

PX746

LED Driver
3x700mA/48V

MANUAL



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Manufacturer reserves the right to make modifications in order to improve device operation.

1. GENERAL DESCRIPTION

3 x 700mA Driver LED with built-in DMX512 signal receiver

The PX746 driver is designed to control LEDs. The device has been placed inside metal housing. The built-in DMX receiver allows for activating 3 channels (R, G, B) by using directly the DMX protocol. A wide range of supply voltage and a high level of current-carrying capacity enable activating large quantities of LEDs.

PX746 can be controlled by the DMX signal or it can work independently.

In this operation mode, the user has access to a fully programmable stage and 18 default sequences for which he can also change the reproduction speed and the smoothness of transition of particular steps. With the use of 16-bit resolution, controlling the parameters of channels is completely smooth. Moreover, the driver offers an effect control mode which allows for controlling the programs that are built into the device and, at the same time, changing such parameters as speed, brightness and fade settings using the DMX512 signal sent from an external controller.

The driver offers a built-in control signal frequency tuning system ("flicker free" technology), which makes it useful in applications for the television industry. As LEDs from the RGB series often differ in parameters, problems in receiving white colour may occur (triggering 100% at all channels). This is why the PX746 has been equipped with a very useful feature called 'white balance'. With this feature, each set of LEDs can be adjusted so that the control of individual colours by the module enables achieving white colour at full activation.

What is more, this feature allows for adjusting colour temperature of white.

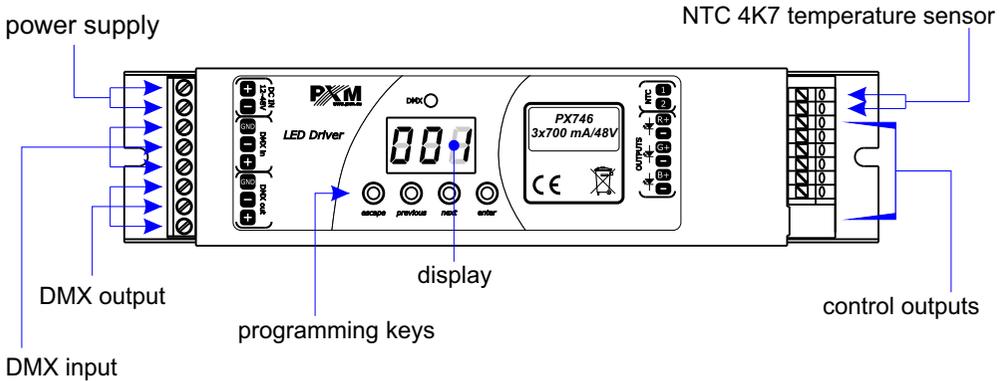
PX746 has also been equipped with a function of temperature power output limit and connectors for connecting a temperature sensor.

2. SAFETY CONDITIONS

The PX746 Driver LED 3x700mA/48V is a device powered with safe voltage up to 48V; however, during its installation and use the following rules must be strictly observed:

1. The device may only be connected to 12 - 48 V DC (stabilized voltage) with current-carrying capacity compatible with technical data.
2. All the conductors should be protected against mechanical and thermal damage.
3. In the event of damaging any conductor, it should be replaced with a conductor of the same technical data.
4. Connection of DMX signal can only be made with shielded conductor.
5. All repairs and connections of outputs or DMX signal can only be made with cut off power supply.
6. The PX746 should be strictly protected against contact with water and other liquids.
7. All sudden shocks, particularly dropping, should be avoided.
8. The device cannot be turned on in places with humidity exceeding 90%.
9. The device cannot be used in places with temperature lower than 2° C or higher than 40° C.
10. Clean with damp duster only.

3. DESCRIPTION OF THE CONNECTORS AND CONTROL ELEMENTS



4. DESIGNATION OF DISPLAYED MESSAGES

- 001** DMX address of a device - a basic item in the MENU
- ALL** setting parameters for all channels simultaneously
- 1Ad** setting parameters for each channel individually
- ELP** inverting the meter display 180 degrees
- AdP** DMX address setting
- 0bA** control method selection (RGB, LIGHTNESS / COLOUR, etc.)
- n85** no DMX signal response method selection
- 000** MASTER / SLAVE mode settings
- 268** LIGHTNESS /COLOUR control mode
- 368** RGB control mode
- 36d** RGB Dimmer control mode
- H50** HSL control mode - HUE / SATURATION / LIGHTNESS
- EFF** effect control mode
- d00** dynamic white

000	all outputs at 100%
0FF	all outputs off
500	scene
P07	programme no. 17
A07	DMX address settings for first channel
000	MASTER mode on / off
0HA	number of channels being sent in the MASTER mode
000	white colour balance setting
000	red balance
000	green balance
000	blue balance
000	white colour balance on / off
5P0	program playback speed
P00	level of steps change smoothness in the program
P00	red during scene programming colour
000	green colour during scene programming
000	blue colour during scene programming
P00	basic frequency of brightness control
500	screen and DMX signal LED blanking
E00	memory error message
000	restore default device settings menu
000	function to limit power
000	value of the limit activation temperature
000	value of the maximum limit temperature
E00	current temperature

the highest temperature recorded by the sensor

the lowest temperature recorded by the sensor

temperature limit is switched off and it is not possible to read the following temperatures: maximum, minimum, and current or when a mode which does not use all channels is set, and unused channels will have the address of the channel

5. DEVICE PROGRAMMING

After you switch on the module, its display shows the program version for a brief moment. To access the main menu, press „enter”, and the display will show **Adr**. Press „previous” or „next” to select the appropriate menu and press „enter” to confirm your selection.

