FOX SMD Pick & Place System Description

Version 1.0 / August 2016

Releases

Date/vis	Version	Modified
10.08.16/FEM	1.0	First issue for FOX

Content

1.   General Description

The new SMD FOX – The Compact Pick-and-Place Machine. It offers180 feeder lanes on one sqm floor space. The new FOX is perfectly suited for use in small production environments and fits through narrow doors. The new FOX can also be fitted with a dispense valve for SMD glue or solder paste for hassle-free manufacturing of 2.5D assemblies. In designing FOX, special emphasis was placed on making product changeovers fast and simple with this machine. The large number of feeders allows many different components to be immediately available for production. Fast, intuitive teach-in of components and import of CAD data is made possible using the proven and well thought out ePlace software. Linear motors and a mineral cast frame make FOX a very sturdy, durable, low maintenance machine.

The new FOX is hereby well prepared for facing nowadays challenging customer demands!

Connector panel
(Power, LAN, Air, SMEMA)

1.1. Quick overview of FOX family:

	FOX1-PP-SA	FOX1-PP-C	FOX1-PPD-SA	FOX1-PPD-C
P&P axis	1	1	1	1
Dispensing preparation			✓	✓
Stand Alone	✓		✓	
Inline (manual)		✓		✓

1.2. BUM beam configurations

The FOX comes with two different BUM (Base Universal Module) configurations:

xxxx-PP-xx → For *P*ick and *P*lace applications only

Tool changer   Bottom Camera   Chip Bin   Calib Plate   Calib Plate Vision

Calib z-height   Calib Plate Dispensing

Medium Bin

xxxx-PPD-xx → For *P*ick and *P*lace and *D*ispensing applications

1.3. Standalone Configuration: FOX1-PP-SA and FOX1-PPD-SA

Up to 406 x 305 mm

BUM Beam

Each Feeder Cassette can have up to 10 lanes
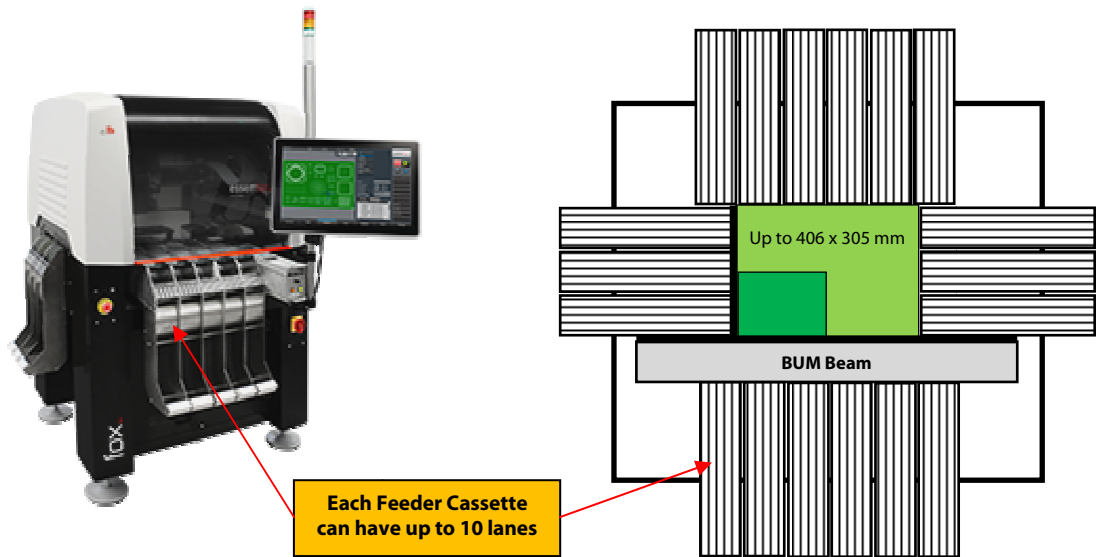
FOX1-PP-SA / FOX1-PPD-SA with up to 180 CLM Feeder lanes

Standard features:

	FOX1-PP-SA / FOX1-PPD-SA
Min. PCB size	20 x 20 mm (0.8 x 0.8″)
Max. PCB size	406 x 305 mm (16 x 12″)
Included PCB Holder	3x PC-LP-SUP
Included support pins	3x PC-SUP-C00 (single fix)
Edge Clearance	3.0 – 5.0 mm (0.11 – 0.2″) (varies with PCB thickness)
PCB thickness	0.5 - 3.5 mm (0.02-0.13″)
Tool Changer	1 x 36 positions with: 6 x standard nozzles included

Corner of PCB table and toolchanger

1.4.   Inline Configurations: FOX1-PP-C and FOX1-PPD-C

Up to 406 x 305 mm

BUM Beam

No Feeder Cassettes can be mounted on the sides!
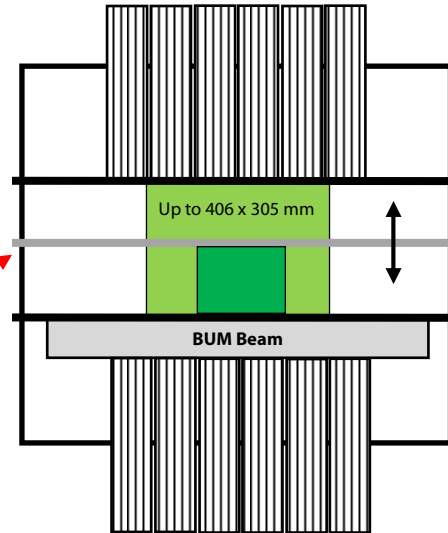
FOX1-PP-C / FOX1-PPD-C with up to 120 CLM Feeder lanes

Standard features:

	FOX1-PP-C / FOX1-PPD-C
Min. PCB size	50 x 50 mm (2 x 2")
Max. PCB size	406 x 305 mm (16 x 12")
Conveyor type	3 stage with manual rail adjustment
Included support pins	3x PC-SUP-C01 (single move)
Edge Clearance	Top side 3 mm (0.11") Bottom side 5 mm (0.2")
PCB thickness	0.5 - 5 mm (0.02 - 0.2")
Tool Changer	1 x 36 positions with: 6 x standard nozzles included
Possible process flow	Left-Right / Right-Left / Batch Left-Left / Batch Right-Right

Conveyor

BUM Beam

Feeders

2.   FOX Standard Features

2.1.   State of the Art Technology

- Controllers with real time-logging
- Linear motors
- Movement controlled via Gigalink-Bus
- Optimized movement in 3D
- Fully automatic calibration using newest mapping technology
- Closed loop axis control
- Zero-clearance direct drive of theta-axis

➔ optimized timing
➔ fast and high dynamics
➔ fast communication
➔ fastest speed
➔ high accuracy machine
➔ full control
➔ high accuracy
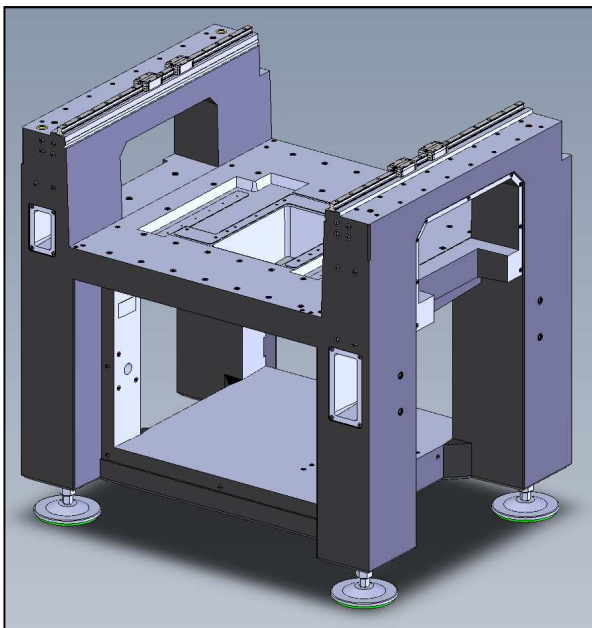
Base-Frame:

Symmetrical mineral casting
- Superior vibration absorption
- Stable performance
  - ➔ No thermal drifts
- Long term performance
  - ➔ No permanent deformation (as welded frames)
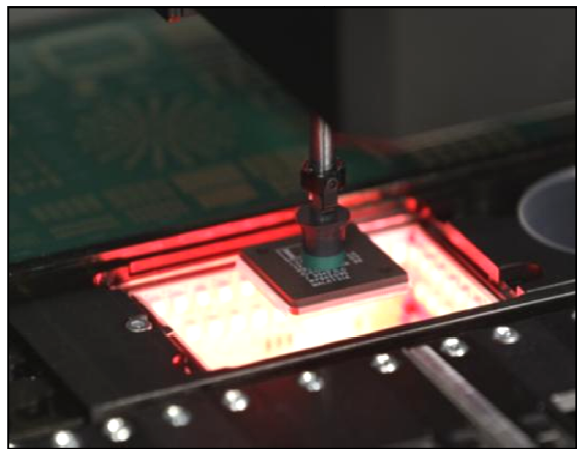
Closed loop axis control
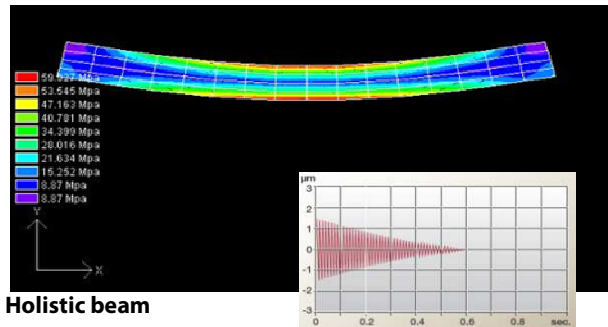
Holistic beam

2.2.   Compatibility/Upgradeability

- FLX feeder can be used on the system
- Dispenser Valves from G2 series can be used
- Standalone to inline upgrade
- Cascading of machines
- Retrofitting of several options

➔ investment protection for existing customer
➔ investment protection for existing customer
➔ modular growth path
➔ higher cph and feeder capacity
➔ flexibility

2.3.   Features included in basic machine

The FOX comes with a lot of features included in the basic package:

- 1 x high precision Pick & Place axis
- High speed feeder bus for up to 180 intelligent feeder places
- Universal magnetic PCB mount and support pins
- 6 nozzles for components 0201 up to 80 x 33 mm
- Calibration nozzle Z-axis height
- Calibration set for placement axes and camera system
- LED interior lightning
- HD Touch Screen
- ePlace software system functions
- Component library
- Universal CAD conversion software
- Detection of bad PCB's in panels
- Process optimization software
- Automated placing constraints
- Direct help functions for the operator
- Standard user level management
- Multilingual
- Machine PC with Windows 10
- Maintenance kit

2.4. Revolutionary ease of use

- 19", 16:9 HD wide Touch screen (capacitive) ➔ Operator friendly
- Ergonomic arrangement of operating elements ➔ Operator friendly
- Operator dedicated Multilanguage capability ➔ Operator friendly
- GUI with intuitive User guidance ➔ Operator friendly
- User level Management ➔ Full security and traceability
- ePlace inside ➔ based on state of the art "eez-Technology"
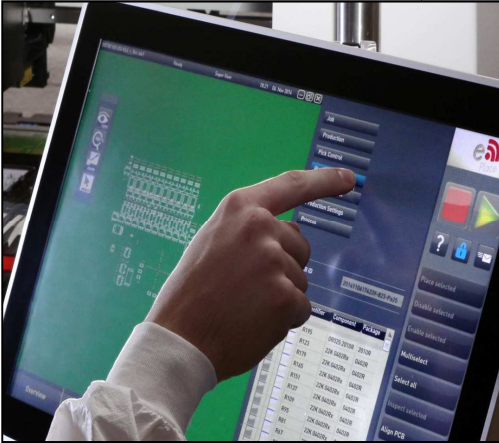
Ergonomic operating elements

19" wide touch screen
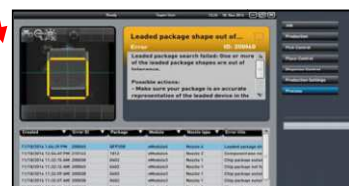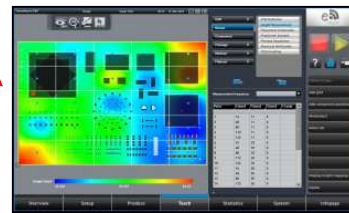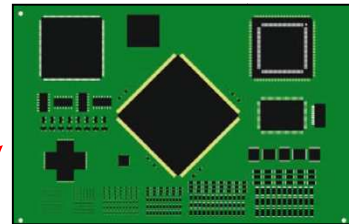
Intuitive user guidance

2.5.   Vision system

- Optional Cognex SMD4 with patented PatMax technology ➔ accuracy; proven technology
- Digital bottom camera (2.4 Megapixel = 26µm/pixel) ➔ accuracy
- Three programmable light settings ➔ optimal illumination
- Diagnostic system ➔ fast root cause finding
- Automatic teach-in of components ➔ user friendly
- Zoom functions ➔ component range; accuracy
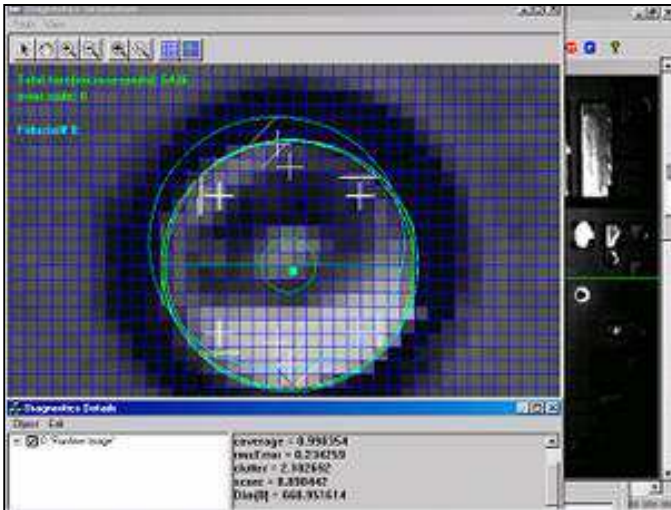
PatMax technology

Top Camera and illumination
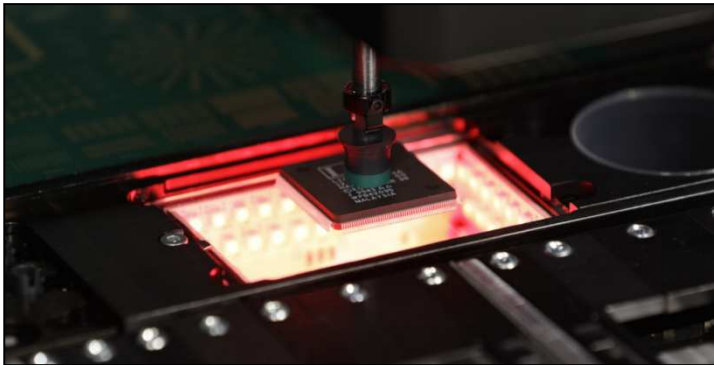
Bottom camera and illumination

Automatic Teach-In of components

Technical facts cameras:

Top Camera:
FOV (Field of View) = 24 x 18 mm
Pixel size X/Y: 18.9 um
1.2 MP – b/w

Bottom Camera :
FOV (Field of View) = 50 x 30 mm
Pixel size X/Y: 26.1 um
2.2 MP – b/w

2.6. Application Range

- Component range 0201 to 80 x 30mm (with option MFOV) → flexibility
- Component height up to 18mm (25mm on request) → flexibility
- Customized nozzles on request → for odd shape components

Component range

High components

Standard and customized nozzles

3. Overview Standard & Optional Features

Please see **FOX specification sheet** for overview and specifications!

4. Machine Options

4.1. CLM Feeder rack & Feeder

4.1.1. Configuration Examples for CLM Feeder racks FOX
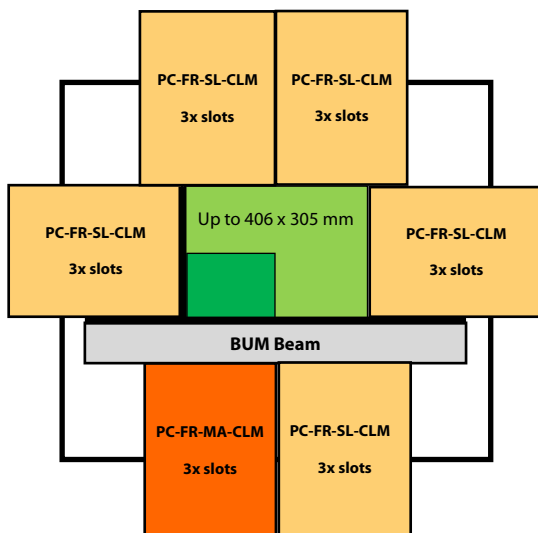
Stand Alone: Full CLM Feeder rack configuration
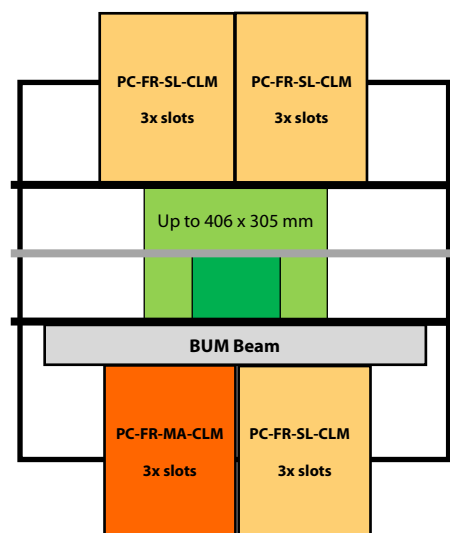
Inline: Full CLM Feeder rack configuration
(no racks can be mounted on the sides)

