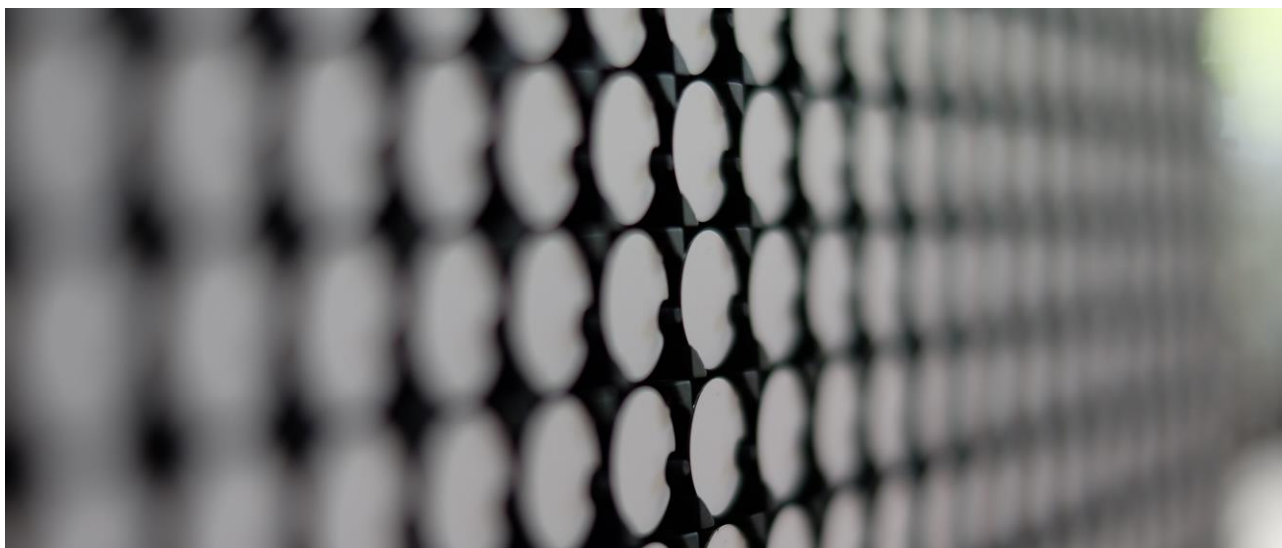


# 14x28 XY5 7x28 XY5 FLIPDOT PANELS

## USER MANUAL



**Attention: Please read the manual carefully.  
In case of any doubts or questions pls contact  
Alfa - Zeta at [info@alfazeta.pl](mailto:info@alfazeta.pl) or +48 42 6891200,  
Please note that Poland is GMT+1**

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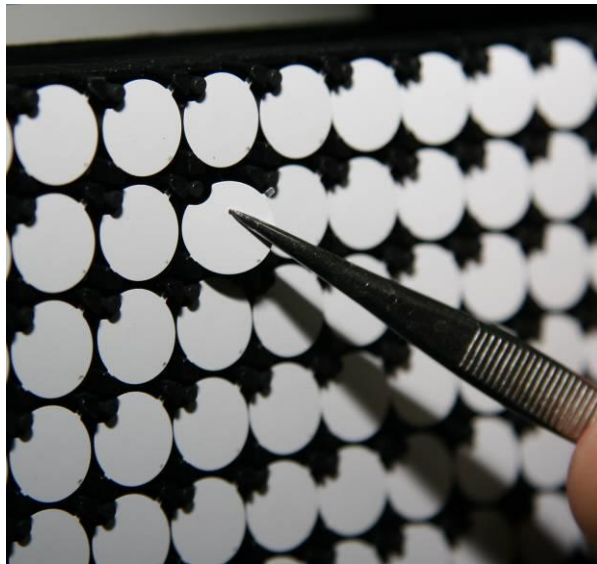
corporate website  
visual information displays  
fiber optic lighting  
LED lighting

