

## PANTERA

### Fully Automatic SMD Pick+Place

### System Description



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### Modifications

Date	Vis.	Modification
12.9.2006	asc	created
25.9.2006	asc	CSM-PAN-PKG added (p. 3)
12.10.2006	asc	p.10 tape thickness specs

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### 1. Configuration

Standard Configuration	CSM-PAN	CSM-PAN-PKG
Machine type	Bench top	Standalone package including: 1xCSM-PAN-ST 1 x CSM731i, Feederrack with 27 slots 10 x CSM740i-E-PA, Eco 8mm Feeder for paper tapes 10 x CSM740i-E-BL, Eco 8mm Feeder for plastic tapes 3 x CSM740i, Intelligent Feeder 8mm 1 x CSM741i, Intelligent Feeder 12mm 1 x CSM742i, Intelligent Feeder 16mm 1 x CSMCAD, Universal CAD data conversion software 1 x CSMFID, Automatic fiducial recognition 1 x CSMPack, Export packing
Pick+Place heads	1	
Tool changer	5 tools included (capacity for 6 tools)	
Component alignment system	Cyberoptics Laser	
Windows version	Winsows XP	
CCD-Camera	b/w vision	
Computer	PC, Pentium, CD-ROM, >64 Mb RAM, >2 GB HD, network card	
Monitor, keyboard	15 Inch monitor, keyboard with trackball	
Included Software	<ul style="list-style-type: none"> <li>• Easyplacer (EP) operating system</li> <li>• Component Library (LIB) with over 300 predefined component types</li> <li>• Feeder setup program (BOX)</li> <li>• Virtual teach-in and program control</li> </ul>	
Language	German, English or French	
Remote support	Free license included	

Options	
Base console with one shelf	recommended
Intelligent feeder racks	Front, back, left, right depending on feeder capacity
Intelligent single tape feeders	8 mm – 56 mm tapes
Intelligent stick feeders	Universal base for 5xSOIC16, component specific pickup lanes
Trayfeeders	Any size
Tape strip racks and feeders	Any width, any tape strip length
Integrated dispensing systems	Time pressure or screw valve dispenser
Barcode reader	Radio barcode reader for quick feeder programming
Barcode printer	Printer for high endurance barcode labels
Software options	<ul style="list-style-type: none"> <li>• Universal CAD data converter</li> <li>• Automatic fiducial recognition</li> <li>• Bad mark sensing for panels</li> <li>• Offline programming software</li> </ul>

### 1.1 Drive system

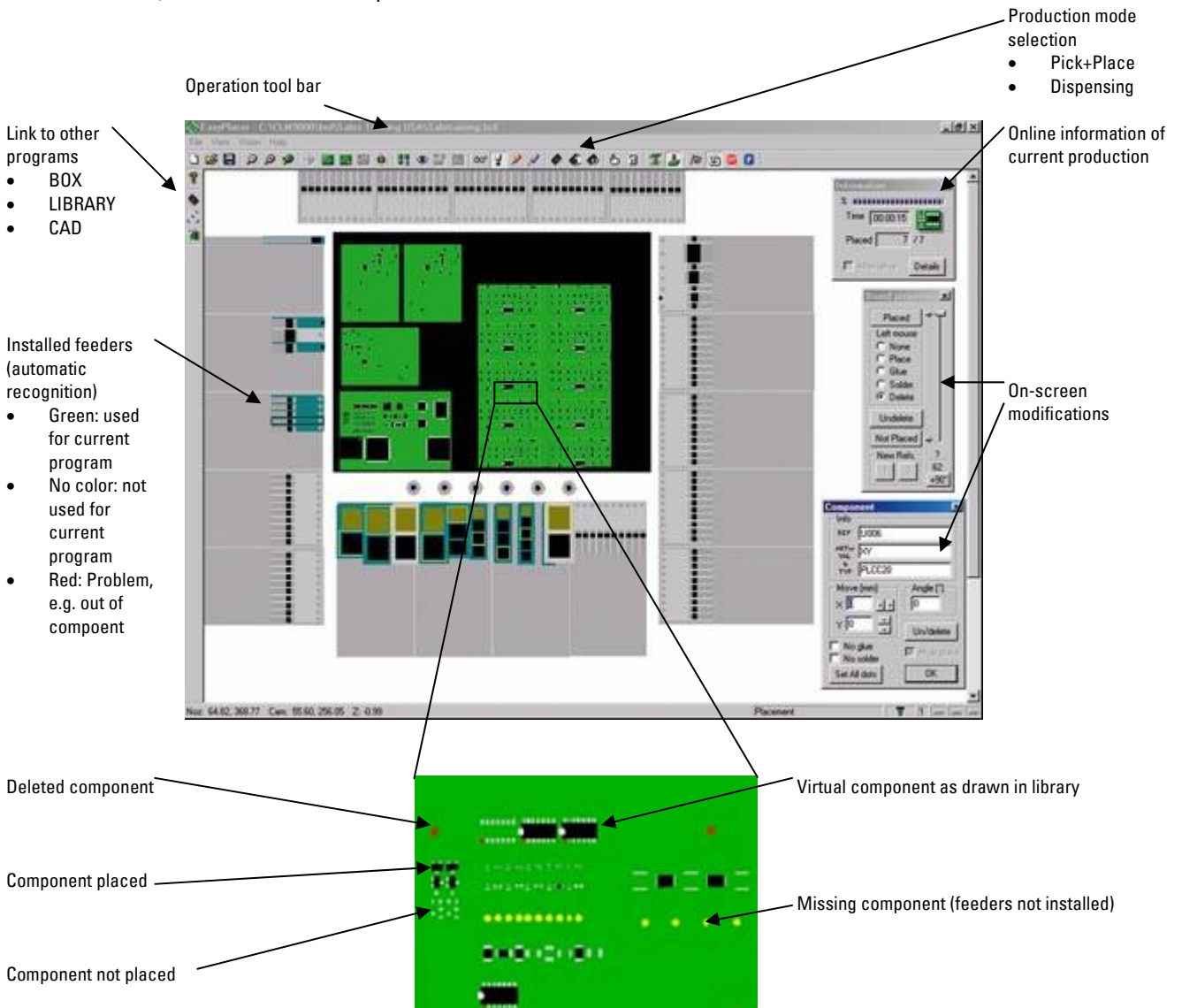
	XY	Z-Axis (C-Axis)	A-Axis (Rotation)
Motor type	Step motor	Step motor	Step motor
Increments per turn	50'000	50'000	50'000
Transmission ratio	51 mm per turn	26.7 mm per turn	-
Theoretical resolution	1.02 $\mu\text{m}$	0.53 $\mu\text{m}$	0.007°

