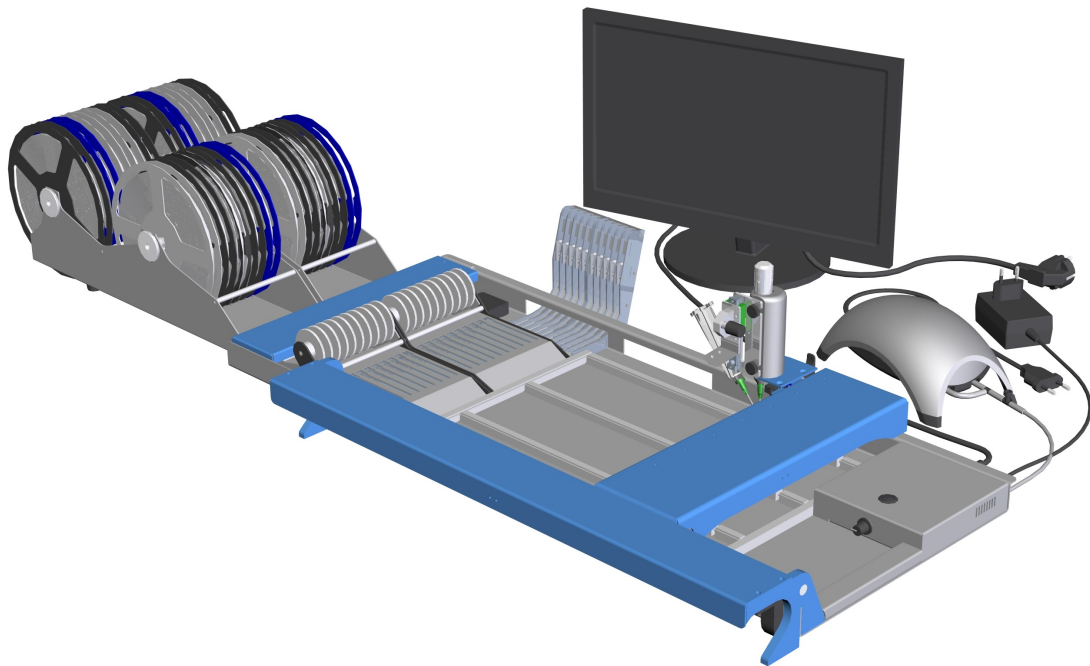


**FORTEX**

# **MPP1 PICK & PLACE MANIPULATOR**



**Operating manual**

**Ver. 2.4**



*Thank you for choosing MPP1 Pick & Place Manipulator.*

*Please read these operating instructions carefully before using the product. The instructions will help you become familiar with the product, its installation and proper use as soon as possible. Please retain this manual for further reference.*

### **Safety instructions**

Use the manipulator only for the purposes specified by the manufacturer, in accordance with the operating instructions and warranty. Read the instructions carefully, the manufacturer is not responsible for damage and injuries caused by improper use.

Dispose of all packaging material and dispose of it in an environmentally friendly manner in accordance with local legislation. If you find damage caused by the carrier, do not use the device and contact your dealer.

The manipulator is intended for indoor use only and must be placed on a flat surface, on a secure, stationary structure. Do not install the manipulator in places with excessive dust and humidity.

For power supply, use a suitable mains plug that complies with your local standards for power supply with a **nominal voltage of 230 V and a frequency of 50Hz.**

**Switch-off device is the power plug.** Power plug must always be accessible in case of an emergency. Protect the charger from any physical or mechanical strain, e.g. bending, twisting, binding, shutting to the ajar door etc. Take special care to socket-outlets, plugs and the locus of entry of power cord into the device. Be careful not to cover vents on the device. The device can overheat itself after prolonged use, which can lead to its damage. If you notice any smoke or unusual smell coming from monitor, vacuum pump, adapter or electronics cover; **turn off the device immediately and contact the seller.** The device can only be moved when it is switched off and all cables are disconnected. Use only approved additional devices or accessories approved by the manufacturer.

*Observe please national and international regulations for occupational safety and health*