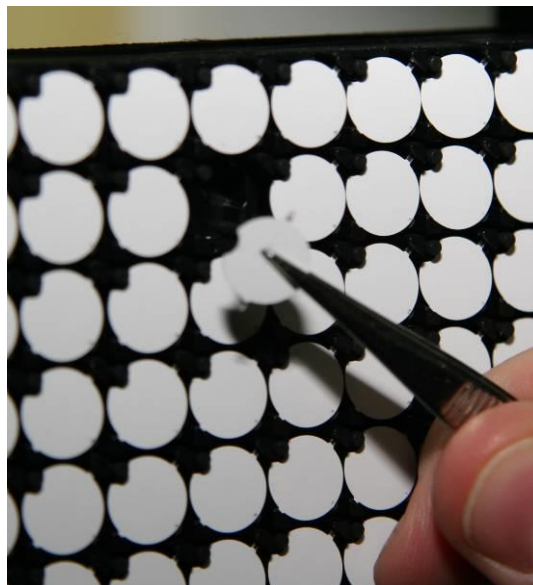
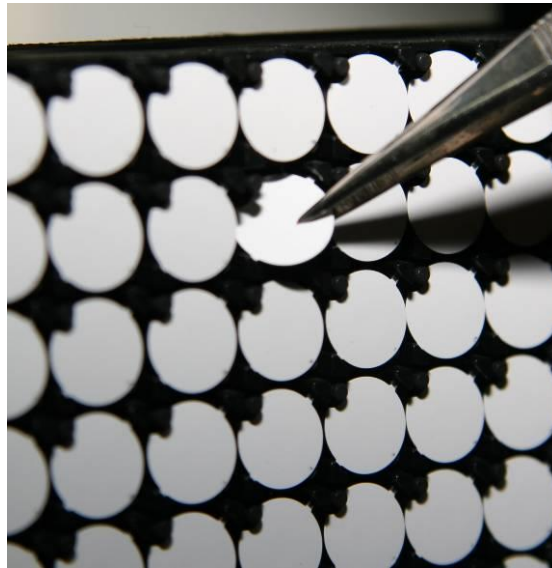
## **SAFETY PRECAUTIONS**

- assemble process must be performed by qualified personnel only,
- always check connection before installing components,
- any additional installations must be made according to local safety regulations,
- anti-shock protection system must be made according to local regulations.

## Handling precautions

- this is a delicate mechanical device. It is very easy to destroy grid of dots. Please always handle boards with care.
- Dots are removable and in case when in result of mishandling any dot is pressed too strong into its socket, you can try to repair it by taking it out by means of tweezers, straighten axes and place the dot again in its socket.
- Do not touch dots with your fingers because it may leave dirt and grease which eventually may lead to malfunction of the dots. If you need to put a dots manually, always use protective gloves.





- If you need to place boards on their faces make sure that ALL dots are turned WHITE before doing it and place the dots on flat, clean, hard surface.
- This is extremely electrostatic sensitive device – try to avoid touching dots. It is also strongly advised that persons handling boards wear anti-Electro Static Discharge equipment (wristbands, coat, etc.)
- This is extremely dust sensitive device. Please make sure that you handle and install it in a dust free environment. Especially harmful are metal chips and particles.

**NEVER DRILL HOLES WITH BOARDS INSTALLED!!**

- Always take columns by edges. Never move columns by gripping display panels.
- In case of 'lazy' or 'slow' dots, you can try to clean them. Remove dot, check if there are no dust, hair, metal particles in the socket and on the dot (around axis) and re-install it carefully. You have a few spare dots: always consider replacing with a new one.
- After longer delay in usage, it may happen that some dots become 'lazy' or 'blocked'. This is a normal situation and does not mean that they broke. It usually helps to run fast black – white flip – flop program for 15 – 20 minutes
- ALWAYS disconnect power supply while making any operations.
- Spare boards can be stored on flat clean surfaces with all dots turned white. They can be also packed with protection cardboard at dot's side.

**Working conditions**

Operating temperature: -40°C to 80 °C

Relative Humidity: 5 to 95% non-condensing (at 40°C)

For most of applications these displays has to be covered in a housing to protect against dust and humidity. The housing needs to be ventilated in order to reduce temperature resulting from sun load.

It is possible to use the displays without a housing however cleaning process would be necessary for proper operation.

**14x28 vs 7x28**

14x28 panel is made of two 7x28 panels connected mechanically only. For proper operation you must separately connect power supply to each of two controllers (see following section). Data between controllers within one 14x28 panel can be connected using rj11 cable is only these two controllers are supposed to work on one RS485 line.