### 1.2 LIGHTPLACER machine operation software (standard)

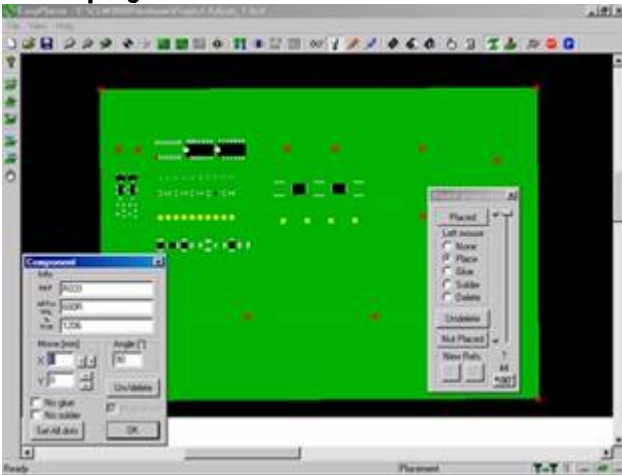
The LIGHTPLACER machine operation software is a user friendly, fully graphical Windows software. It is easy to learn and extremely simple to work with.

The software is packed with helpful features that make the operator's work easier. ESSEMTEC continuously improves the software based on customer feedback.

For more details, ask for a life machine presentation.

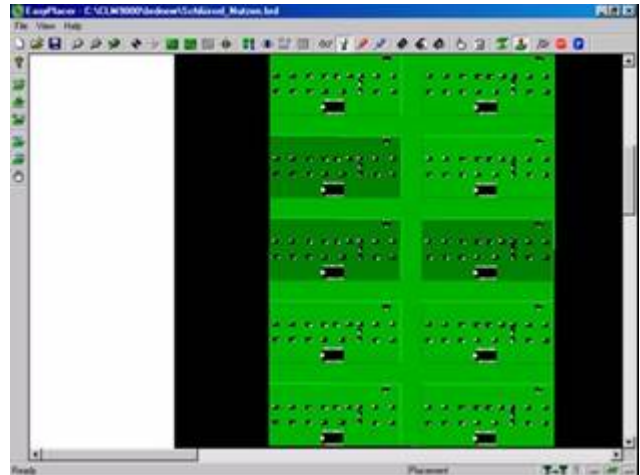


### Online program modifications



LIGHTPLACER allows last-minute modifications of the pick+place program directly on the machine. All changes are displayed in virtual reality.

- Right mouse click to the component: modifications such as type, value, reference, position or angle
- Right mouse click to the PCB: modifications of the component status such as placed or not placed, delete or undelete.



The status of each board of a panel can be modified to include or exclude from placement.

- Right mouse click to the board for manual change of the status
- CSM-BMS option automatically checks for bad marks and sets the status accordingly