5.1. Button features

- escape** - goes back to the previous MENU level or discards changes made
- previous** - scrolls to the previous feature on the same MENU level or decreases the parameter's value
- next** - scrolls to the next feature on the same MENU level or increases the parameter's value
- enter** - enters the next MENU level and confirms changes made

5.2. DMX addressing: group and individual

The PX746 menu allows the user to set a DMX address in the 1 - 512 range. It is possible to set an address individually **Ind** for each channel or on a group basis “**ALL**” for all the channels simultaneously.

ON A GROUP BASIS

Using the „next” or „previous” keys, set the desired DMX address by selecting values from 1 to 505+511 (depending on the control mode selected) and press „enter”. The address thus set will be assigned to the first channel, subsequent DMX addresses will be assigned to subsequent channels.

Once an address is programmed in this manner, the individual settings for each channel are cancelled.

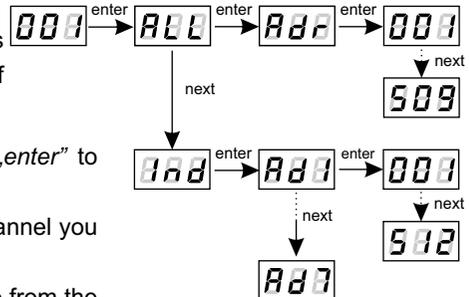
ON AN INDIVIDUAL BASIS

Using this menu you can set a DMX address individually for all the channels (the number of channels depends on the control mode selected).

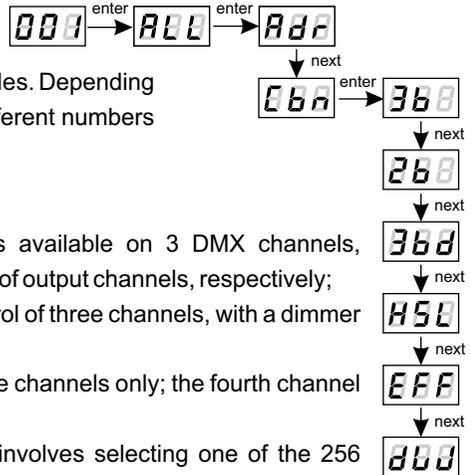
After you select **Ind** in the main menu, press „enter” to confirm your selection.

Using the „previous” or „next” keys, select the channel you want to set (**Ad1 - Ad7**) and press „enter”.

Using the „previous” or „next” keys, select a value from the range 1 - 512 and press „enter”.



5.3. Colour mode



This driver can operate under various control modes. Depending on the mode selected, the device will occupy different numbers of DMX channels.

The following modes are available:

- **HSL** mode (**H**ue, **S**aturation, **L**ightness) is available on 3 DMX channels, responsible for hue, saturation and lightness of output channels, respectively;
- **3bd** mode (3-byte plus a dimmer) - direct control of three channels, with a dimmer on the fourth channel;
- **3b** mode (3-byte) mode - direct control of three channels only; the fourth channel is inactive;
- **2b** mode (2-byte) - operation in this mode involves selecting one of the 256 colours, defined by the manufacturer, on one DMX channel and lightness on the other DMX channel;
- **dW** mode - dynamic white - control of 2 channel groups: cold white + warm white, by means of four DMX channels. The first DMX channel is responsible for colour temperature of the first group, and the other channel - for lightness of the group. Similarly, the third and the fourth DMX channels control the other group;
- **EFF** mode - an effect control mode. It is available on 8 DMX channels and allows you to select desired effects and their parameters.

Description guide of **EFF** mode settings - (the table on the next page):

CHANNEL1 - red component

CHANNEL2 - green component

CHANNEL3 - blue component

CHANNEL4 - operating mode selection

CHANNEL5 - speed settings (higher value - quicker changes)

CHANNEL6 - fade settings (higher value - smoother transition)

CHANNEL7 - lightness settings (higher value - stronger glow)