## Connections, sockets and buttons

Every display module is equipped with display elements board and control boards. (one per 7x28 area) They are connected together by means of multi-pin connector. Every module needs the following connections:

- 24V DC (+ and -)
- RS485 (+ and -) (by means of either J1 or J2 or J3)

See below description of connections:

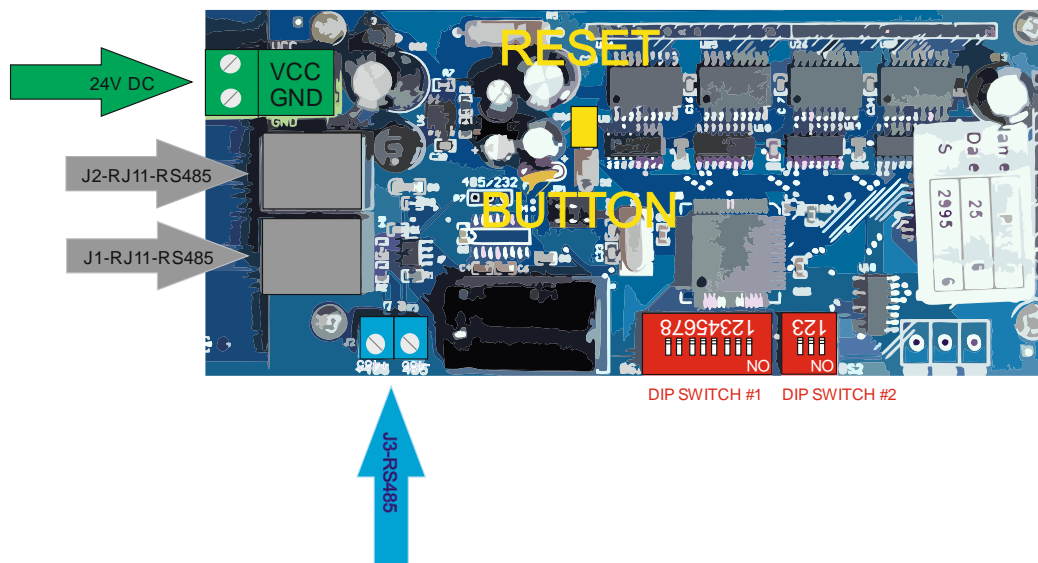
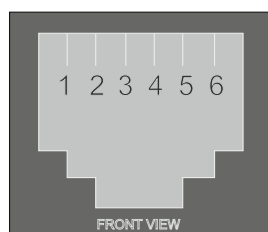


Image 1. Description of inputs / outputs

Name	Description
24V DC	24V DC Power supply. Please observe polarity and see "Power consumption considerations"
J1	R11 socket for data connection. In series with J2 and J3. See below pinout description.
J2	R11 socket for data connection. In series with J1 and J3. See below pinout description.
J3	Screw connector for data connection. In series with J1 and J2.
DS#1	See below for explanation
DS#2	See below for explanation

J1 & J2 description (RJ11 standard)



Pin	Function
1	N/C
2	RS485+
3	RS485+
4	RS485-
5	RS485-
6	N/C

Dip Switch DS#2 : speed of transmission settings.

Value	ON			Speed
	1	2	3	
0	↓	↓	↓	N/A
1	↑	↓	↓	N/A
2	↓	↑	↓	N/A
3	↑	↑	↓	9600
4	↓	↓	↑	19200
5	↑	↓	↑	38400
6	↓	↑	↑	57600
7	↑	↑	↑	9600
	OFF			

Dip Switch DS#1 : address and test mode .

Position	Meaning
0 – 5	Address in binary code (natural)
6	Magnetizing time: OFF - 500 us (default) , ON - 450 us [see remarks]
7	Test mode: ON – test mode ON, OFF – test mode OFF – normal operation