### Virtual quality control and virtual teach-in



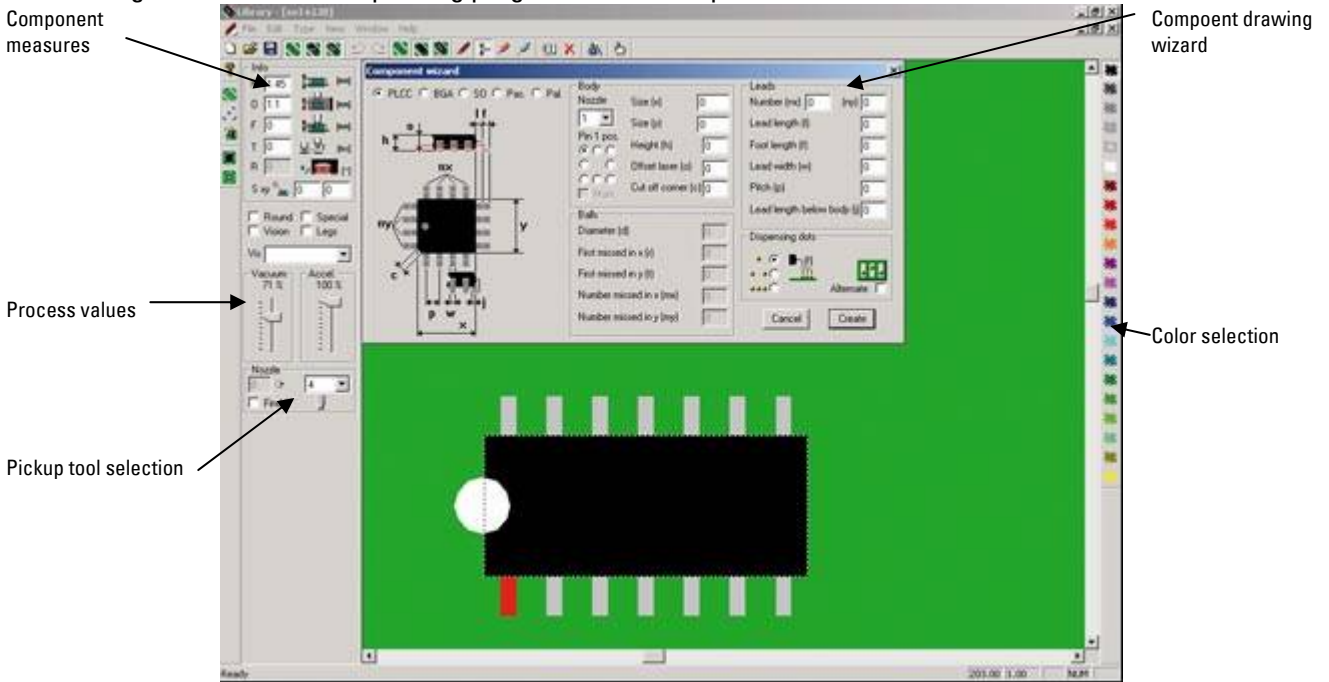
Virtual program combined with live PCB video

The virtual pick+place program can be overlaid to the live video picture taken by the camera in the pick+place head. This powerful feature enables to see the result of the placement before the production starts. Therefore, the quality can be checked before placing components, a cost saving feature especially for small batch sizes.

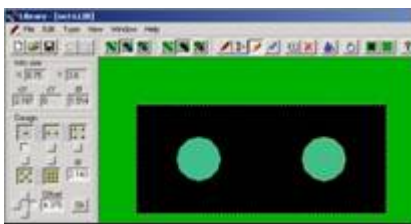
The same function enables quick and precise teach-in of modification: the virtual component is moved to the placement position on the PCB and the correct orientation is displayed graphically.

### 1.3 Component definition program (LIBRARY)

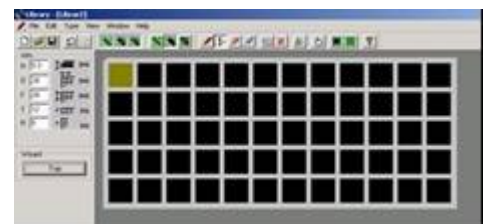
LIGHTPLACER uses graphical components in it's real shapes and dimensions to display a pick+place program. All component types are defined in the LIBRARY program. The standard library includes several hundreds of known component shapes, but the program also includes a free COMPONENT WIZARD for creation of new types of components. Non-standard components can also be created with the included drawing program. A component definition includes all process information and dimensions required from the pick+place machine. Furthermore, glue and solder dots are automatically generated by the COMPONENT WIZARD which enable the automatic generation of the dispensing program for the complete PCB.



Component definitions are saved in individual files (\*.LIB) which can be shared with other users of ESSEMTEC pick+place machines.



Automatic generation of glue dots and solder paste dots for the integrated dispensing system (CSM701 and CSM704)



Additional feature (included): Tray drawing wizard

### 1.4 Feeder definition program (BOX)

Component feeders can be loaded anywhere, neither a feeder rack nor a connection with the machine is required. This allows a very high flexibility in organisation and layout of the assembly line and the component stock.

The program BOX can be run on the machine or offline (included in CSM-OFF).