character ("x")- possibility to control a given parameter of a selected mode

character ("-") - no possibility to control a given parameter of a selected mode

EFF mode (effect) channels description

Channel 1 RED	Channel 2 GREEN	Channel 3 BLUE	Channel 4 TRYB	Channel 5 SPEED	Channel 6 FADE	Channel 7 JASNOŚĆ
–	–	–	0 ÷ 7 - Program 1	x	x	x
–	–	–	8 ÷ 15 - Program 2	x	x	x
–	–	–	16 ÷ 23 - Program 3	x	x	x
–	–	–	24 ÷ 31 - Program 4	x	x	x
–	–	–	32 ÷ 39 - Program 5	x	x	x
–	–	–	40 ÷ 47 - Program 6	x	x	x
–	–	–	48 ÷ 55 - Program 7	x	x	x
–	–	–	56 ÷ 63 - Program 8	x	x	x
–	–	–	64 ÷ 71 - Program 9	x	x	x
–	–	–	72 ÷ 79 - Program 10	x	x	x
–	–	–	80 ÷ 87 - Program 11	x	x	x
–	–	–	88 ÷ 95 - Program 12	x	x	x
–	–	–	96 ÷ 103 - Program 13	x	x	x
–	–	–	104 ÷ 111 - Program 14	x	x	x
–	–	–	112 ÷ 119 - Program 15	x	x	x
–	–	–	120 ÷ 127 - Program 16	x	x	x
–	–	–	128 ÷ 135 - Program 17	x	x	x
–	–	–	136 ÷ 143 - Program 18	x	x	x
–	–	–	144 ÷ 151 - OFF	–	–	–
x	x	x	152 ÷ 169 - Strobo 10%	x	–	x
x	x	x	170 ÷ 199 - Strobo 20%	x	–	x
x	x	x	200 ÷ 229 - Strobo 50%	x	–	x
x	x	x	230 ÷ 255 - RGBD	–	–	x

DESCRIPTION OF PROGRAMS

The following tables show the values for each output channel - R, G and B in programs from 1 up to 18 (**P01 - P18**). The value of 255 corresponds to the maximum lightness level on a given channel, 127 - 50% of power level, 0 - full channel blanking.

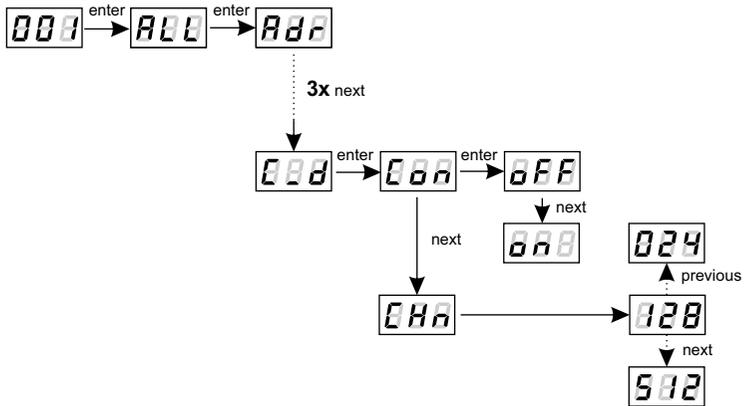
		P01	P02	P03	P04	P05	P06	P07	P08	P09	P10
krok 1	R	255	0	0	0	255	255	0	255	0	255
	G	0	0	0	0	0	0	255	0	255	0
	B	0	255	0	0	0	0	255	0	0	0
krok 2	R	0	0	255	0	255	255	255	0	0	0
	G	255	255	0	0	255	0	0	255	0	0
	B	0	0	0	255	0	255	255	0	255	255
krok 3	R	0	255	0	0	0	0	255			
	G	0	0	0	0	255	0	255			
	B	255	0	0	0	0	255	0			
krok 4	R			0	0	0	0				
	G			255	255	255	255				
	B			0	0	255	255				
krok 5	R			0	0	0	0				
	G			0	0	0	255				
	B			0	0	255	0				
krok 6	R			0	255	255	255				
	G			0	0	0	255				
	B			255	0	255	0				

		P11	P12	P13	P14	P15	P16	P17	P18
krok 1	R	0	0	0	255	0	0	0	0
	G	0	0	0	0	255	0	127	0
	B	0	0	0	0	0	255	255	0
krok 2	R	255	0	0	255	127	127	127	255
	G	0	255	0	127	255	0	255	255
	B	0	0	255	0	0	255	127	255
krok 3	R				255	0	0	255	
	G				0	255	0	127	
	B				0	0	255	0	
krok 4	R				255	0	0	127	
	G				0	255	127	0	
	B				127	127	255	127	

5.5. MASTER / SLAVE function

The PX746 module has a built-in DMX512 receiver and can be controlled from any desktop or controller running in this standard. Moreover, it is equipped with a programmable function of response to no DMX signal (*noS*). With 18 built-in default programs, it is possible to obtain interesting effects without an external controller. However, in larger installations, several PX746 drivers implementing the same program cannot provide a full reproduction synchronisation. Therefore, PX746 has a MASTER feature. When it is activated, the module changes from a DMX receiver into a transmitter of this signal and sends self-realized programs to the other modules. The first driver on the DMX line should be assigned MASTER status. The other drivers should operate in SLAVE mode.

With this solution, it is possible to make a precise synchronization even in very large installations.



Con - turning on or off the MASTER function

CHn - select the amount of DMX channels sent

NOTE:

Generally, PX746 sends 3 channels – R, G, B, respectively. The minimum number of channels sent is 18, so the four basic channels are multiplied six times. Where needed, they can be multiplied to give 512 channels (it is not recommended to use this setting due to the slow transmission).