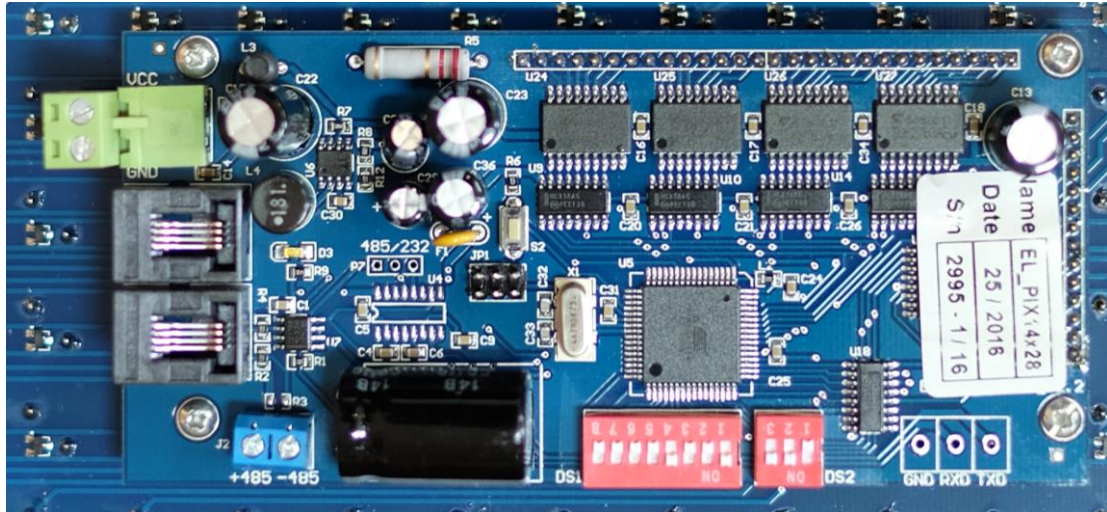


Image 2 A controller

**PLEASE DISREGARD ALL OTHER CONNECTIONS.**

J1 and J2 are sockets which can be used to simplify connections between modules in a multi – size signs. By purchasing short rj11 cables it is possible to perform cabling very quickly.

Please note that each 7x28 region is independent and has to be connected separately. Each one of two controllers must be connected to 24V and rs485 (using either J1/J2 sockets or J3 screw connector).

## Power consumption considerations

We measured time / energy needed to change one complete 14x28 panel from white to black and obtained the following results:

Max. current consumption	680mA
Idle current	40mA
Energy to swap one complete panel	160ms x 680mA
Max. voltage is	25V DC
Nominal voltage:	24V
Suggested power supplies:	1A / panel @ 24V

These above data and suggestions are assuming that you are using 2C configuration and that you are planning to maximize switch time. If power usage is your concern you can reduce by



slowing down transmission. If you drive panels 2x slower, you can use 2x smaller power supplies.

## Refresh speed and magnetizing time

The minimum refresh rate of 10 fps can be achieved under the following assumptions:

- Maximum 10 panels (20 controllers) are operating on one rs485 line
- There is enough power from power supplies (1A/panel)

The limitation of 10 panels/line can be realized by using Ethernet-to-RS485 converters which are connected with master controller by means of 1Gb/s LAN network. Ask for details.

The 10 fps is calculated for a case when all dots are changing their state. In case of real animations only a fraction of dots are being changed. As a result, efficient refresh rate for a video stream is around 25 fps.

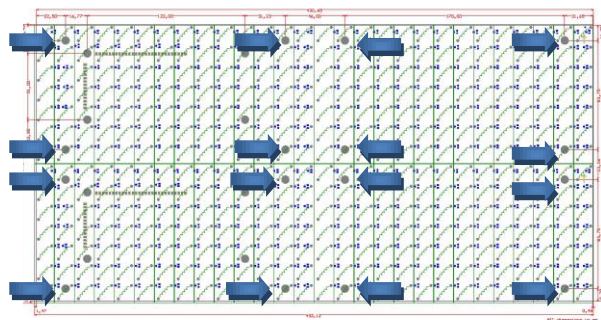
There is an option to shorten magnetizing time which might speed up the refresh rate even further, however at risk of not enough magnetic force energy being transferred to dots. The shorter magnetizing time may lead to problem with stability for some animations and setup, however in many cases are allowing to speed up operation. There is no risk of experimenting with this parameter, you can always return back to the default value.

## Connection to Arduino

Arduino does not have built in rs485 interface. In order to drive a panel a converter is needed. Google for 'RS485 breakout' or ask for advice.

## Mechanical fixing points

Each panel is equipped with brass threaded tubes which serve as a fixing points. Ask for detailed drawings.



### **Connection to PC/MAC**

Most of PC/MAC does not have RS485 port. In order to drive a panel from a PC or MAC, USB to RS485 converter or Ethernet – to – RS485 converter is needed. Ask for details.

### **Driving protocol**

The driving protocol is supplied separately. Please ask.

## **Cleaning and maintenance**

The XY5 panels are mechanical device with small disks being turned by means of magnetic force.

It is strongly advised to protect displays with a housing in order to prevent dust build up.

There are two behaviors of disks which suggests mechanical problem which might be resolved by cleaning procedures:

- Slow or lazy disks - disks which are turning slower then the others or start turning later then the others
- Blocked disks which can't turn.