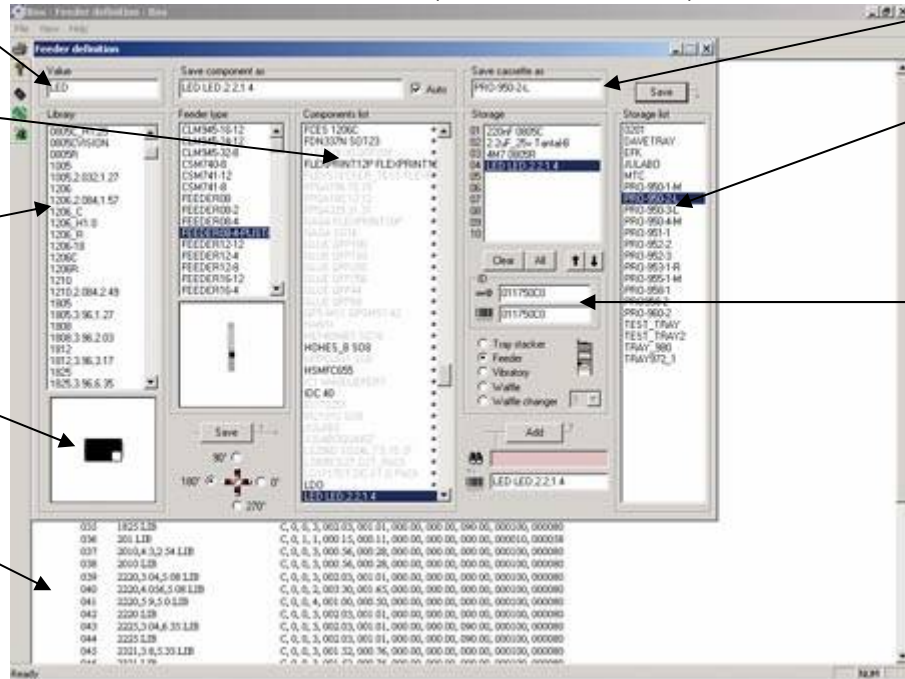
Component Value

Customer's component stock

Component Type

Component orientation in feeder

Feeder setup list



Feeder name

Feeder list

Feeder ID

The BOX software for feeder programming; components can be identified as "Type and Value" or by a customer specific "Article number" (field "save component as")

### Feeder recognition concept

All tape and stick feeders on the PANTERA are intelligent. The machine automatically recognizes the position of the feeder. By the unique barcode (on feeder electronics) the PANTERA can identify the feeder and looks up in the data base what component is teached on this feeder.



Feeder with unique ID-Code



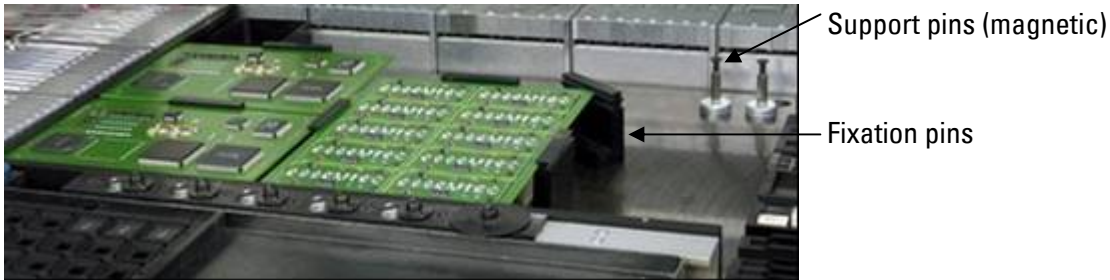
LIGHTPLACER machine operation software



Feeder setup data base (BOX software)

### 1.5 PCB holder

The PCB holder is universal and does not require any tooling to change from one PCB size to another. All parts are fixed magnetically which allows a quick modification but strong force during operation. Single sided or double sided PCBs can be fixed.



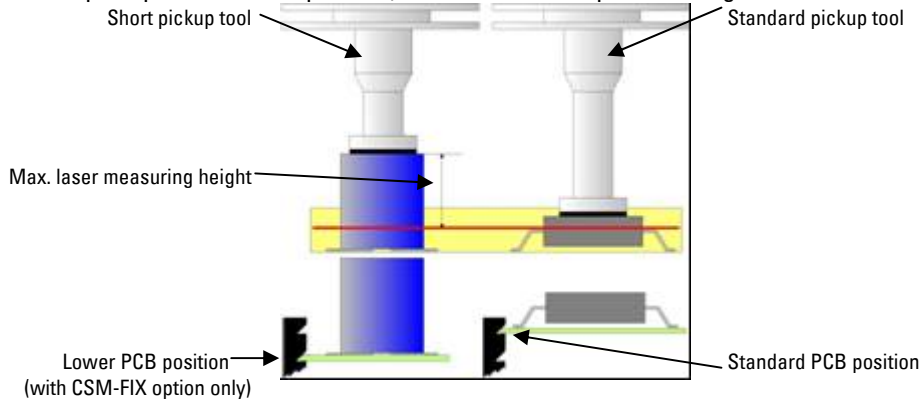
Universal PCB holder. The fixation pins have two levels, tall components can be placed on the lower level.

- Min. PCB format: 50x50 mm (2x2")
- Max. PCB format: 380x250 mm (15.0x9.8") \*
- Edge clearance: 2 mm
- PCB thickness: 0.5-3.5 mm
- Clearance below PCB: 40 mm \*\*

\* The board size can be larger by reducing the feeder capacity  
 \*\* 35 mm if PCB is installed on the lower level

### Maximum component height

Depending on the used pickup tool and PCB position, the maximum component height can be different.