4.1.2. PC-FR-MA-CLM / PC-FR-SL-CLM

On FOX, **all CLM feeding systems** with intelligent interface require a CLM Feederrack Master (PC-FR-**MA**-CLM). Depending on the amount of CLM Feeder, up to 5x additional CLM Feeder rack Slave (PC-FR-**SL**-CLM) can be added. The rack is mounted on the machine base.
Feeder cassettes can be pulled out and in again for refilling purposes on a different rack position without losing pick position. The system is hot swap able, means that removing and putting back feeder cassettes during running machine is possible. Nevertheless, it is recommended to be very careful working so due to risk of crashing feeder cassette with P&P axis. This could happen when feeder cassette is wrongly introduced into the machine.

CLM Feeder rack with Feeder Base Plate

4.1.3. CLM940 Feeder Base Plate

Description

All CLM feeding systems with intelligent interface require a CLM940 feeder base plate. The base plate is mounted on the machine base.
On each CLM rack can be mounted up to 3x base plates CLM940.
Pickup positions don't have to be re-taught because the base plate (CLM940) precisely repositions the feeder.

Ordering Guide

Use the "Machine Configurator" (Excel) for feeder selection and order the required number of feeder base plates.
For maximum flexibility and minimum changeover time it is advisable to use the machine with the maximum quantity of CLM940 feeder base plates.

CLM940
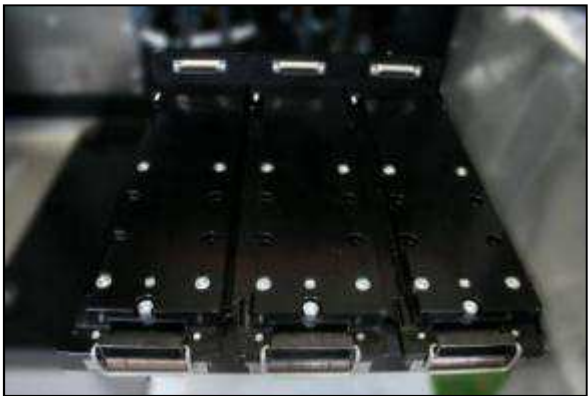
CLM Feeder rack with 3x base plates CLM940

Calculation examples:

Configuration full feeder:	FOX Stand Alone	FOX Inline
Max. quantity of CLM racks PC-FR-xx-CLM	6	4
Max. quantity of CLM940	18	12
Equivalent feeder capacity	180	120

4.1.4. CLM950-CLM958: Tape Feeder Cassette

4.1.4.1. Description

Feeder cassettes offer large feeder capacity within a small form factor. The cassette feeders are motorized and programmable; therefore they provide a very accurate and smooth feeding.

For each feeding lane, the pitch can be programmed in the software, no mechanical change is necessary. For irregular pitches, the feeder makes a standard pitch and the machine picks from intermediate positions as well.

Tape down holder and feeding

Intelligent interface to machine

Reel holder
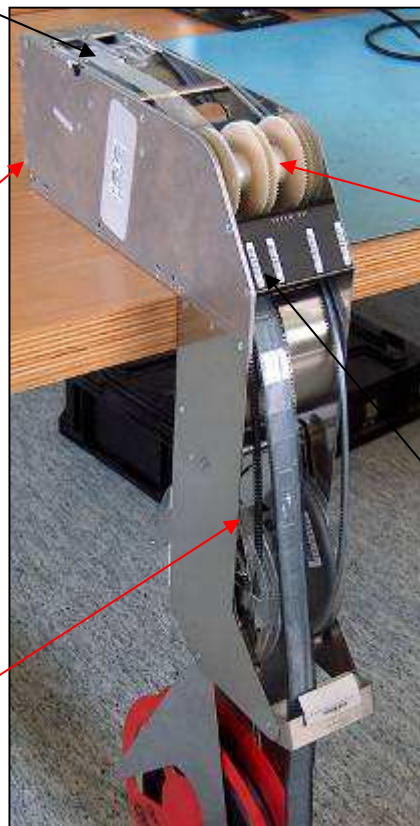
Feeder setup anywhere: no feeder rack required

Cover tape spool with magnetic lock
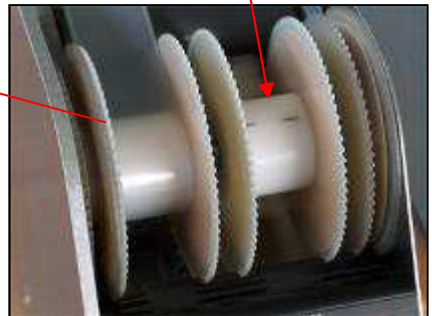
Cover tape spools
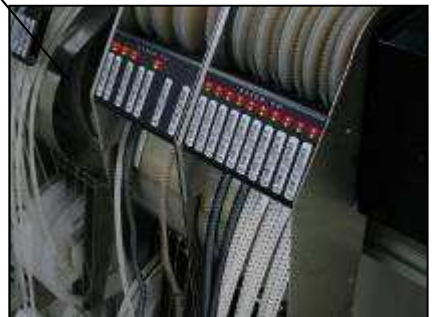
LED status display (green and red LED) and lane identification code.

4.1.4.2. Upgrade of Existing Feeder Cassettes

The old CLM/FLX Feeder (only LED type) must be upgraded to make it compatible to the FOX platform. After the upgrade with Essemtec Article **SERV-PFFU** the feeders can be still used on the platform CLM/FLX. For each feeder cassette one SERV-PFFU is required. This upgrade will significantly reduce the investment costs compared to new feeders.

Other CLM/FLX feeder (not LED type) can also be upgraded, but with restriction that those feeders cannot be used anymore on CLM/FLX machines:
SERV-PFVU: CLM960 (Vibrafeeder)
SERV-PFAU: CLM942 (Intelligent adapter cassette for single feeders for tall components)

4.1.4.3. Ordering Guide

Different cassette configurations are available. Each configuration is given and not changable (e.g. CLM952-LED includes 3x12mm and 3x16 mm feeder). Use the "Pick&Place Configurator" (Excel) for feeder selection.
For single feeders for tall components please see next pages.

Intelligent Tape Feeder Cassettes	8 mm Lanes	12 mm lanes	16 mm lanes	24 mm lanes	32 mm lanes	4&7"/15" reel holders*
CLM950-LED	10	-	-	-	-	10/0
CLM951-LED	4	1	1	1	-	5/2
CLM952-LED	-	3	3	-	-	3/3
CLM953-LED	4	4	-	-	-	4/4
CLM955-LED	-	7	-	-	-	7/0
CLM956-LED	-	-	5	-	-	2/3
CLM957-LED	-	-	1	3	-	1/3
CLM958-LED	2	-	-	-	2	2/2
Pitch	Programmable 2 mm, 4 mm, 8 mm, …					
Maximum tape height	6.5 mm/0.26"					

*4&7" reel holders can be used for 4" mini reels and 7" standard reels

4.1.4.4. Accessoires

All feeders are delivered with reel holders (see table above). The reel holders can be ordered separately for specific feeder cassette setup or spare parts.

Order number	Reel diameter	Reel width	Remarks
CLM7-8	7"	8 mm	
CLM7-12	7"	12 mm	
CLM7-16	7"	16 mm	
CLM13-8	13"	8 mm	
CLM13-12	13"	12 mm	
CLM13-16	13"	16 mm	
CLM13-24	13"	24 mm	
CLM13-32	13"	32 mm	
CLM15-95	15"	95 mm	Placed on floor beside machine

Special Real holder CLM15-95

4.1.5. PC-CLM960: Stick Feeder Cassette (CLM Vibrafeeder)

Description

Components in sticks are fed by vibration. The strength of the vibration is adjustable, the vibration time is programmable.
A good contact between the stick and the vibrating surface is a prerequisite for reliable feeding. Therefore, strong steel springs press the sticks to the feeder's vibrating surface.
Component specific lanes are mounted for pre-alignment before pickup.