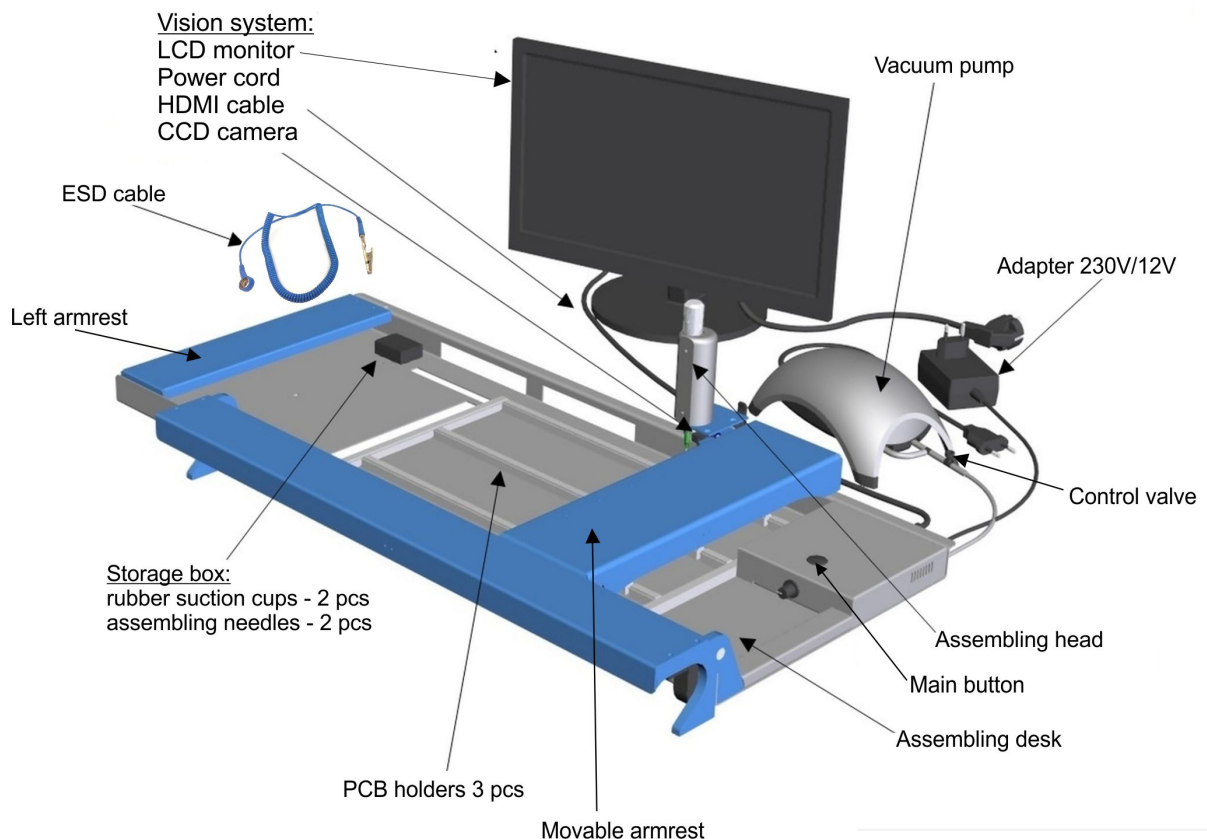
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## MPP1-VIS - Description

**MPP1 - Pick & Place Manipulator** (Manipulator) is a compact system intended for manual assembling of PCB prototypes or small series PCBs. Assembly head performs a smooth movement in both X and Y axis and therefore it allows the user to comfortably pick the components from the feeders and put them gently on a PCB. Precise movement of the header in Z axis direction, allows very gentle placing of larger components (Integrated circuits, Processors) into the solder paste, using the integrated vacuum switch. Rotation of components can be regulated by a button on a manipulator head. Effective lighting is also integrated in an assembling head. Vision system makes assembly of small components like 0603, 0402 and large like QFP much easier. The captured image from the CCD camera is displayed on the LCD monitor. The quiet high-performance vacuum pump is equipped with a control valve that allows change the level of vacuum.

### Standard delivery contains:



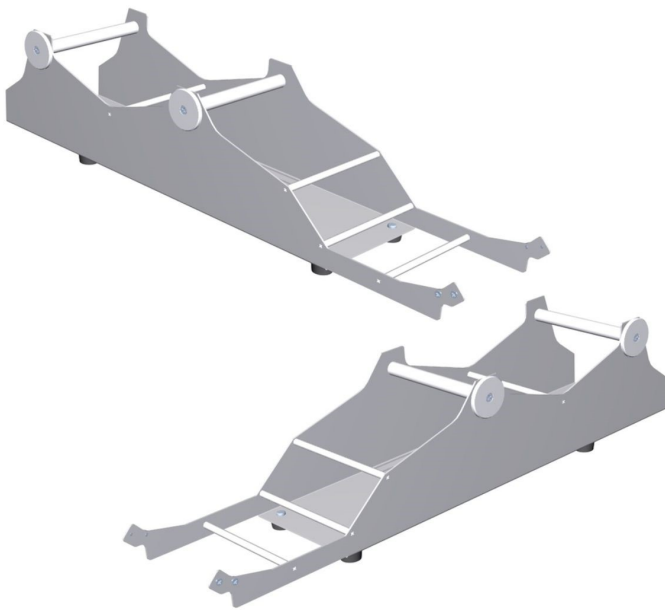
## Optional accessories:



Tape feeder



Combined tape feeder



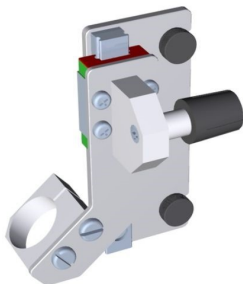
Reel holders



Stick feeders



Additional PCB holder



Dispensing head

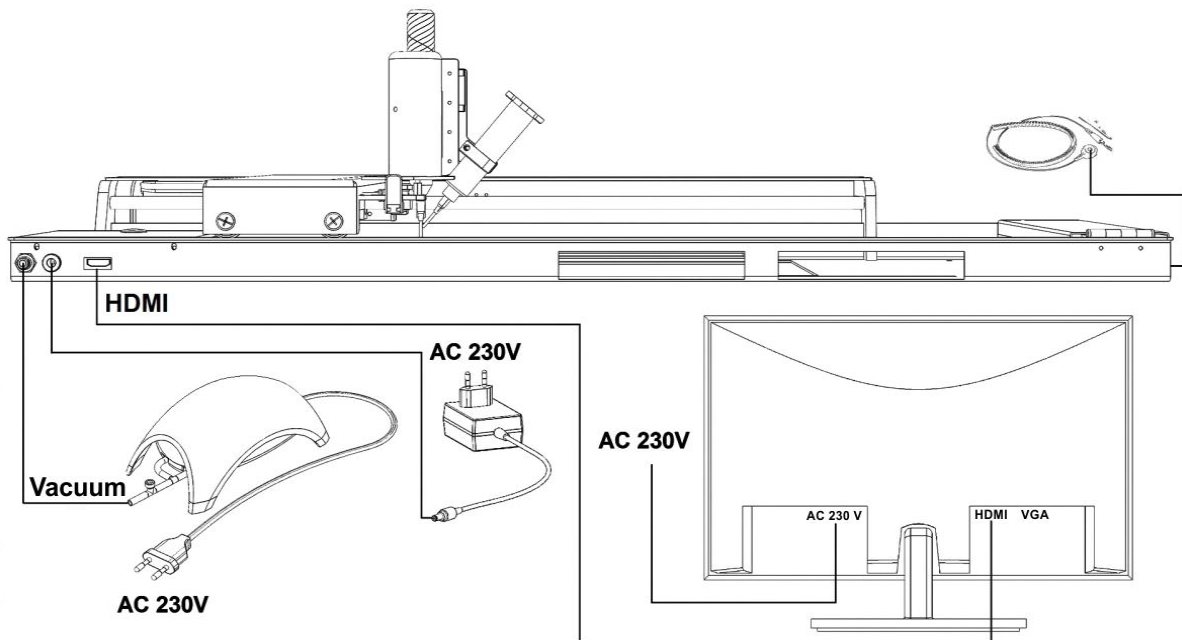


Dispenser and accessories

## Technical data:

Manipulator dimensions:	760 x 385 x 195 (H) mm
Manipulator + feeders dimensions:	1145 x 430 x 195 mm
Motion of head in X/Y/Z axes:	480 x 235 x 15 mm
Weight:	6 kg
Maximum PCB dimensions :	380 x 295 mm
Working area dimensions:	380 x 250 mm
Power supply:	230 V /12 V
Vacuum pump power supply:	230 V, 6 W
Vacuum/flow:	>0,024 MPa / 5 dm <sup>3</sup> /min

## Scheme:



## Caution!!!

Before switching-on the device, make sure that all cables are connected correctly and that the vacuum hose is connected to both the pump and the manipulator. Ground the device with an ESD cable (included).

Plug the monitor, vacuum pump, and adapter into an electrical socket (AC 230V).

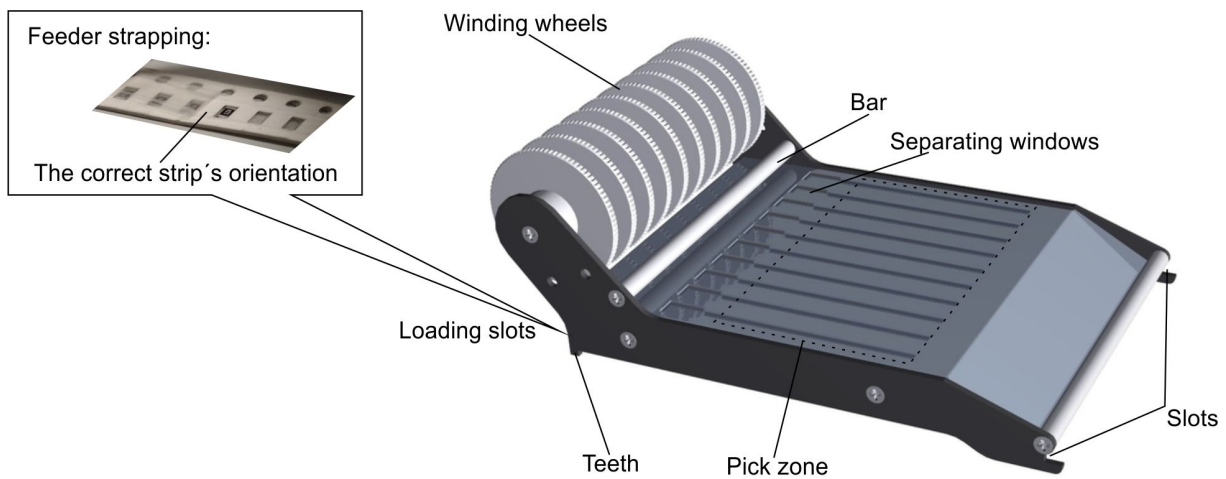
Do not disconnect any cables, disconnect the adapter or the vacuum pump from the socket while working with the manipulator! Always switch off the device with the main button!

After switching-off the manipulator, you can disconnect the monitor, adapter, and vacuum pump from the socket.