In order to verify if the disk is only blocked and it is not electrical failure, it is suggested to move manually the blocked disk while being magnetized. If it 'jumps to a right position it means that this dot requires extra cleaning.

### **Usage of vacuum cleaner.**

Vacuum cleaner is a good device because it allows to remove dust from the sign. The main danger while using it is that if a suction force is too strong, it results in either removal of disks from their sockets or at least bending of axis. In both cases disks must be replaced with a new ones because sooner or later they will make problems.

On the other hand the suction force should be strong enough to remove the disks in a delicate manner. If usage of vacuum cleaner is planned, it is strongly advised to set its suction force to a minimum level and test from a distance of approx.. 5 cm if dust is being removed from the sign. In case of too strong force, increase distance or change vacuum cleaner to the one with smaller suction force. It is also advised to use a vacuum cleaner as a final stage of cleaning

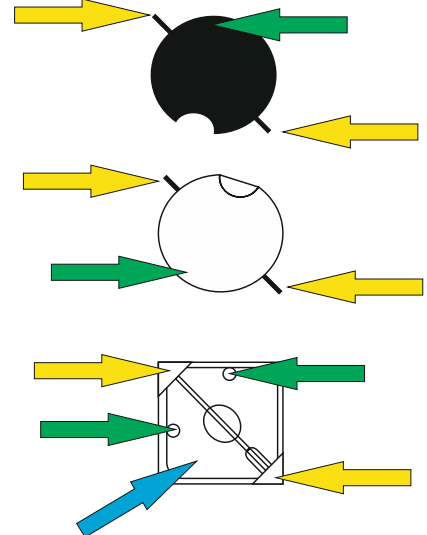
after usage of compressed air. The compressed air is removing dust from inside and the vacuum cleaner helps to remove them from the sign.

**Damages caused by improper cleaning are not covered by a guarantee.**

**These are the mechanical problems which can prevent free rotation:**

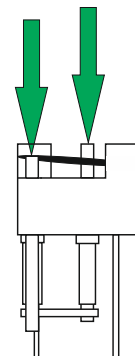
- a) Sockets of disks and disks axes are being blocked by hair or dust particles. In order to clean this point (marked by yellow arrows on the following drawing) it is suggested (in this order):

- i. Use compressed air to remove obstacles
- ii. Use vacuum cleaner set at minimum suction force to remove the obstacle
- iii. Take the disk away from its housing and manually remove obstacles (see 'Handling Precautions' chapter of this manual)
- iv. Replace a dot for a new one.



- b) Housing space (marked with blue arrow on the following drawing) can accommodate dust, hair and small metal particles. In order to remove them, it is suggested to perform the following steps (in this order)

- i. Use compressed air to remove obstacles
- ii. Use vacuum cleaner set to a minimum suction force to remove the obstacles
- iii. Remove disk and clean bottom of a housing with a cotton swab with a drop of 70% technical spirit



- c) Stator pins can glue to disks because of dust combined with humidity creates an adhesive substance. In order to remove it clean points indicated by green arrows on the following drawing with a cotton swab and a drop of 70% technical spirit. If this does not help, replace this disk.

**A daily maintenance which should keep the sign dust free should include:**

- Flip/flop program routine (especially after longer break in operation) at least 5 minutes or 10 minutes after longer than 2 days period of inactivity.
- In case of lazy / blocked disks – cleaning according to above procedures

### **Preventive maintenance**

A preventive maintenance would allow to reduce number of blocked / lazy disks. Time period of this general cleaning is difficult to estimate because this is a function of dust level, humidity level, temperature, etc. A reasonable minimum would be once every 4 weeks however in case in increased number of blocking disks, this time period should be shorten.

**Preventive maintenance should include:**

- Cleaning disks with compressed air (speed of blowing at around 2s/14 dots, angle irrelevant, distance: around 3 cm from dots, assumed usage of technical compressed air containers. It is necessary to use clean air for this operation and to avoid condensation of humidity from this compressed air at disks)
- Cleaning of dots with a vacuum cleaner with regulated suction force and this suction force set to minimum. Distance not closer than 5 cm, angle irrelevant. **It is critical to make sure that suction force is not too strong and is not deflecting disks axes and/or pull the disks out of their sockets completely (see section Usage of vacuum cleaner)**

**DO NOT** use any kind of lubricants or grease. This may help for a while but later block the disks completely.