Pickup tool	Tool length	Component height standard position	Component height in lower position	Max. Laser measuring height
CLMS1*	20.5 mm/0.8"	9.5 mm/0.37"	12 mm/0.47"	7.5 mm/0.30"
CLMS2*	20.5 mm/0.8"	9.5 mm/0.37"	12 mm/0.47"	7.5 mm/0.30"
CLMS3*	20.5 mm/0.8"	9.5 mm/0.37"	12 mm/0.47"	7.5 mm/0.30"
CLMS4*	20.5 mm/0.8"	9.5 mm/0.37"	12 mm/0.47"	7.5 mm/0.30"
CLMS5*	20.5 mm/0.8"	9.5 mm/0.37"	12 mm/0.47"	7.5 mm/0.30"
CLMS6*	20.5 mm/0.8"	9.5 mm/0.37"	12 mm/0.47"	7.5 mm/0.30"
CLMS5-17*	17.5 mm/0.69"	10.5 mm/0.41"	15 mm/0.59"	10.5 mm/0.41"
CLMS6-17*	17.5 mm/0.69"	10.5 mm/0.41"	15 mm/0.59"	10.5 mm/0.41"

\*for more details about pickup tools see "pickup tools and tool changer"

### PCB holder accessories

Accessory	Description	Included in standard delivery
CSM-FIX	Magnetic fixation	3
CSM-SUP-41	Magnetic support pin for PCB in standard position	0
CSM-SUP-35	Magnetic support pin for PCB in lower position	0

### 1.6 Pickup tools and tool changer



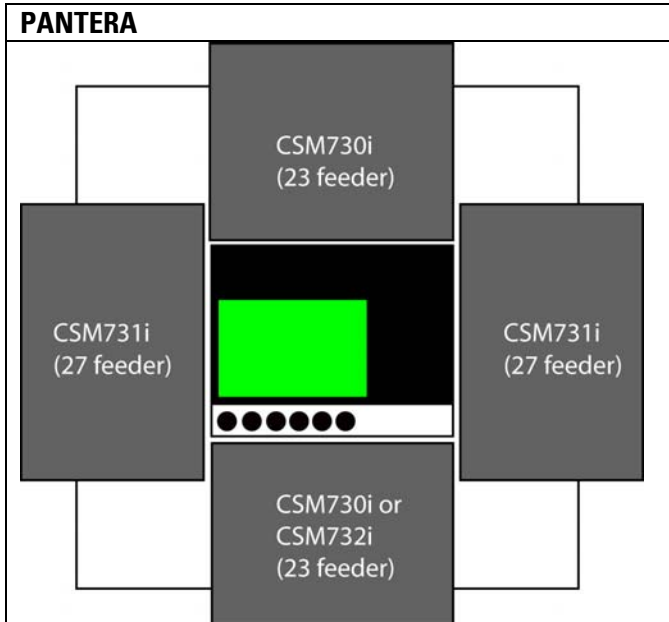
Automatic tool changer

The CSM pick+place system is delivered with highly accurate vacuum pickup tools for all different kind of components. All tools are spring-loaded which enables to apply a programmable force onto the components during placement if required. Furthermore, the tools automatically compensate a PCB warping. 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. Even round components such as "melfs" are perfectly placed with the standard vacuum pickup tools. For special applications, component specific tools can be created. Non-symmetric tools are possible, such tools are pre-aligned before pickup by the laser centring. All tools can be completely disassembled for cleaning.

Ordner Number	Tool length	Diameter (outer/inner)	PANTERA standard quantity
CLMS1	20.5mm/0.8"	0.8/0.3mm	1
CLMS2	20.5mm/0.8"	1.2/0.7 mm	1
CLMS3	20.5mm/0.8"	3.0/1.4 mm	1
CLMS4	20.5mm/0.8"	4.0/1.4 mm	1
CLMS5	20.5mm/0.8"	7.0/4.5 mm (rubber)	1
CLMS6	20.5mm/0.8"	10.0/7.5 mm (rubber)	-
CLMS...-D	20.5mm/0.8"	For die placement	-
CLMS5-17	17.5mm/0.6"	7.0/4.5 mm (rubber)	-
CLMS6-17	17.5mm/0.6"	10.0/7.5 mm (rubber)	-

## 2. Feeders

### 2.1 Intelligent Feeder Racks



Rack Type	CSM730i	CSM731i	CSM732i*
Mounting position	Front and/or back	Left and/or right	Front (for 32 mm and wider tapes)
Capacity for 8 mm feeders (slots)	23	27	23
Maximum quantity per machine	2	2	1

\*Vibratory stick feeders can not be installed on the CSM732i rack

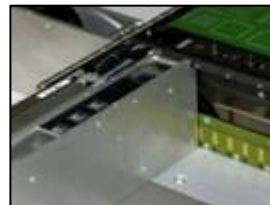
### 2.2 Intelligent Tape Feeders



CSM740i, CSM741i



CSM742i, CSM743i



CSM744i-CSM746i



Cover tape box (CSM740i-CSM743i)

Single feeders	Tape width	Tape thickness	Tape bending diameter	Reel holder	Positions allowed	Requirements	Slots required
CSM740i-E-BL	8 mm	0.15-0.3 mm Pocket: 8 mm	70 mm	4-7"	All	Eco-Feeder, for blister only, ≥0805 components	1
CSM740i-E-PA	8 mm	0.5-1 mm	70 mm	4-7"	All	Eco-Feeder, for paper only, ≥0805 components	1
CSM740i	8 mm	0.15 - 1-3 mm Pocket: 8 mm	70 mm	4-7"	All	Any feeder rack	1
CSM741i	12 mm	0.15 - 1-3 mm Pocket: 8 mm	70 mm	4-7"	All	Any feeder rack	2
CSM742i	16 mm	0.15 - 1-3 mm Pocket: 8 mm	70 mm	4-13"	All	Any feeder rack + CSMST	2
CSM743i	24 mm	0.15 - 1-3 mm Pocket: 8 mm	70 mm	4-13"	All	Any feeder rack + CSMST	2
CSM748i	24mm	Pocket: 20 mm	-	4-13"	Front only	CSM732i +CSMST	2
CSM744i	32 mm	Pocket: 20 mm	-	4-13"	Front only	CSM732i +CSMST	3
CSM745i	44 mm	Pocket: 20 mm	-	4-13"	Front only	CSM732i +CSMST	3
CSM746i	56 mm	Pocket: 20 mm	-	4-13"	Front only	CSM732i +CSMST	4

Pitch for all feeders: Programmable, 2 mm, 4 mm, 8 mm, 12 mm, ...