Specifications

Width: 10 units = 10 sticks SO8 or similar
Vibration amplitude: Adjustable
Feeding time: Programmable

Pickup lane

Steel springs

PC-CLM960 stick feeder cassette

Vibration adjustment
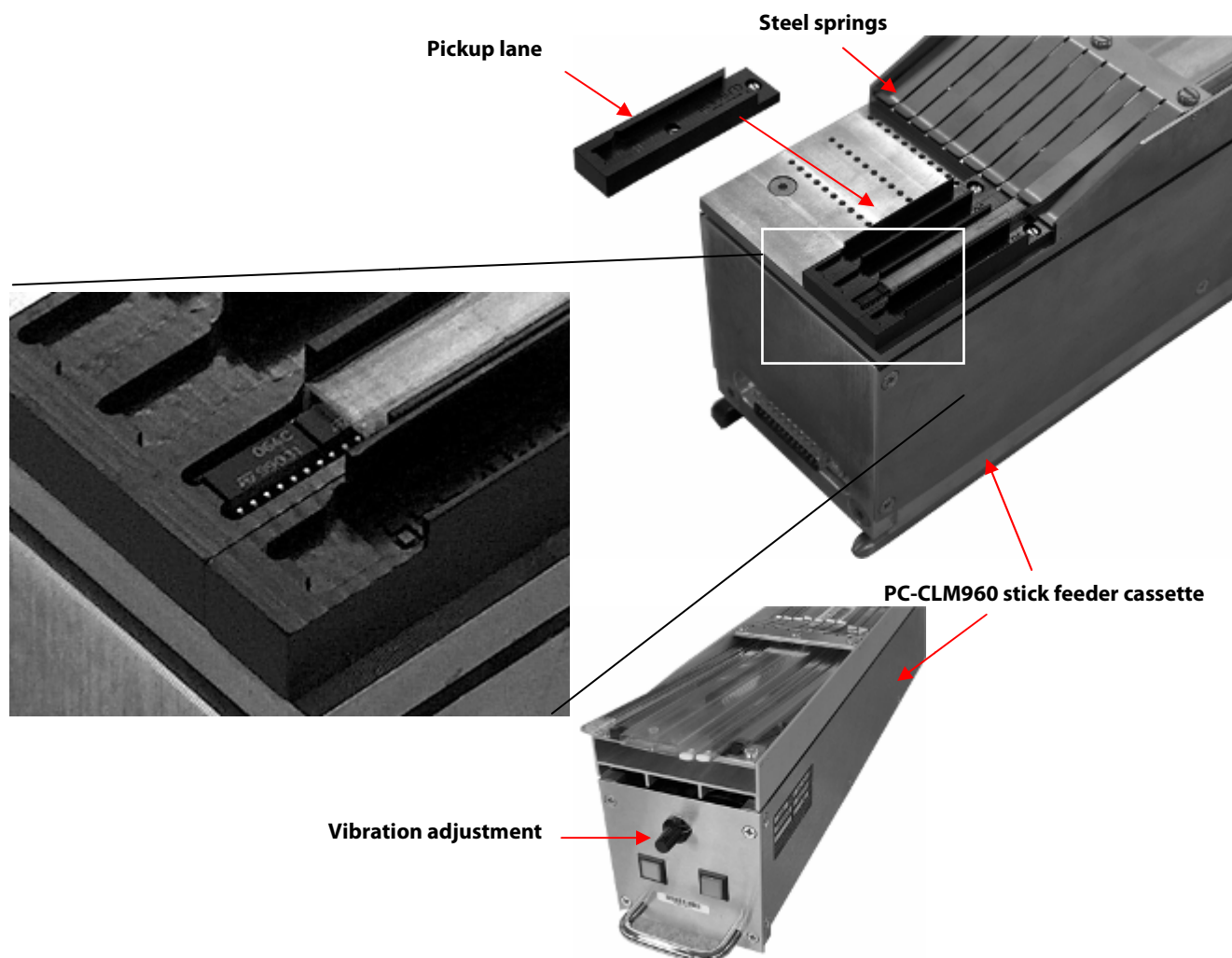
4.1.5.1. Stick Feeder Pickup Lane Ordering Guide

Description

Component specific pickup lanes must be ordered separately with the PC-CLM960 stick feeder cassettes. For non-standard pickup lanes, ask for the special order form.

Width Calculation

Summarize the width (units) of all required pickup lanes.
Divide by 10 units (capacity of one cassette)
Round up the result and get the required number of stick feeder cassettes (PC-CLM960)

Example:
- **Components:** 5 x SO8 + 3 x SO14 + 2 x PLCC44
- **Lanes:** 1xCLMV996+1xCLMV995+2xCLMV973
- **Slots:** 1x5 units +1x3 units + 2x2.5 units = 13 units
- **Cassettes:** Roundup (13 units / 10 units) = 2
- **Required:** 2 x PC-CLM960

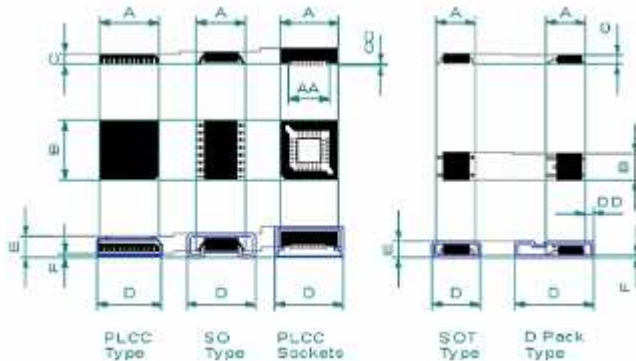| Component specific pickup lanes	Component	A mm/Inch	B mm/Inch	C mm/Inch	D Min mm/Inch	D Max mm/Inch	E mm/Inch	F mm/Inch	Width (Units)
CLMV999	1xSO6-8	6.5/0.26	5.3/0.21	1.3/0.05		7.8/0.31	3.8/0.15	1.2/0.05	1
CLMV997	3xSO6-8	6.5/0.26	5.3/0.21	1.3/0.05		7.8/0.31	3.8/0.15	1.2/0.05	3
CLMV996	5xSO6-8	6.5/0.26	5.3/0.21	1.3/0.05		7.8/0.31	3.8/0.15	1.2/0.05	5
CLMV998	1xSO14-16	6.5/0.26	10.3/0.41	1.3/0.05		7.8/0.31	3.8/0.15	1.2/0.05	1
CLMV995	3xSO14-16	6.5/0.26	10.3/0.41	1.3/0.05		7.8/0.31	3.8/0.15	1.2/0.05	3
CLMV994	5xSO14-16	6.5/0.26	10.3/0.41	1.3/0.05		7.8/0.31	3.8/0.15	1.2/0.05	5
CLMV990	1xSOL8	10.5/0.41	5.3/0.21	2.5/0.10	14.7/0.58	15.5/0.61	5.2/0.20	1.2/0.05	2
CLMV989	1xSOL 14-16	10.5/0.41	10.3/0.41	2.5/0.10	14.7/0.58	15.5/0.61	5.2/0.20	1.2/0.05	2
CLMV988	1xSOL 18-20	10.5/0.41	12.8/0.50	2.5/0.10	14.7/0.58	15.5/0.61	5.2/0.20	1.2/0.05	2
CLMV987	1xSOL 20-24	10.5/0.41	15.4/0.61	2.5/0.10	14.7/0.58	15.5/0.61	5.2/0.20	1.2/0.05	2
CLMV986	1xSOL 28-32	10.5/0.41	20.5/0.81	2.5/0.10	14.7/0.58	15.5/0.61	5.2/0.20	1.2/0.05	2
CLMV962	1xSO8-W	8.0/0.32	5.5/0.22	2.0/0.08		10.7/0.42	4.3/0.17	1.2/0.05	1
CLMV980	1xPLCC 18-22	8.5/0.34	13.6/0.54	3.7/0.15		11.0/0.43	6.8/0.27	0.8/0.03	2
CLMV975	1xPLCC 28-32	12.6/0.50	15.2/0.59	4.4/0.17		15.1/0.59	7.2/0.28	0.8/0.03	2
CLMV973	1xPLCC 44	17.6/0.69	17.6/0.69	4.4/0.17		20.3/0.79	8.7/0.34	1.6/0.06	2.5
CLMV972	1xPLCC 52	20.2/0.80	20.2/0.80	4.4/0.17		22.7/0.89	7.2/0.28	0.8/0.03	3
CLMV971	1xPLCC 68	25.3/1.00	25.3/1.00	4.4/0.17		22.7/0.89	7.2/0.28	0.8/0.03	3.5
CLMV970	1xPLCC 84	30.3/1.19	30.3/1.19	4.4/0.17		32.7/1.29	7.2/0.28	0.8/0.03	4
CLMVSP1	1xspecific	Use the "oder form" to specify the dimensions				8.00/0.31			1
CLMVSP2	1xspecific					12.5/0.49			1.5
CLMVSP3	1xspecific					17.5/0.69			2
CLMVSP4	1xspecific					21.5/0.85			2.5
CLMVSP5	1xspecific					27.00/1.06			3
CLMVSP6	1xspecific					31.5/1.24			3.5
CLMVSP7	1xspecific					36.5/1.44			4
CLMVSP8	1xspecific					40.5/1.59			4.5
CLMVSP9	1xspecific					46.00/1.81			5

4.1.5.2.   SERV-PFVU: Feeder (CLM960) modification to FOX (PC-CLM960)

Description

Upgrade-Kit for your CLM960 Vibrafeeder to PC-CLM960. For this upgrade the CLM960 Vibrafeeder must be sent to our support team at headquarters.
Note: After this upgrade, the Vibrafeeder can be used only on the FOX platform.