## Tape feeder

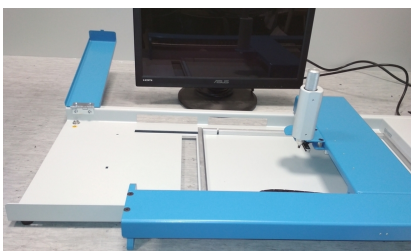
Multichannel tape feeder is a compact device which enables the removal of the covering foil from tapes and picking component. Furthermore it secures the position of tapes while picking the components and it ensures the removal of empty tapes. Flexible pinch plates allow loading the tapes of various thicknesses. Tape feeder is easily removable from the assembling desk. When using more than two feeders it is possible to avoid unnecessary loading or unloading (which is a time consuming operation), particularly, it is advised that frequently repeated types of assembling had their respective feeders.

Reel holders can be attached to the feeders, which is beneficial while feeding the tapes from the reels. It increases the comfort of assembling and ensures continuous feeding of the components tape. Once the work is finished it is possible to remove the reel holder along with the attached feeder at once, or to replace it with another, which ensures swift transition between individual tasks.

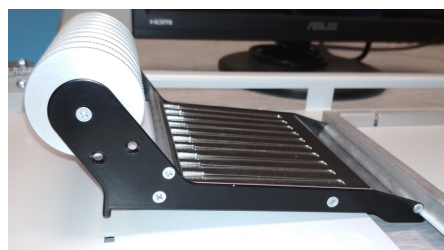


## Placement of tape feeder on the assembling desk

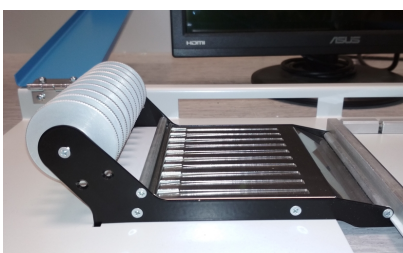
It is possible to put two tape feeders on an assembling desk at once:



Tilt the left armrest.



Tilt the Feeder forward and slide it all the way into the slot.

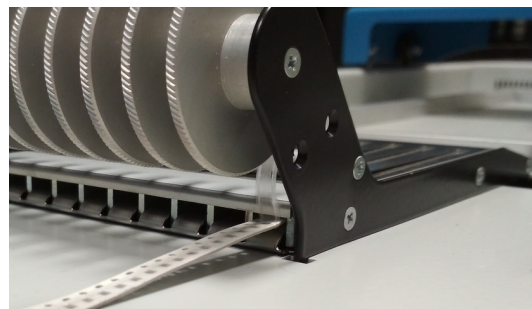
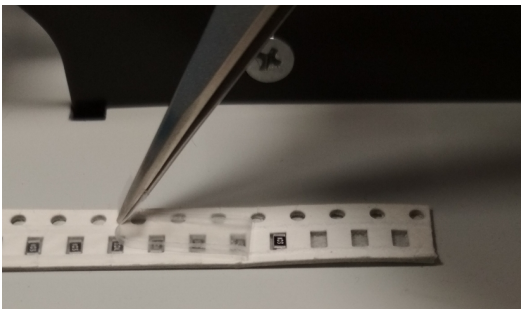


When the feeder is inserted correctly, the teeth under the wheels fit into the small holes that fix the feeder against shifting.

## Feeder strapping

**Important:** It is recommended to perform this operation on the assembling desk. Always load the strips according to the principle that the strips must be inserted into the feeder from left to right, with the cover foil facing up and the holes in the strip on the far side from the operator. Otherwise the picking of the components will be difficult and the tape foil will deform while winding!

Before inserting the tape of SMD components to loading slot, peel the foil to 15-20 mm and insert it into the slot under the winding wheel. (The foil can as well be peeled in the separating window in front of the winding wheel and the bar using tweezers.)



Carefully slide the strip forward until it appears in the separating window in front of the bar. Grasp the foil and peel it to a length of 5-7 cm.

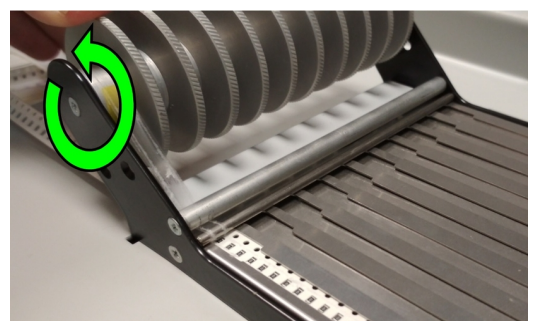
**While foil is peeled, strip in the channel is moving forward, so make sure that the components do not pop out!**



Drag the end of the foil under the bar in front of the winding wheels. Stick the adhesive tape (size approx. 6 x 50 mm) on the free end of the foil, then stick the foil onto the winding wheel so that it winds anticlockwise. (Dragging the foil over the bar can result in its rupture or an uneven movement of the tape!)