### 2.3 Tray Feeder



CSM771 mounted in placement area

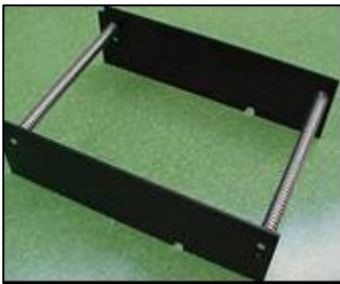


3xCSM986 (mounted on CSM980-23)

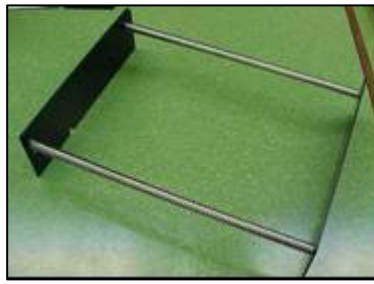
Tray Feeder	CSM771	CSM986*
No. of Platforms	1	1
Components programmable per platform	10	10
Maximum tray height	10 mm	10 mm
Platform size	310x150 mm	285x93 mm
Position on machine	Inside place area	From front only*
Requirements	---	Tape strip feeder base

\*see tape strip feeders

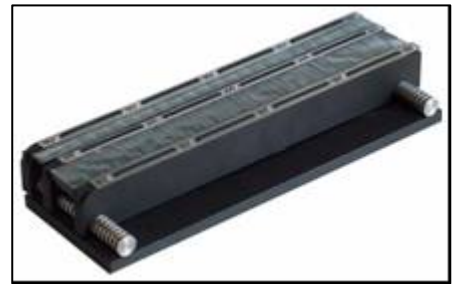
### 2.4 Tape Strip Feeders



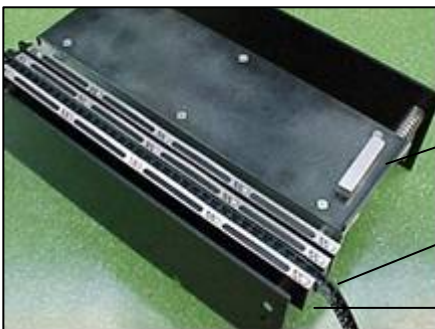
CSM980-12



CSM980-23



CSM981



CSM986

2xCSM985

CSM985-32

	CSM980-12	CSM980-23	CLM981
Position on machine	From front only	From front only	In placement area
Requirements	12 slots of feeder rack	23 slots of feeder rack	---
Capacity	15x8 mm	31x8 mm	7x8 mm
Tape strip width	Adjustable 4, 8, 12, 16, ... mm	Adjustable 4, 8, 12, 16, ... mm	Adjustable 4, 8, 12, 16, ... mm
Tape strip holder CSM985	Tape width 8-24 mm Pickup range: 100 mm	Tape width 8-24 mm Pickup range: 100 mm	Tape width 8-24 mm Pickup range: 280 mm
Tape strip holder CSM985-32	Tape width 32-xx mm Pickup range: 100 mm	Tape width 32-xx mm Pickup range: 100 mm	Tape width 32-xx mm Pickup range: 280 mm
Tray holder CSM986	Size 93x285 mm Pickup Range 93x100 mm (max. 2)	Size 93x285 mm Pickup Range 93x100 mm (max. 4)	Size 93x285 mm Pickup Range 150x350 mm (max. 1)