5.6. White balance

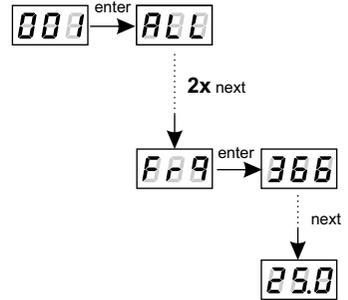
Sometimes, there may be problems achieving white colour on the LEDs of RGB series. This may be due to the use of diodes with different technical parameters. For this reason, the PX746 module is equipped with a white balance function (*bAL*). This option allows you to select the proper colour temperature for the full control of all four outputs (white colour) in the range of 0-100%.

5.8. Light control frequency

The **Frq** function allows for setting the basic control frequency. This feature is extremely useful for controlling lamps for the television industry. By applying the "flicker free" technology, it is possible to avoid the unpleasant flickering effect which is caused by improper signal synchronization that controls the LEDs.

The user can choose from the available frequency range from 366 Hz up to 25 kHz which can be smoothly changed using the „previous" or „next" buttons and selecting a different value.

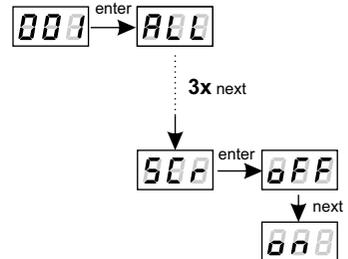
Frequency values above 1.51 kHz can avoid flickering in the camera.



5.9. Screen saving

The device is equipped with a feature that allows for turning off the backlight. The **SCr** option activated turns off the display after a minute of inactivity (do not use the keys). The device continues its operation without interfering with other parameters. Press any key to restore the backlight.

- on** - screen saver activation
- oFF** - screen saver deactivation



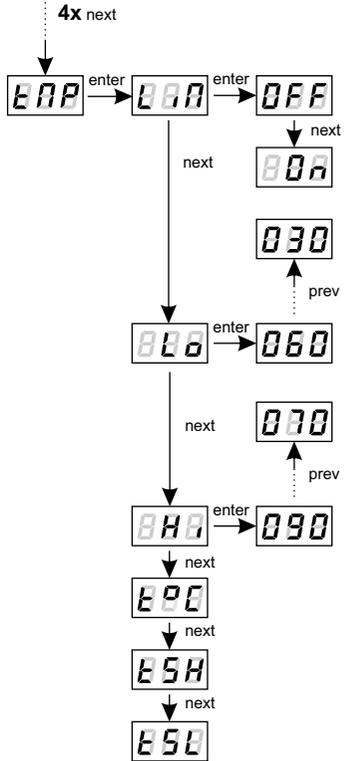
5.10. Temperature limits and sensor failure

PX746 has been equipped with a function that limits the output power depending on the temperature value read using the external sensor mounted in the lamp. This allows for programming a temperature value which, if reached, limits the power or disables the lamp supplied by the driver. The product is designed to work only with the NTC 4K7 type thermistor.

001 enter ALL

The meaning of the statement

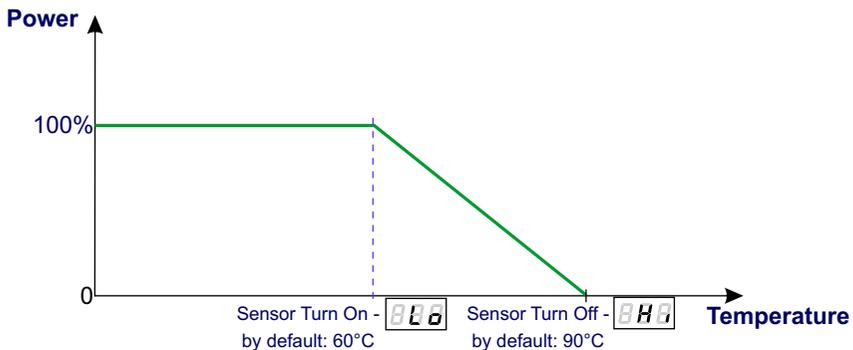
- tMP** (EPP) - power limitation management depending on temperature read on the external sensor
- LiM** (EPP) - powering **On** and **OFF** of the power limitation function
- Lo** - limit activation temperature value can be set between 30°C and 60°C
- Hi** - maximum limit temperature value set in the range from 70 up to 90°C
- t°C** - current temperature
- tSH** - the highest temperature recorded by the sensor
- tSL** - the lowest temperature recorded by the sensor



Error messages:

- Er0** - no thermistor or thermistor open
- ErC** - shorted termistor
- 888** - **LiM** temperature limit was not turned on

The course of the power limitation between **Lo** and **Hi** values is linear as shown in the graph below:



If this function is activated and the temperature sensor is incorrectly connected or there is no sensor, the driver displays a relevant message – **Er0** at the current temperature location, and instead of the first DMX address, i.e. at the very beginning of the menu. To disable the message, connect an appropriate sensor or disable the temperature limit.