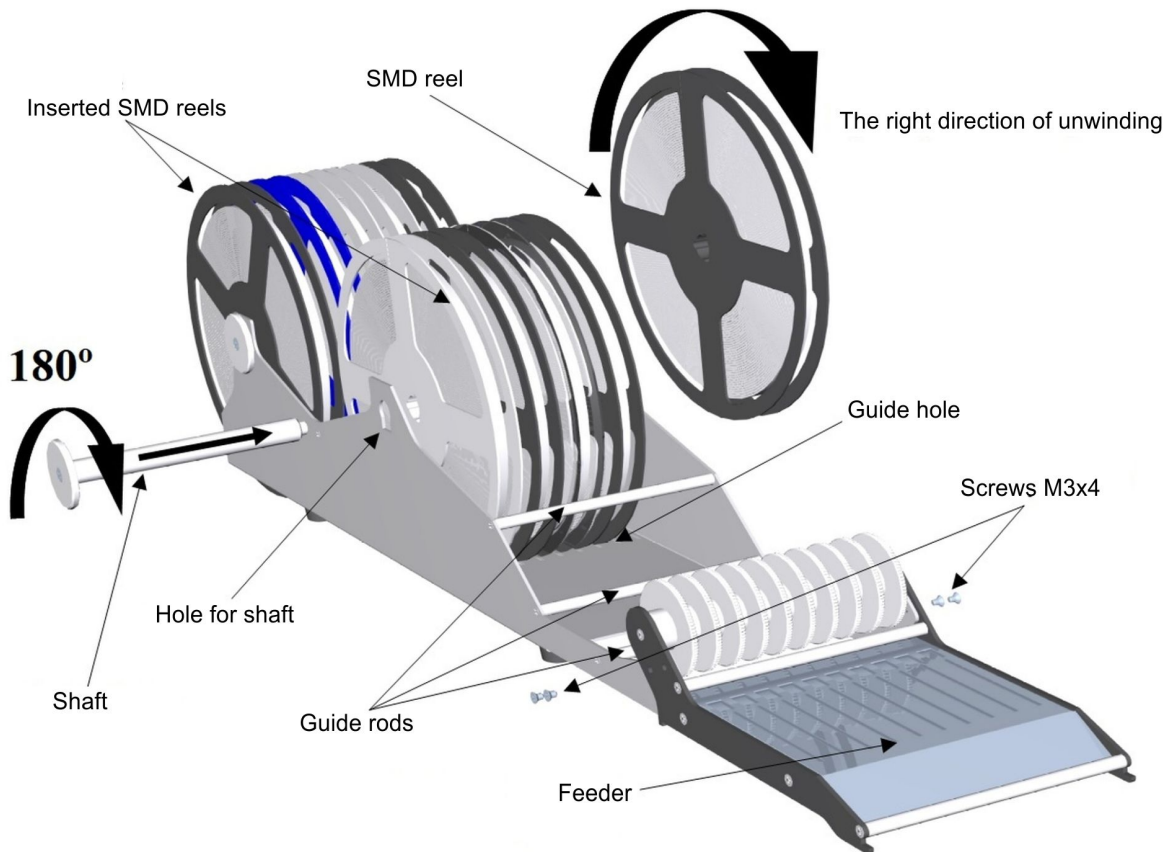
Move SMD component tape forward carefully by foil winding onto the winding wheel. If the strips are damaged or broken, the strip may jam or slide heavily (e.g. short-cut straps).





## Reel holders

A reel holder, which enhances the comfort of assembling, can be attached to the tape feeder. Mount the Feeder using the M3x4 screws included in the delivery!



You can add or replace SMD reels in any phase of assembling. By default, two pieces (one pair) of reel holders are sold as an accessory to MPP1

**Reel replacement** - turn the shaft so that the safety pin gets into the cut - out and then take out the shaft. Insert the reels to the guide hole of holder. **Be careful about correct direction of tape unwinding from the reel.** Insert the shaft through the shaft hole and slide it over the reels till it fits into the smaller hole in the sidewall on the other side. After moving the safety pin through the cut - out, turn the shaft by 180°. This lifts the reels and secures the shaft against ejection. The tapes must always be dragged under the guide bars!

## Stick feeder

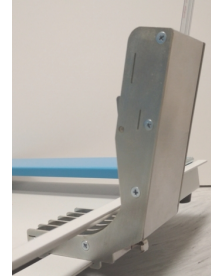
The IC stick feeders allow the feeding of integrated circuits of various sizes directly from the sticks.

### Insertion of IC sticks:

Remove the Feeder from the assembling desk, put it backside on a flat horizontal surface. Take out the safety latch from one end of the stick so that the integrated circuits do not spill out. Slide this end under the flexible holder as far as it goes. Repeat the procedure for the required number of positions.



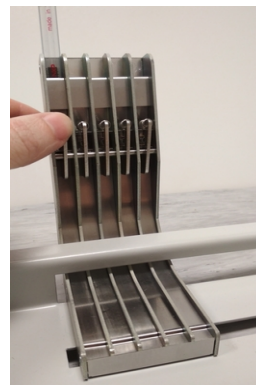
Holding teeth and the safety hook are used to fix the stick feeders to the assembling desk. Press the safety hook as far as it goes. Insert the stick feeder (along with the sticks) through the rear opening and insert both front and rear teeth under the metal plate. Release the safety hook to fix the feeder. Make sure it is fixed properly.



### Feeding of the ICs:

Press the pinch pad of the dosing mechanism in the requested channel. One piece of the IC will slip from the dosing mechanism to the picking position, from where it can be easily picked up using a respective needle or a suction cup.

