & TEAR denotes the damage that naturally and inevitably occurs as a result of normal use or aging even when an item is used competently and with care and proper maintenance.

TROUBLESHOOTING AND CUSTOMER SUPPORT

In case of troubles and for customer support, please, write to **support@psi.cz** or contact your local distributor.

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