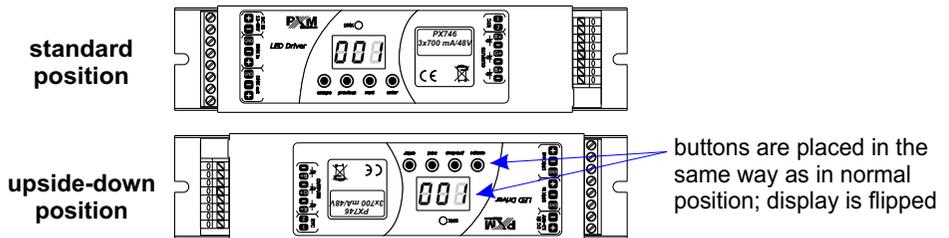
5.11. Display function

As the driver should be installed (as far as possible) in a small distance from the controlled LEDs, the lack of space may force the necessity of mounting the device upside-down. In such case the displayed messages become illegible, that does not have the influence on device operation, but makes the programming much more difficult.

That is why the PX746 driver has a display flip feature available. It turns the screen 180°. The keys order is reversed as well.

To activate this both middle buttons ("*previous*" and "*next*") of the driver have to be pressed in the same time for about 3s. To deactivate function the procedure is the same.

The figure on the next page shows how flip function works.



5.12. Default settings and memory error

If you have any difficulty accessing the device menu, e.g. it is not possible to enter a particular menu level or it is necessary to restore the device to its default settings, follow the instructions below.

In the first case, if there is no access to the menu level or it is incorrectly displayed, this may indicate an error of saving to the device memory.

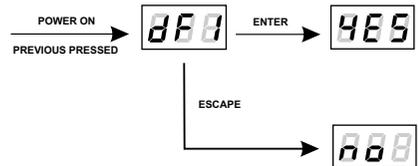
If the procedure has been performed and the device still does not operate properly, it must be sent to the manufacturer.

To restore the device to its default settings, press and hold the previous key while switching on the device. One of the messages that will be displayed will say **dFI**, which means successful restoring to default settings (the previous key has to be held down while powering on the device, until the **dFI** message is displayed).

If this message is accepted by pressing „enter”, the default settings will be restored. The user can also exit this menu level without restoring the default settings. In order to do this, press the „esc” key.

Please note that all set parameters of the PX746 device after restoring the default settings will be changed to those shown below:

- DMX address - 1,
- driver operating mode - RGB (3b - 3-byte),
- master mode - off,
- number of sent DMX channels - 128,
- white balance - off
- no signal operating mode - Program 1
- smoothing function (smooth) - off



Err message - memory error

The device is equipped with a built-in memory work control function.

If there are problems with the memory operation on the PX746 display, the **Err** message appears - memory error.

In this situation, select the “enter” key. The device will reload the default configuration and upload it to the memory. If after this operation, the **Err** message remains on the screen, the memory is permanently damaged and the unit must be sent to the service point.

5.13. RDM description of available parameters

The PX746 supports the DMX-RDM protocol. DMX protocol allows only of a one-way data transmission, while its extension the RDM protocol can transmit information in two directions. This makes possible to simultaneously send and receive information, and hence the possibility of monitoring activities of the compatible devices. Thanks to RDM some available settings of compatible devices may be programmed using this protocol.

Below is a list of RDM parameters supported by the PX746:

Parameter name	PiD	Description
SUPPORTED_PARAMETERS	0x0050	all supported parameters
PARAMETER_DESCRIPTION	0x0051	description of additional parameters
DEVICE_INFO	0x0060	information concerning the device
SOFTWARE_VERSION_LABEL	0x00C0	firmware version of the device
DMX_START_ADDRESS *	0x00F0	DMX starting address of the device; minimum value: 1, maximum value: 512. According to the RDM standard, for device whose footprint is 0, the value of this parameter may be 65535 and then it is not possible to change the initial address settings for the entire device, but only for sub-devices.
IDENTIFY_DEVICE *	0x1000	device identification; Two states are possible: identification is off (0x00 value) and identification is on (0x01 value).
STATUS_MESSAGES	0x0030	information about device status
DEVICE_MODEL_DESCRIPTION	0x0080	device description, e.g. name
MANUFACTURER_LABEL	0x0081	manufacturer description, e.g. name
DEVICE_LABEL *	0x0082	additional device description; It is possible to enter an additional device description using up to 32 ASCII characters.
FACTORY_DEFAULTS	0x0090	device default settings
DMX_PERSONALITY	0x00E0	DMX operational mode
DMX_PERSONALITY_DESCRIPTION	0x00E1	description of individual operational modes
DEVICE_HOURS	0x0400	operating time counted in hours
TEMPERATURE_LIMIT_ON/OFF	0x800E	temperature limitation activation for the temperature sensor connected to the driver, For 0 value, the function is not active; for 1 value, the function is active. Default value is 1.