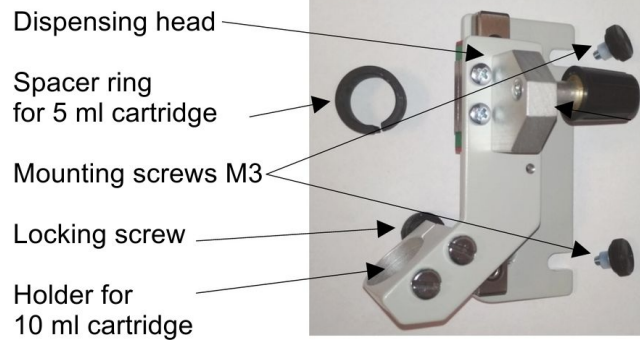
If any of the sticks is emptied and you do not want to remove the entire feeder, you can carefully overfill integrated circuits from the full tube to the empty one.



## Dispensing head

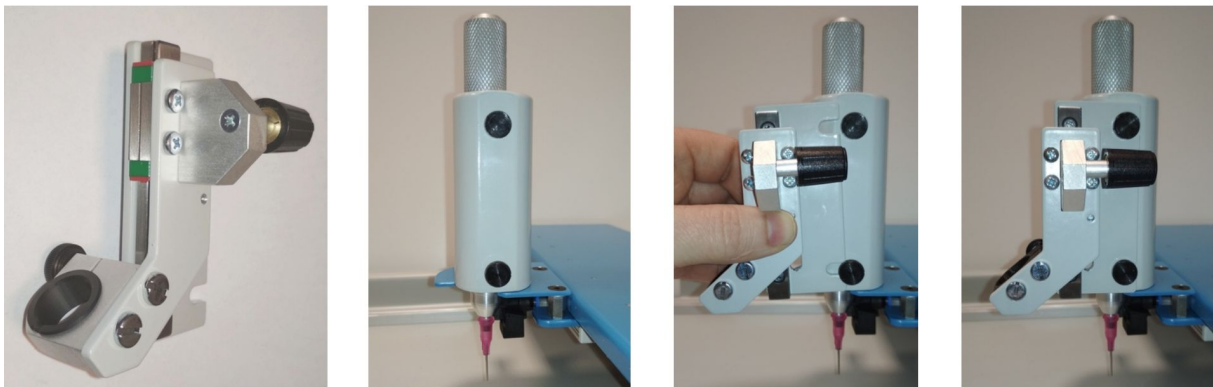
Dispensing head allows convenient dosing of glue or solder paste from a 5 or 10 ml cartridge. **However, it is necessary to purchase a suitable dispenser.**

Description:

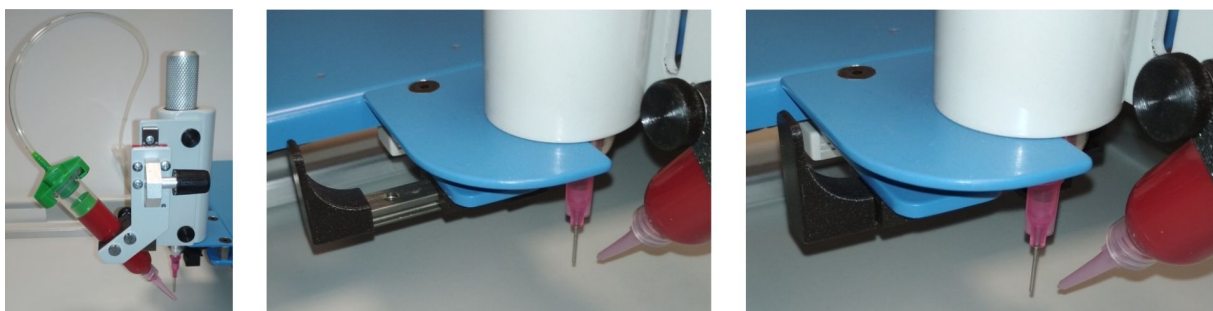


## Mounting of the dispensing head

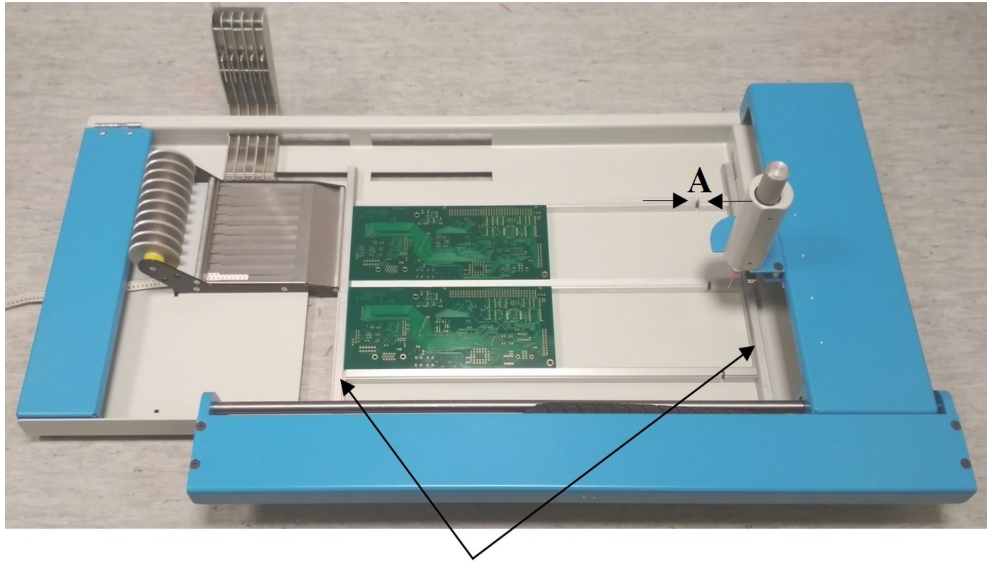
Screw the M3 mounting screws into the holes on the assembling head. Insert the dispensing head as far as it goes under the M3 mounting screws heads. Tighten the M3 mounting screws.