4.1.5.3.   PC-CLM942: Deep Pocket Feeder Adapter

4.1.5.4.   CLM945-xx-V2 series: Deep Pocket Feeders

Deep pocket feeders allow a larger tape height for tall components when using CLM type feeders on a machine. They are recommended for special components with medium use.
The feeding pitch is programmable by the software, no mechanical change is necessary. For irregular pitches, the feeder drives a standard pitch and the machine picks from intermediate positions as well.
Deep pocket feeders are mounted into an adapter PC-CLM942 which is automatically identified by the machine when plugged in.

In order to use CLM945-xx feeders from a former Pantera platform on a FOX, they must be mechanically updated. This can be done by the customer himself. For each deep pocket feeder following sales article is needed:
SERV-MUDP
Once upgraded feeders can still be used on older platforms, but pick position needs to be re-teached.

Note:
Single feeder adapter PC-CLM941 with single feeders CSM74x series shall not be used anymore on FOX platforms

Tall component single feeders	16 mm lanes	24 mm lanes	32 mm lanes	44 mm lanes	56 mm lanes	72mm lanes	Reel holder	Slots
PC-CLM942 (base)	3*	2*	2*	1*	1*	1*	-	22
CLM945-16-V2	1	-	-	-	-	-	7/13"	6
CLM945-24-V2	-	1	-	-	-	-	7/13"	8
CLM945-32-V2	-	-	1	-	-	-	7/13"	11
CLM945-44-V2	-	-	-	1	-	-	7/13"	13
CLM945-56-V2	-	-	-	-	1	-	7/13"	15
CLM945-72-V2	-	-	-	-	-	1	7/13"	21
Pitch	Programmable, 4 mm, 8 mm, 12 mm, …							
Maximum tape thickness	20mm/0.79"**							
Tape bending diameter	118mm/4.65"							
Position on machine	From front only							
Requirements	PC-CLM942 requires 1xCLM940 feeder base							

*maximum capacity, e.g. 22 slots / 8 slots = 2x24 mm feeder

4.1.5.5.   SERV-PFAU: Feeder CLM942 modification to PC-CLM942

Description

Upgrade-Kit for CLM942 Adapter Cassette to PC-CLM942. It can be executed by the customer. The upgrade is done by changing the electronics.

Note:
After the upgrade the feeder can be used **only** on FOX machines.

4.1.6. PC-CLM971/PC-CLM972/PC-CLM974: Tray Feeder

Description
Tray feeder for components in palette. A tray is defined by the first pickup position and the grid distance in X and Y. The pickup starts at one edge and ends at the opposite edge of a tray.

PC-CLM971

PC-CLM972 / PC-CLM974 tray table

Specifications

Tray Feeder	PC-CLM971	PC-CLM972	PC-CLM974 [*]
No. of Platforms	1	1	1
Maximum tray height	10 mm	10 mm	10 mm
Platform size	310 x 150 mm	399 x 290 mm / 15.7" x 7.1"	399 x 290 mm / 15.7" x 7.1"
Pickup area	310 x 150 mm	399 x 165 mm / 15.7" x 6.7"	399 x 165 mm / 15.7" x 6.7"
Position on machine	Inside place area	Only on front side	Only on front side
Requirements	Reduces place area by 310 x 150 mm	2x PC-FR-SL-CLM (CLM Feederrack Slave); 2xCLM940	1x PC-FR-SL-CLM (CLM Feederrack Slave); 2xCLM940

Note:
[*] PC-CLM974 is mounted with 2x CLM940 base plates on the SAME CLM rack.

4.1.7. PC-CLM980/PC-CLM981: Tape Strip Feeders

Description
Tape strip feeders allow working with small pieces of tape which are too short for a feeder. The tape strips are defined like a tray by the first pickup position and the pitch between the pockets.
Cover tape needs to be pulled away before production start.

PC-CLM980   **PC-CLM981**   **PC-CLM984**

CLM985-32
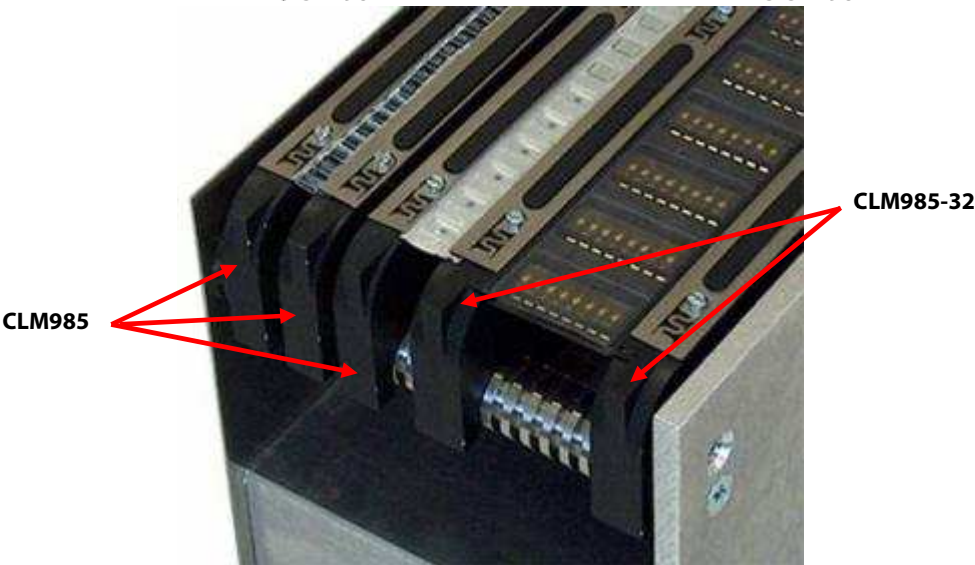
CLM985

Specifications

	PC-CLM980	PC-CLM981
Position on machine	From front only	Inside place area
Requirements	1xCLM940	For standalone systems only
Capacity	7x8 mm	7x8 mm
Tape strip width	Adjustable 4, 8, 12, 16… mm	Adjustable 4, 8, 12, 16 … mm
Tape strip holder CLM985	Tape width 8-24 mm Pickup range: 165/6.5" mm	Tape width 8-24 mm Pickup range: 280 mm (11")
Tape strip holder CLM985-32	Tape width 32-xx mm Pickup range: 165/6.5" mm	Tape width 32-xx mm Pickup range: 280 mm (11")
Tray holder CLM986		Size 93x285 mm/3.8x11.6" Pickup range 93x285 mm

Configuration Examples with Tray Tables and Tape Strip Feeders:
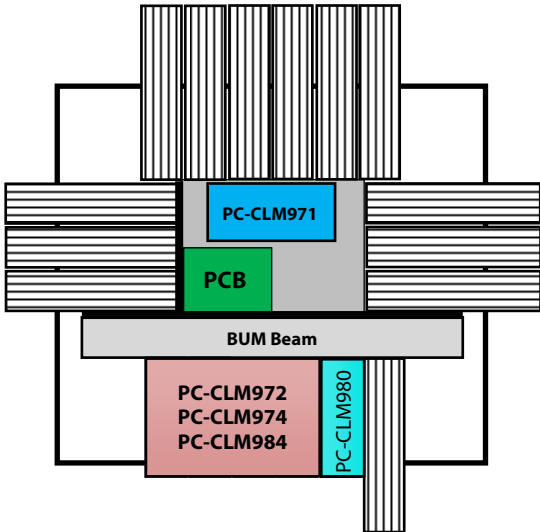
FOX Stand Alone
(max. PCB size 406 x 155 mm)
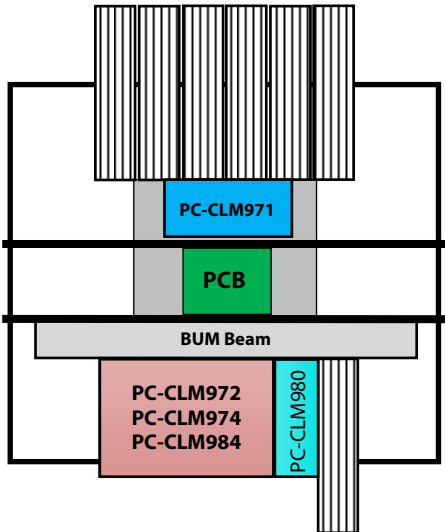
FOX Inline
(max. PCB size 406 x 130 mm)

4.2. Dispensing options and configurations on FOX1

Description

It is possible to equip the FOX1 additionally with one dispensing valve on the front panel on the machine. The connector panel allows an easy "Plug and Play" of the different valves. Exchanging the same valve-type on the machine for a high volume throughput can be realised within a few seconds. No disassembling of covers and pushing/pulling on delicate machine-pcb is needed. Valves, its accessories and dispensing z-axis are identical to the used ones on the Paraquda and Scorpion platform.