Parametr name	PiD	Description
TEMPERATURE_THRESHOLD_LOW *	0x800F	lower temperature value for which the temperature limitation is being activated
TEMPERATURE_THRESHOLD_HIGH *	0x8010	upper temperature value for which the temperature limitation is active, i.e. the cut-off temperature for exits from the driver
BALANCE_RED *	0x8011	value of control level of red channel balance; Minimum value is 0 and maximum is 100 (the value equals to percentage of control level). For the maximum value (100) the LEDs work with maximum brightness. Default value is 100.
BALANCE_GREEN *	0x8012	value of control level of green channel balance; Minimum value is 0 and maximum is 100 (the value equals to percentage of control level). For the maximum value (100) the LEDs work with maximum brightness. Default value is 100.
BALANCE_BLUE *	0x8013	value of control level of blue channel balance; Minimum value is 0 and maximum is 100 (the value equals to percentage of control level). For the maximum value (100) the LEDs work with maximum brightness. Default value is 100.
SMOOTH_DIS_0/P2P_1/TIM_2 *	0x801A	the choice of options relating to the Smooth function; At 0 value Smooth is turned off, for a value of 1 Smooth mode is set to a Packet to Packet (P2P) and for the value of 2 Smooth is in time mode (tim). The default value is 0 - Smooth off.
SMOOTH_TIME *	0x801B	smooth time for tim function chosen in subsection above; Unit in [ms]. Minimal value of this parameter is 10 and maximal 999 [ms]. Default value is 200.

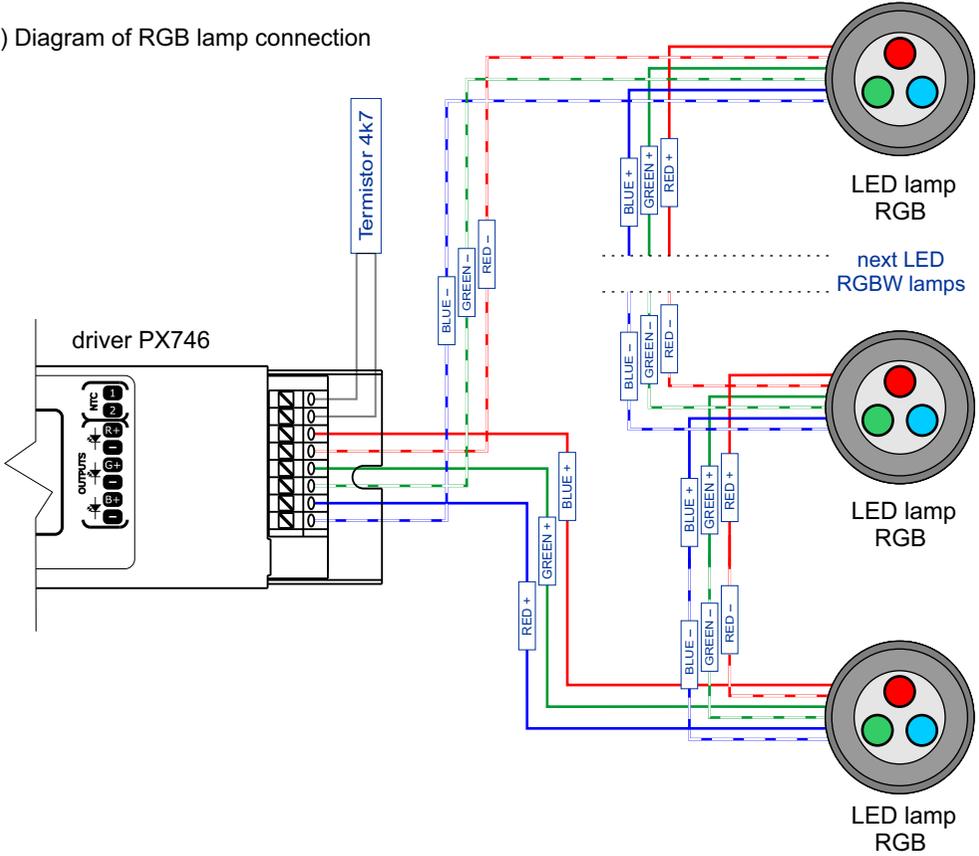
Parametr name	PiD	Description
NO_SIG_P1-18 SC_19 ON_20 OFF_21	0x801C	choice of work mode for No DMX signal; Minimal Value is 1, maximal 21. For values 1-18 menu allows to chose program from 1 to 18 which is played during no DMX signal detection. For the 19 value a scene saved in memory is set and for the 20 value all outputs are set to ON with maximum value. The value 21 sets to OFF all outputs during time with no DMX signal received. Default value is 21.
SCENE_RED *	0x801D	settings of red channel value for scene saved; Minimal value is 0, maximal 255 (maximal brightness). By default value set to 255.
SCENE_GREEN *	0x801E	settings of green channel value for scene saved; Minimal value is 0, maximal 255 (maximal brightness). By default value set to 255.
SCENE_BLUE *	0x801F	settings of blue channel value for scene saved; Minimal value is 0, maximal 255 (maximal brightness). By default value set to 255.
SCREENSAVER_ON/OFF *	0x8024	settings of screensaver; With the 0 value display blanking is not active, the 1 value means screensaver active. Default value is 0.
PROGRAM_SPEED *	0x8025	programs playback speed settings (playing next steps of program); Minimum value is 1 and maximal 999 (maximum speed). By default it is set to 10. Value 1 represents 0,1s, and 999 - 99,9s.
PROGRAM_FADE *	0x8026	settings of smooth transition between following steps of a program; The minimum value is 0 (step transition) a maximum of 100 (transition completely smooth). The default value is 100.