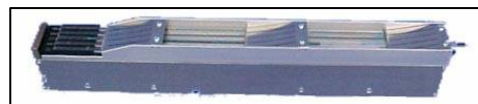
### 2.5 Intelligent Stick Feeder



Component specific pickup lane



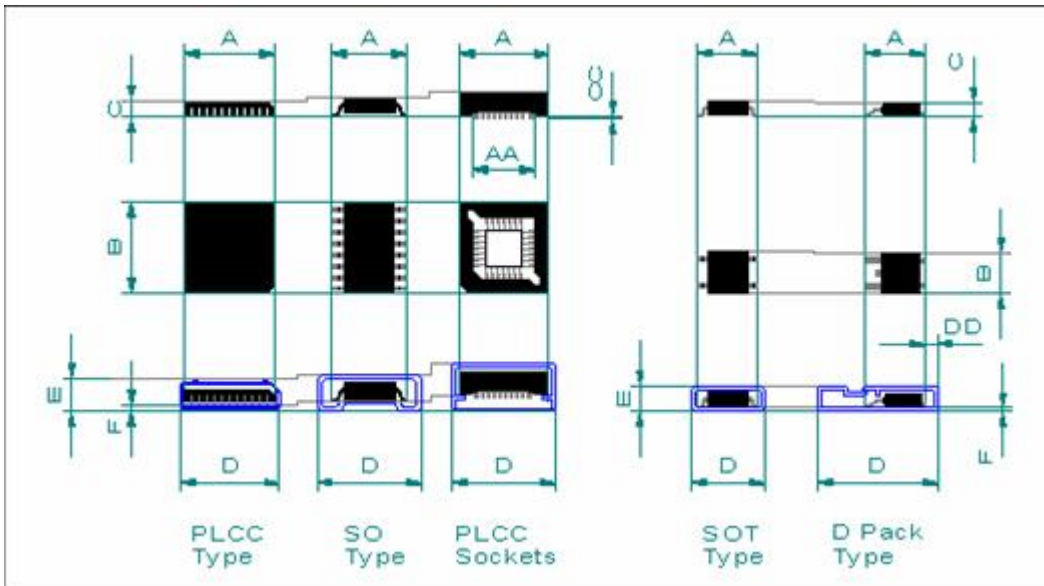
Component in pickup position



CSM760i feeder base

Vibratory Stick Feeder	CSM760i
Capacity, width	5 units = 5 sticks S08 or similar
Component range	Specific pickup lanes
Vibration amplitude	Adjustable
Vibration time	Programmable
Position on machine	All positions allowed
Requirements	3 slots of feeder rack Installation possible on all racks except CSM732i

### 2.6 Component Specific Pickup Lanes for Sticks

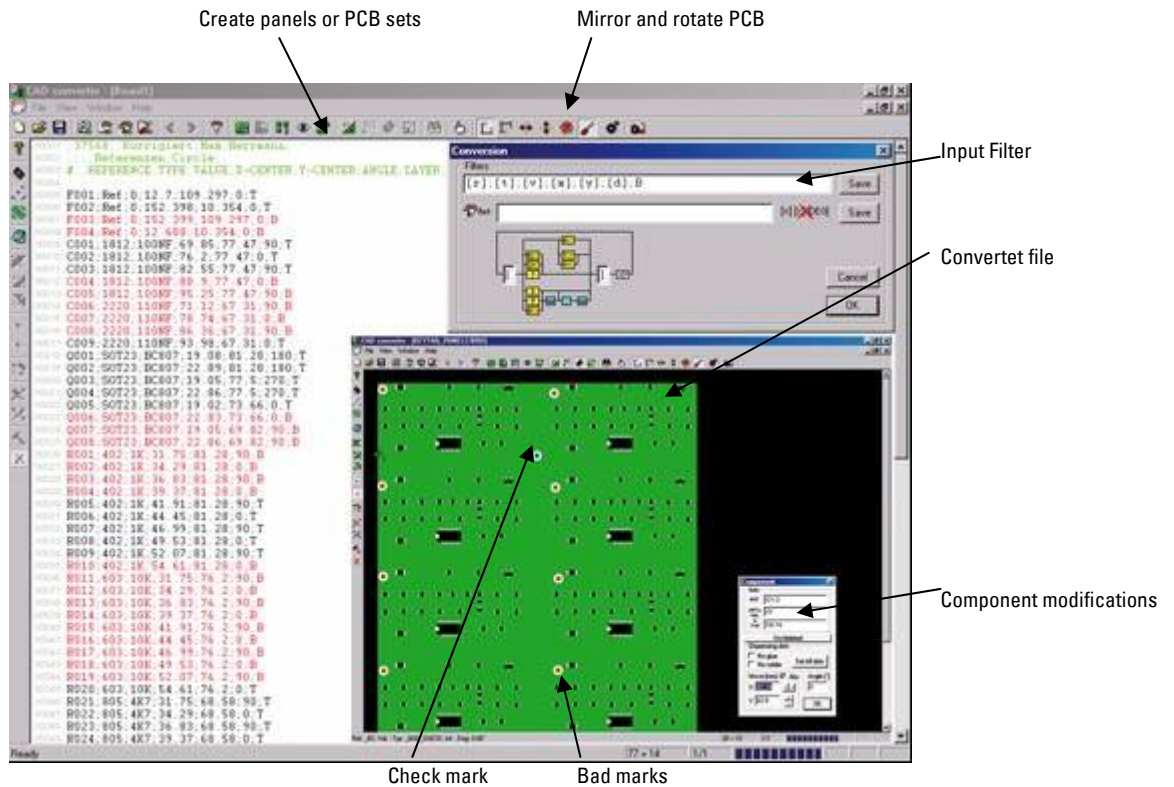
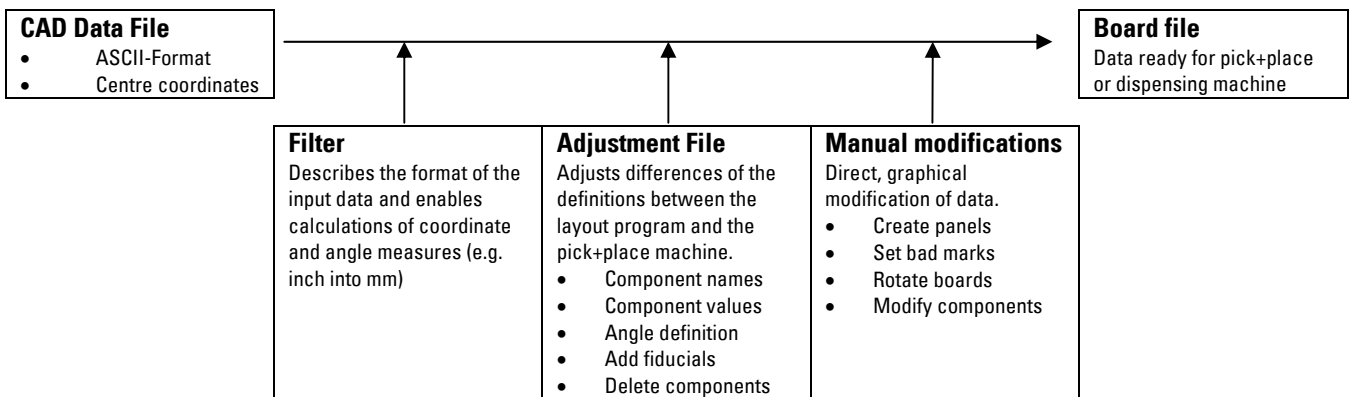