Dispensing Connector Panel

PS-DA → Dispensing Axis

Available Dispensing Valves:
VTP → Time Pressure
VSR → Archimedean Screw Valve

Available Laser unit for height measurement *(not visible, behind front panel):*
FX-ODV
FX-ODP

Pick & Place axis
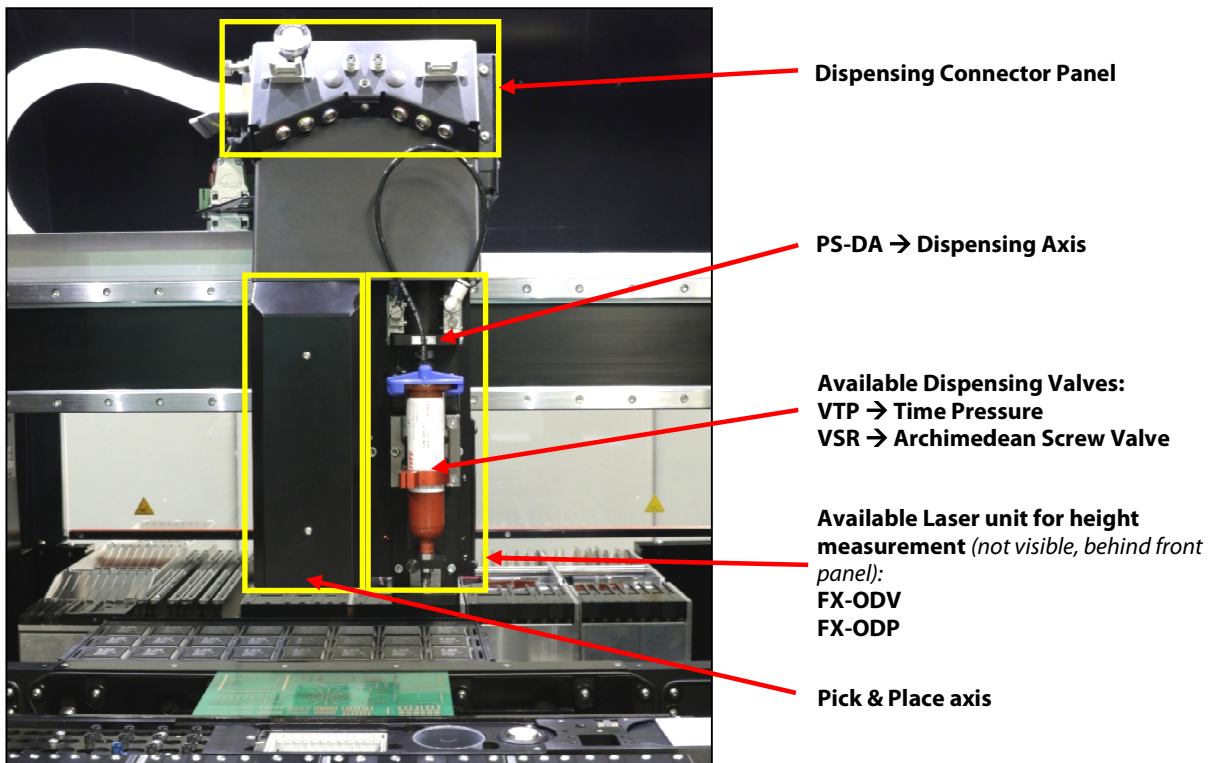
FOX1-PPD-C

Following valves are available and used in most common processes:

Sales Articles	Description
PS-DA	Dispensing axis
VTP	Time Pressure Valve
VSR	Archimedean Screw Valve

Rules for dispenser configuration on a FOX1:
- Maximal 1x dispenser axis and valve can be mounted at a time
- A valve needs a z-axis → **PS-DA**
- **Different types** of valves are not interchangeable

Recommendations for dispensing:
- Laser height measurement is nearly a must for a stable dispensing process. Two different laser units are available, see next chapter for details
- Vacuum cleaning option **FX-VCS** is highly recommended, maintenance and nozzle cleaning are reduced considerably
- Process Control Adjustment & Stabilization option **SC-SW-PCAS** is highly recommended, process setup time can be reduced considerably. Parameter adjustment for required volume and dot size are realized automatically

4.2.1. SC-SW-PCAS: Process Control Adjustment & Stabilization

Description

This software licence enables a closed-loop adjustment of dot size/weight, line width/weight and many other automatic dispensing actions (for example, purging and cleaning) and ensures therefore a continuous and precise dispensing process. It's possible to define an order sequence with different actions for different processes in the recipe.

Furthermore, the function "measurement frequencies" (at production start, after/before "n" processes/dots or lines) enables the necessary flexibility for defining specific automated actions which shall be executed during the dispensing process.

Process	Action	Value	No	Tolerance [%]	Frequency	n
Glue	Dot-Purge				Production Start	
Glue	Cleaning				Before & After n Proc...	1
Glue	Test dot [mm]	1	3	20	Before & After n Proc...	1
Solder	Dot-Purge				Before n Process	1
Solder	Test dot [mg]	0.5	5	15	Before n Process	1

Screenshot of additional available parameters with licence SC-SW-PCAS

4.2.2. FX-VCS: Vacuum Cleaning Station

Description

The Vacuum Cleaning Station cleans nozzle tips from dispensing fluids by applying a strong vacuum when tip is inserted automatically in the vacuum cleaning station. In combination with the software option SC-SW-PCAS where its used frequency can be programmed depending on used fluid and application, cleaning and maintenance time can be reduced drastically. Nevertheless, for example over night dried fluids cannot be removed with this system.

4.2.3. FX-ODV / FX-ODP: Laser height measurement

Description

Laser height measurement has been introduced in order to support dispensing and P&P processes by means of PCB warpage compensation and in a second line to enable processes on different height levels. Depending on the application and requirements, the corresponding option has to be chosen. Please note that these options are only a single part of the process within the complete application in order to meet customers' requirements.

Note: It is highly recommended to order one Laser option for dispensing applications!

Art.	Hardware	Specs		Description	Advantages
FX-ODV	Laser module mounted on beam backside, next to top camera	Size laser module:	50 x 60 x 20.4 mm	Height measurement for PCB **warpage compensation** and placement/dispensing on **different height levels**. Incl. needed SW-licenses. Highly recommended for most dispensing applications	- Costs
		Measurement range:	±10 mm from 0 height		
		Repeatability:	15 my		
		Linearity:	± 20 my		
		Light:	Red laser		
		Laser spot size:	0.5 x 1 mm (@ 0 height)		
		Max. output:	1 mW		
		Wave length:	655 nm		
		Laser class:	2 (EN 60825-1)		
FX-ODP		Size laser module:	76.5 x 78 x 25.6 mm		- Extended measurement range - Improved stability on difficult material surfaces - Smaller laser spot
		Measurement range:	+15/-20 mm from 0 height		
		Repeatability:	3 my		
		Linearity:	± 20 my		
		Light:	Red laser		
		Laser spot size:	0.26 x 1.2 mm (@ 0 height)		
		Max. output:	1 mW		
		Wave length:	655 nm		
		Laser class:	2 (EN 60825-1)		

General note to laser height measurement:

PCB material, pad sizes, surface colors and surface finish can have a considerable influence on the measurement results. In combination with medium and dispensing processes with needle like time pressure and screw valve the end result may vary significantly. Therefore it is highly recommended to test in advance customer application (PCB, substrate) in order to select the needed laser solution.