Insert the 10 ml cartridge into the holder so that the end of the dispensing nozzle is at the same height as the end of the assembling needle. (For a 5 ml cartridge, also insert the spacer ring into the holder.) Fix the cartridge position by a safety screw. Move the CCD camera to the front position so that the dispensing nozzle is located in the center of the screen. **Connect the hose into the dispenser (not included).**



The PCB holders can be removed from assembling desk or relocated by pressing both ends together.



Side holders

Place the PCB holder on the surface of the assembling desk between the side holders. First, slide the tab on one end of the holder all the way into the groove at the bottom of the side holder. Lower the PCB holder and the protrusion will snap into the groove of the second side holder.



Place the printed circuit board on the upper groove of the PCB holders. Set the spacing between the PCB holders to the width of the PCB. If the size of the PCB allows it, place more pieces on the work surface.

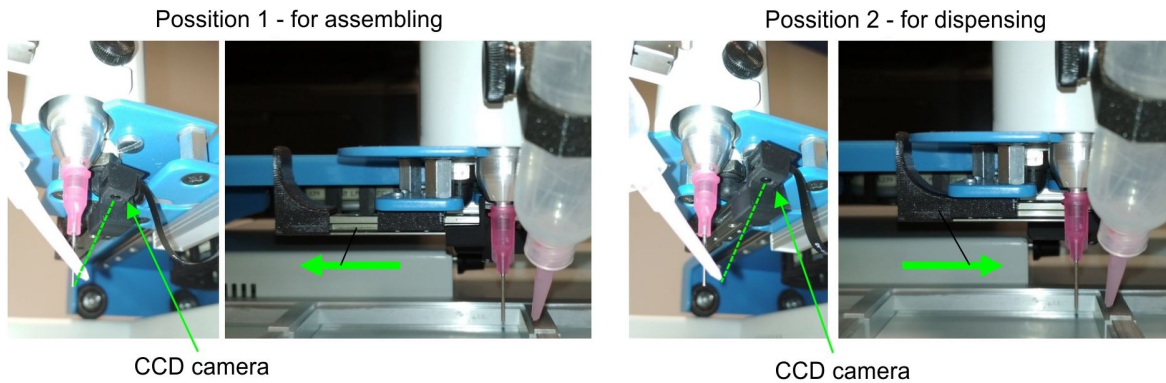
## Vacuum pump

Caution! Use only the vacuum pump that is included in the delivery (the pumps are specially adapted for use with manipulators). Switch on the pump before starting the manipulator and switch it off after manipulator has been switched off. Set the intensity of the vacuum with the control valve. The maximum vacuum is required to lift large or heavy components, for small SMD it is recommended to reduce the vacuum. The use of rubber suction cups or a suitable needle diameter significantly affects the vacuum required to lift the component.



## Using the Vision system

For assembling small components of size 0402 as well as for precise placing of the integrated circuits with a very fine pitch, a miniature CCD camera is built into the assembling head. The camera has 2 positions and shows either assembling needle or dispensing nozzle.



Enlarged image taken at a small angle is displayed on a large 15" monitor. The focus of the CCD camera is set at the factory, it does not require any adjustments from the operator. It is technically impossible to install the camera onto the vertical axis of the assembling needle, that's why it is installed in a small angle. This can result in a slightly blurred image around the edges of the LCD display.

### Technical data of Vision system:

#### CCD camera:

Viewing angle: 78°

CMOS sensor: 1/4" - 8 Mpx

Video resolution: 1080p / 30fps - Full HD

#### PC monitor

Display dimensions: 15.6" (40 cm) widescreen 16:9

Resolution: 1366 x 768 px

Dimensions with stand: 378 x 281 x 189 mm

The PC monitor has standard settings (brightness, contrast, color), which can be individually adjusted according to the actual need.

The main switch on the control box turns on/off the camera electronics as well as the lighting in the head. The lighting can be adjusted with a rotary knob on the front wall of the box.

## Work with the Manipulator

The manipulator MPP1 was developed for manual assembling of SMD components. With different types of feeders it is possible to assemble SMD components from strips but also from IC sticks.

**Before switching on the manipulator, check that all cables are connected correctly and that the vacuum hose is connected to both the vacuum pump and to the manipulator. Ground the manipulator with an ESD cable (included). Plug the monitor, vacuum pump and adapter into an electrical outlet (AC 230 V).** If all cables are connected and the vacuum pump is switched on, you can switch on the manipulator with the main button on the right. The button lights up and the camera view appears on the screen within 3 - 5 seconds. If the preview does not appear, check that all cables are connected properly.

**Do not disconnect any cables, disconnect the adapter or the vacuum pump from the socket when the manipulator is switched on!** Place the feeders on the assembling desk as described.