Parametr name	PiD	Description
BALANCE ON/OFF *	0x8027	to activate or deactivate the balance of output channels; A value of 0 is a balance off, a value of 1 active balance. The default value is set to 0.
PWM_FREQUENCY *	0x8028	LEDs refresh frequency; The minimum value is 366 and the maximum is 25000. The unit is [Hz] and the default value is 366.
SERIAL_NUMBER	0x8030	device serial number
DISPLAY_FLIP *	0x8031	inverting the meter display 180 degrees; The minimum value is 0, and the maximum is 1. The default value is 0.

* - parameter editable

6. CONNECTION SCHEME

a) Diagram of RGB lamp connection



Example connection the PX746 driver to the LED lamp:

- the cables should be connected with the correct order of colors,
- LEDs should be connected only in series,
- controlled LEDs can be connected using two conductors only, i.e. two per channel,
- the number of serially connected LEDs depends on the driver and supply voltage.

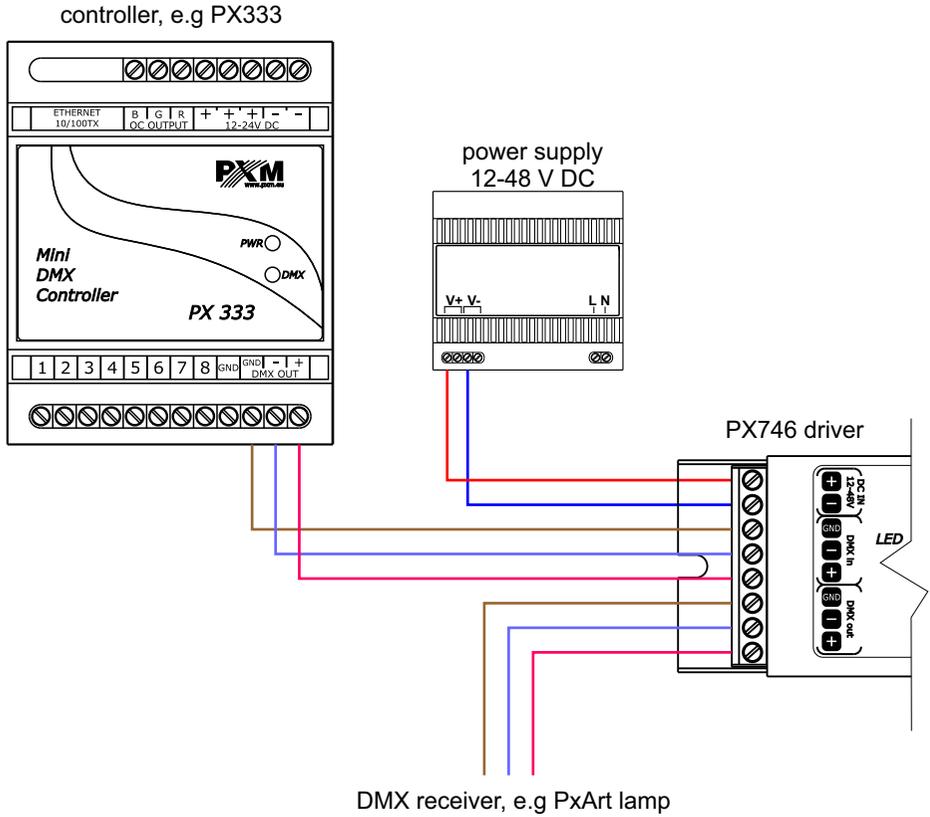
a) RGBW lamp connection,
700 mA power supply