Laser height measurement is fully integrated in ePlace with needed parameterization in order to fulfil customers demand, for example: The measurement frequency is adjustable in the software, either the board is measured only at the start of production or before every board. Functionalities are constantly enhanced; ask Application Engineering or Product Management for further details.
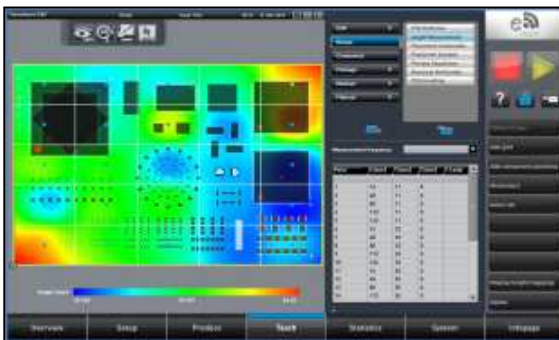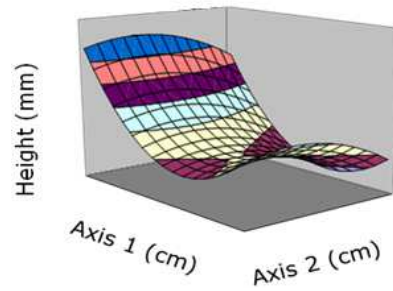
Easy programming of height measurement points and schematic figure of the 3D height mapping

4.3. Conveyor & PCB Supports

4.3.1. FX-CA: Inline Conveyor automatical width adjustment

The automatically adjustable rail on the FOX1 minimizes changeover time and operator assistance when changing the product. After the new job is loaded the back rail will be automatically adjusted by the gantry system. After adjusting the backrail to its new position the machine measures the height of the backrail in order to calculate the exact PCB plane for an optimal place/dispensing process.

The automatic conveyor has the same functions and behaviour as the manual one. This option is in upgradable in the field. Ask support for further details.

4.3.2. FX-CEX-IN / FX-CEX-OUT: Inline extension (IN or OUT)

Inline extension for IN and/or OUT, length = 400mm.
One sales article is needed for either input or output side, process flow view from left to right. It improves PCB handling when handling them manually, or gives the needed space to the adjoining machine for access.
Definable process flows stay the same as on the standard conveyor machine.
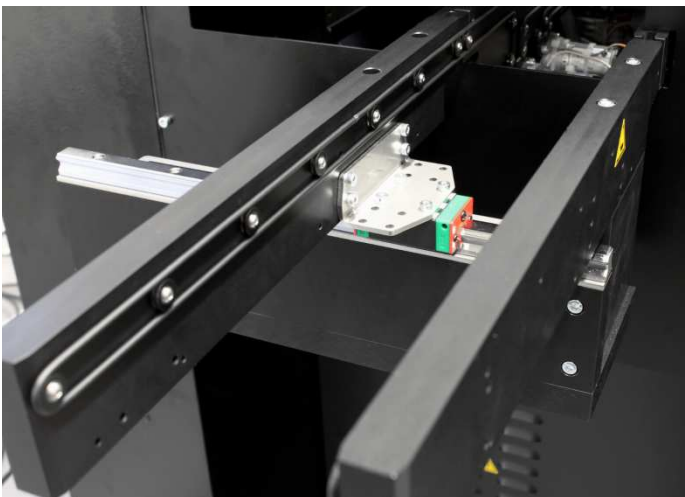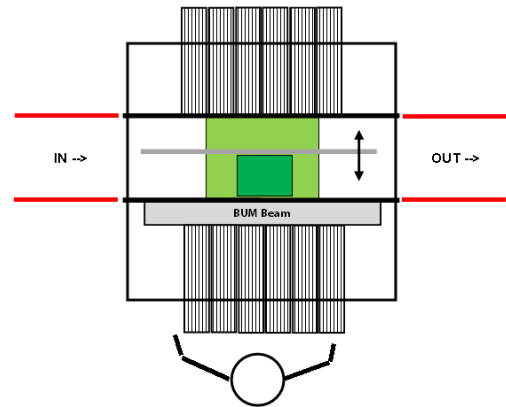
FX-CEX-IN : inline extension input, 400 mm

4.3.3.   FX-INS-IN / FX-INS-OUT: Conveyor inspection system

The control box can only be mounted on a input (FX-CEX-IN) or
output (FX-CEX-OUT) conveyor extension as an inspection system.
If the control box is activated on the output of the machine, it will
maintain processed PCB (either every one or just one) on the
conveyor extension giving the operator the possibility to visually
check the PCB. As soon as the operator gives the clearance, the
PCB is passed over to the next system (handling, oven, etc.). The
same works on the input side, before PCB is being processed in the
FOX.

4.3.4.   PC-LP-SUP: PCB Edge/Corner Fixation Pin

The PCB holders are universal and do not need any tooling to change from
one PCB size to another. All parts are fixed magnetically, which allows a quick
modification but strong fixation during operation.
They are used only for standalone machines.

Note:
For Standalone machines only, **not usable for inline systems**

4.3.5.   PC-SUP-C00: PCB Support Pin, height adjustable

Support Pins height adjustable. Fixed magnetically on the PCB table, which
allows a quick adaptation for a new job, but strong fixation during operation.
They are mainly used to support large boards to preventing bending them
while placing the components.

Note:
For Standalone machines only, **not usable for inline**.

4.3.6. PC-SUP-C01: Support Pin Single Move

Support Pins single move type, height adjustable. Fixed magnetically on the PCB table, which allows a quick adaptation for a new job, but strong fixation during operation. The pins moves up to a predefined position together with the conveyor clamping and are used to support large boards preventing bending them while placing the components.

Note:
Usable only for inline systems

### 4.3.7. PC-SUP-C20: PCB Support System

The PC-SUP-C20 is a system to support the PCB with hundreds of soft polymer pins. The system is ESD proven and perfectly damping vibrations for all types of PCB materials and geometries. The PCB support is magnetically fixed on the PCB table and easy to adjust in position and height. The polymer pins move up together to a pre-adjusted height. If the PCB has components on the backside, the soft pins will move sideward by themselves and still guarantee a strong stabilization.
In addition this PCB support system is easy to mount and easy to connect to an already installed machine. It does not need any additional valves.

Note:
Usable for inline systems

Specifications

PCB Support System	PC-SUP-C20
No. of Pins	>400
Maximum comp. height	10 mm (on backside)
Size total	330 x 40 mm
Size support pins total	306 x 10 mm
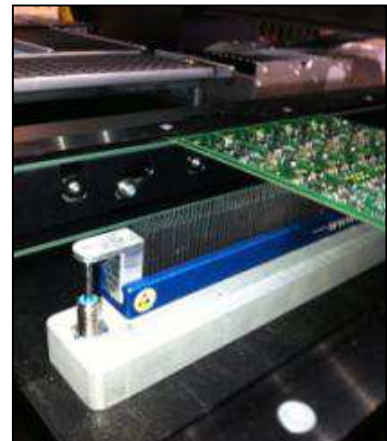
4.4. Toolchanger & Pickup Tools

4.4.1. Toolchanger with 36 Positions

The FOX1 comes with one tool changer. The tool changer has 36 positions for two different types of tools (24 small / 12 large).
A controlled, pneumatic driven slider mechanism ensures that nozzles are being secured constantly. Only during a nozzle change the mechanism is opened for a short time.

4.4.2. Pickup Tools

The FOX1 Pick & Place system is delivered with highly accurate vacuum pickup tools for all different kind of components. Components are picked up and hold with vacuum only. The vacuum is generated directly in the pick & place head which enables a strong holding force and a fast reaction time. For special applications, component specific tools can be created on request.

4.4.3. PC-ATZ: Calibration Nozzle Test-Z

With this nozzle the machine performs the automatic Z-height detection for an optimal pick-up process. It shortens the change-over time from one product to the next one and reduces operator interactions. Each new machine is being delivered with one PC-ATZ

4.4.4. FX-S-SET: Complete set of nozzles

Nozzle-Set includes 6 Nozzles, see following table. Each machine is delivered with one complete PC-S-SET. Using this nozzle set enables production with most of the products in the market.

Overview:

Order Number	Tool length	Diameter (outer/inner)	Quantity	Application
PC-S01	16mm/0.63"	Multi hole	1	0201, 0402, 0603
PC-S02	16mm/0.63"	1.2/0.7 mm	1	0603, 0805, 1206, SOT
PC-S03	16mm/0.63"	3.0/1.4 mm	1	1210, SOIC, Tant.cap, SOD,
PC-S04	16mm/0.63"	4.0/1.4 mm	1	SOL, SOW, SOM, SOY, SOX
PC-S05	16mm/0.63"	7.0/4.5 mm (rubber)	1	PLCC (small), QFP (small), BGA (small)
PC-S06	16mm/0.63"	10.0/7.5 mm (rubber)	1	PLCC (large), QFP (large), BGA (large)

4.4.5. Nozzles for special applications

Essemtec offers customized nozzles for special applications like LED's, connectors etc. See pricelist for actual available types. Also in ePlace are all available nozzles visible.