### Assembling

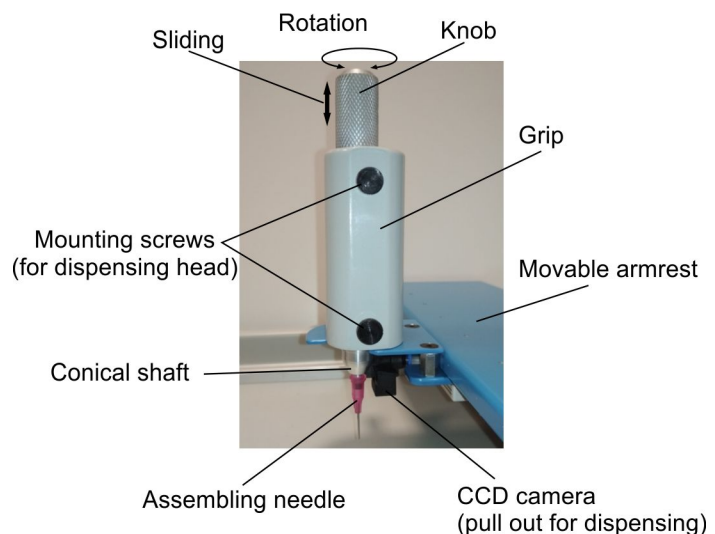
**Attach the needle to the conical shaft - put it gently so that it can be easily removed. For small components (0201, 0402) use a thinner pink needle, for larger components (603, 1206, SO8, SO16 etc.) a thicker brown needle.** Use a rubber suction cup to fit larger integrated circuits or the processors. Slide the rubber suction cup onto the assembling needle so that the end of the assembling needle stayed inside the suction cup. Place the required number of assembled PCBs on the PCB holders.

Place your left hand on the left armrest, your right hand put on the movable armrest and grasp the assembling head with your palm. The thumb controls the rotation of the knob (ie the component) as well as the vertical movement of the assembling needle. The conical shaft of the needle has a free movement in the range of 4-5 mm, which is used to turn the vacuum on and off.

Move the assembling head over the component, carefully bring the end of the needle closer to the component surface and lightly touch it. This sucks the component to the end of the needle. When the needle touched the component and the component is sucked, stop the downward movement of the button. Gently release the button to return to its primary upper position. Move to the desired position, turn the knob to direct the component correctly and press down the knob to place the component on the PCB.

When the mounting head is pushed to the lowest position, the vacuum is switched off (reduced to a minimum) and the part remains stuck in the paste. When we release the head and the spring pushes it to the highest position, the vacuum is switched on again (increased to the maximum). Small parts adhere to the paste without reducing the vacuum.

**Always switch-off the manipulator with the main button! After switching off the manipulator (using the main button), you can disconnect the monitor, adapter and vacuum pump from the socket.**



## Maintenance

The manipulator does not require special maintenance. Make sure that the round rod of movable armrest is neither covered in dust nor messed with various impurities. It must be kept lightly oiled. Larger impurities (metal or wood sawdust etc.) can damage linear bearing. The assembling needle must be cleaned from solder paste after work, because later cleaning can be problematic if the paste dries up.

The assembling head is maintenance-free, no further lubrication is required. Improper intervention can damage the assembling head, e.g. non-linear movement may occur or excessive oiling can leak and degrade the PCB.

Always keep the feeders dust-free and it is recommended that you clean the sliders from dust before use to prevent them from sticking to the IC's pins.

## Service

In case of manipulator failure, please contact the dealer or the device manufacturer. Only original spare parts available from the manufacturer must be used for repair. **Do not repair in any case the manipulator yourself.**

## Disposal

Dispose of the packaging in an environmentally friendly manner. It is made of ecological materials, which can either be recycled or disposed of in local waste recycling site.

Do not dispose of electrical tools in the municipal waste. Dispose of electronic tools in accordance with European directive no. 2012/19/EU, which states that worn out electronic tools and devices must be collected separately and handed in for ecological recycling.

To get more information about disposal of worn out electronic devices, please inquire at the relevant public administration body.

We reserve the right to make any changes in the operating manual of the device.



**Packing list**  
**MPP1 - PICK & PLACE MANIPULATOR**  
**version 2.4**

Serial number: .....

<i>Standard delivery</i>	<i>Volume</i>	<i>Packed</i>
Assembling desk MPP1 with movable armrest and assembling head with integrated CCD camera	1 pc	
PCB holder	3 pcs	
Storage box	1 pc	
Assembling needle NEED1, brown	1 pc	
Assembling needle NEED2, pink	1 pc	
Rubber suction cup dia 3.5 mm	1 pc	
Rubber suction cup dia 6.4 mm	1 pc	
Vacuum pump with the control valve and hose (1m)	1 pc	
ESD cable with crocodile clip	1 pc	
Adapter 230 V / 12 V	1 pc	
PC monitor (HDMI cable, power cord)	1 pc	
Operating manual	1 pc	
Warranty	1 pc	

<i>Optional accessories</i>	<i>Volume</i>	<i>Packed</i>
Tape feeder		
Tape feeder combined		
Reel holder		
Reel holde combined		
IC feeder		
IC feeder		
Assembling needle (code )		
Rubber suction cup (code )		
Dispensing head		
PCB holder		
Dispenser (code )		
Other:		

<i>Date</i>	<i>Packed by</i>	<i>Checked by</i>