b) Monochrome lamp connection (one colour), 700 mA power supply

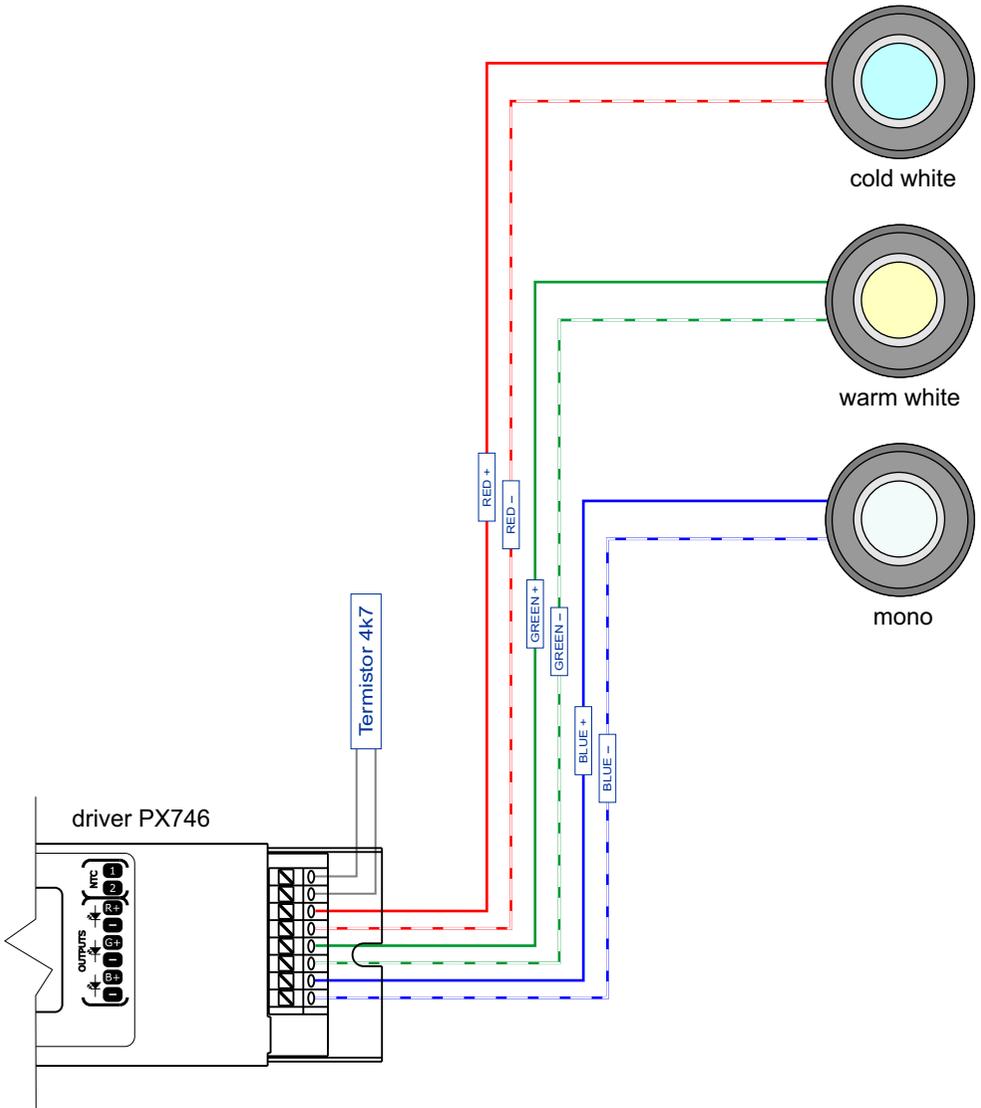
LED Driver	Power supply	Number of diodes of one color
PX746	12 V	1 ÷ 3
	24 V	4 ÷ 6
	48 V	7 ÷ 12

LED Driver	Power supply	Quantity of powered lamps
PX746	12 V	3
	24 V	6
	48 V	12

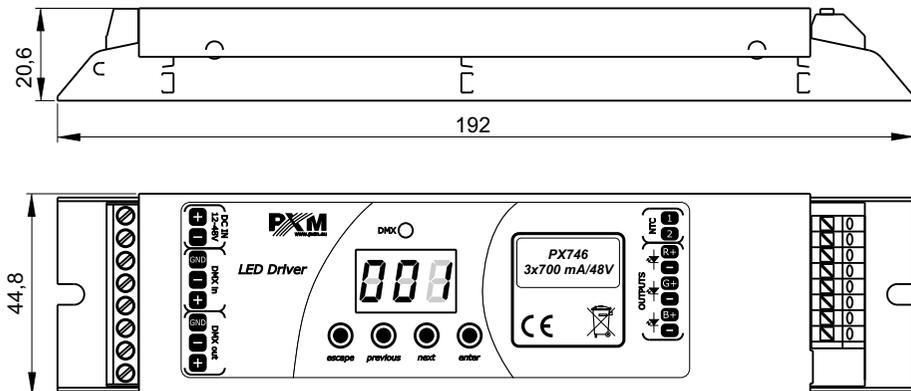
b) Power supply and DMX connection diagram



c) Monochrome lamp in DW mode connection diagram



7. DIMENSIONS



8. TECHNICAL DATA

- power supply: 12 - 48 V DC
- DMX input: 1 (512 channels)
- DMX output: 1 (24-512 channel - 3 control)
- number of output channels: 3
- total current consumption: 2,1 A
- current consumption without load: 0,5 W
- output load: 700 mA / channel ^{+2%}_{-5%}
- output sockets: PCB terminal block; Push-button; max.1.5 mm²
- programmable scene: 1
- number of programs: 18
- MASTER/SLAVE mode: yes
- control accuracy: 16 bit
- weight: 0,15 kg
- dimensions: length: 192 mm
height: 20,6 mm
width: 44,8 mm





Podłężę 654
32-003 Podłężę

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DECLARATION OF CONFORMITY

PXM Marek Żupnik spółka komandytowa
Podłężę 654, 32-003 Podłężę

we declare that our product:

Product name: **Driver LED 3x700mA/48V**

Product code: **PX746**

smeets the requirements of the following standards as well as harmonised standards:

PN-EN 50581:2013,	EN 50581:2012
PN-EN 61000-4-2:2011,	EN 61000-4-2:2009
PN-EN 61000-6-1:2008,	EN 61000-6-1:2007
PN-EN 61000-6-3:2008,	EN 61000-6-3:2007

and meets the essential requirements of the following directives:

2011/65/UE DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction on the use of certain hazardous substances in electrical and electronic equipment.

2014/30/UE DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 2004/108/EC.



Marek Żupnik spółka komandytowa
32-003 Podłężę, Podłężę 654
NIP 677-002-54-53

Podłężę, 26.09.2017

mgr inż. Marek Żupnik.