PC-SLED-xxxx → LED nozzle series
PC-SN-xx → Connector nozzle series
PC-SMEx-xxxx → MELF nozzles
PC-SSPE-xxxx → Special nozzle series
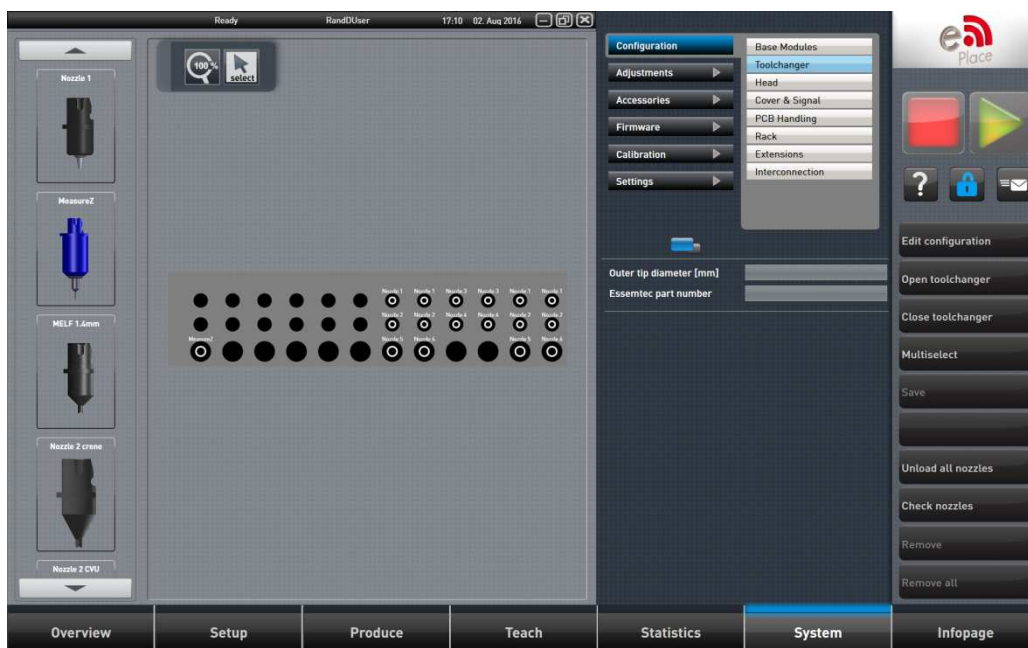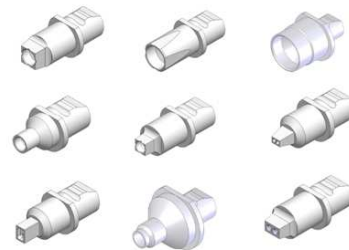
4.4.6. Nozzles for special applications with mountable rubber tip

In order to respond to a high variety of component geometries and special P&P applications, Essemtec has developed a special nozzle adapter where dedicated rubber tips can be mounted. This feature is fully implemented in ePlace and includes the most used rubber tips from SPT and Minitron in a library. If needed, new rubber tip suppliers and types can be added. Conditions are that it fits on the adapter nozzle and into the toolchanger, and doesn't extend the allowed height.
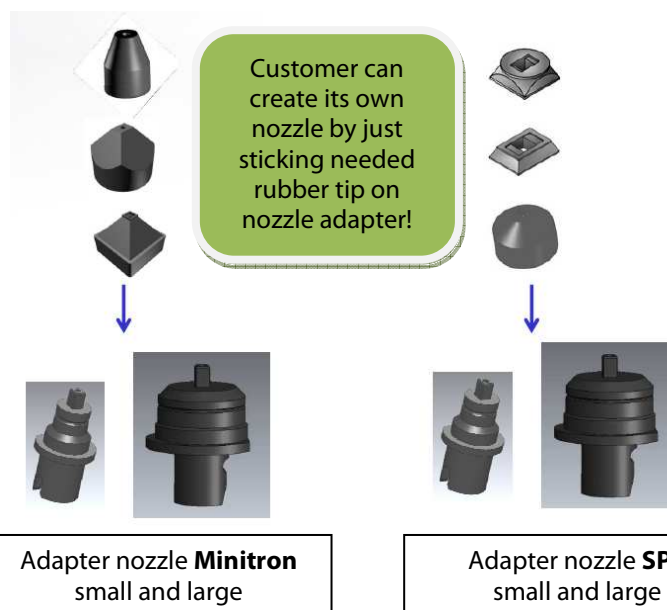
It is recommended to consult our support or Product Management in case of special applications:

Available rubber tips in ePlace

Small body:	Sales article:
Nozzle Minitron	**PC-SSPE-0002**
Nozzle SPT	**PC-SSPE-0005**

Large body:	Sales article:
Nozzle Minitron	**PC-SSPE-0004**
Nozzle SPT	**PC-SSPE-0006**

Customer can create its own nozzle by just sticking needed rubber tip on nozzle adapter!

Adapter nozzle **Minitron** small and large

Adapter nozzle **SPT** small and large

4.5. Calibration Tools

4.5.1. Calib tools head

Calibration set for the automatic recalibration of the P+P Head.
- Offset Nozzle-Top camera
- Offset Nozzle-Bottom camera

This set includes:
- 1x Ceramic-Plate 65 x 50mm
- 1x Alu Calib-Plate 15 x 15mm

Note:
It's included in the FOX base machine

4.5.2. FX-CAL: Calib tool XY mapping

Calibration tool for XY mapping and Head rotation.
- 1x Glass-Plate 610 x 300mm
- 4x Support PC-SUP-C00
- 1x carrying case

Note:
Needs to be ordered separately

4.6. Various

4.6.1. FX-SIG: Signal tower

The status of the machine can be highlighted by 3 colours of the signal tower.
Colours: RED, ORANGE, GREEN

The functioning of the lights are programmable in ePlace:

4.6.2. FX-TRAFO-110

Transformer CH/US & US/CH
Power: 4876 VA
Primary: 90/100/110/115/120/215 VAC
Secondary: 230 VAC
Frequency: 50/60 Hz
Max. external temperature: 40°C
Without housing, internal mounting

Note:
The transformer will be mounted into the machine base.
An external transformer is not supported by Essemtec.

4.6.3. FX-UPS / FX-UPS-110: Uninterruptable Power Supply

The option Uninterruptable Power Supply allows in an event of power loss a safe switch off of the machine. The machine stops properly the actual running production, shuts down ePlace and finally the machine PC. No information is being lost, no emergency stop executed. The machine itself is still powered by the UPS battery until it runs out of power.

After power recuperation, machine needs to be started manually. After a machine initialization and loading of the stopped job, production can be continued from where it has been stopped.

Technical specs:
230V and 120V version available
Power: 3'000 VA / 2'700 W
Weight: 38kg
Size (w x l x h): 86.2 x 441 x 647 mm

Important: The UPS is mounted <u>besides</u> the machine, not within the machine. Therefore, additional floor space needs to be foreseen.

Note:
Installation only by an Essemtec authorized technician.

4.6.4. FX-MO

This option enables to use a machine from the backside. A second touch screen is being mounted and can be used in the identical way as the original one on the front side.

This option is specially recommended when using an inline system with feeder on the backside within a long production line. Operator doesn't have to walk around the line, all functions are available on the backside.

This option can be retrofitted in the field by the Support Team.

4.6.5. FX-BAR / FX-BAR-2D-F: Wireless Bar Code Reader, incl. Software

The wire-less Bar Code Reader is used for easy and fast setup of the feeders on the machine or at the offline feeder setup station. It is as well useful for the setup-check at the machine before the production run starts.

Easy feeder setup by scanning the bar code of the component and on the feeder slot. The bar code reader directly communicates with ePlace. It assigns the scanned component to the scanned feeder lane. Additionally in ePlace and eMis a job can get loaded by reading a barcode. Use the barcode field in Setup and Produce tab to scan a barcode e.g. from a production sheet. The read barcode has to be equal to the job name or order number of an existing job and it has to be unique. After reading the barcode, the job is loaded and ready to produce.

The barcode reader is equipped with a rechargeable battery and is delivered complete with charging station. It allows working in a 15 m circle around the base station without cable by radio transmission. Therefore, feeders can be set up directly on the machine or beside on the component storage place. The reader is preset for the code type 128.

4.6.6. PC-PRI

High resolution barcode printer (300dpi) with 2.000 high endurance labels and one ribbon.