Component specific pickup lanes	Component	A mm	B mm	C mm	D Min mm	D Max mm	E mm	F mm	Width (units)
CSMV999	1xS06-8	6.5	5.3	1.3		7.8	3.8	1.2	1
CSMV997	3xS06-8	6.5	5.3	1.3		7.8	3.8	1.2	3
CSMV996	5xS06-8	6.5	5.3	1.3		7.8	3.8	1.2	5
CSMV998	1xS014-16	6.5	10.3	1.3		7.8	3.8	1.2	1
CSMV995	3xS014-16	6.5	10.3	1.3		7.8	3.8	1.2	3
CSMV994	5xS014-16	6.5	10.3	1.3		7.8	3.8	1.2	5
CSMV990	1xS0L8	10.5	5.3	2.5	14.7	15.5	5.2	1.2	2
CSMV989	1xS0L 14-16	10.5	10.3	2.5	14.7	15.5	5.2	1.2	2
CSMV988	1xS0L 18-20	10.5	12.8	2.5	14.7	15.5	5.2	1.2	2
CSMV987	1xS0L 20-24	10.5	15.4	2.5	14.7	15.5	5.2	1.2	2
CSMV986	1xS0L 28-32	10.5	20.5	2.5	14.7	15.5	5.2	1.2	2
CSMV962	1xS08-W	8.0	5.5	2.0		10.7	4.3	1.2	1
CSMV980	1xPLCC 18-22	8.5	13.6	3.7		11.0	6.8	0.8	2
CSMV975	1xPLCC 28-32	12.6	15.2	4.4		15.1	7.2	0.8	2
CSMV973	1xPLCC 44	17.6	17.6	4.4		20.3	8.7	1.6	2.5
CSMV972	1xPLCC 52	20.2	20.2	4.4		22.7	7.2	0.8	3
CSMV971	1xPLCC 68	25.3	25.3	4.4		27.7	7.2	0.8	3.5
CSMV970	1xPLCC 84	30.3	30.3	4.4		32.7	7.2	0.8	4
CSMVSP1	1xspecific	Use the "order form" to specify the dimensions				8			1
CSMVSP2	1xspecific					12.5			1.5
CSMVSP3	1xspecific					17.5			2
CSMVSP4	1xspecific					21.5			2.5
CSMVSP5	1xspecific					27			3
CSMVSP6	1xspecific					31.5			3.5
CSMVSP7	1xspecific					36.5			4
CSMVSP8	1xspecific					40.5			4.5
CSMVSP9	1xspecific					46			5

### 3. Options

#### 3.1 CSM-CAD, CSM-OFF-CAD Universal CAD conversion software

- Accepts all CAD-Data formats
- Merging of BOM (Bill of Material) and LOC (List of Components)
- Top/bottom layer separation
- Adjustment of CAD and machine library data
- Definition of reference marks
- Deleting of components
- Mirroring horizontal and vertical
- Board rotation
- CSM-OFF-CAD requires CSM-OFF



### 3.2 CSMOFF

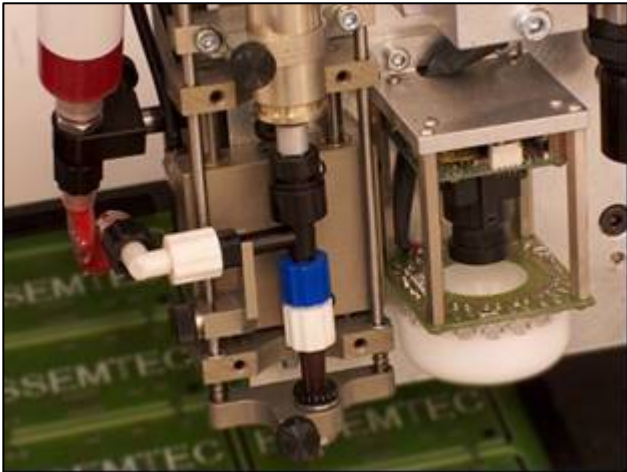
- Offline license for BOX and LIBRARY programs
- Enables the offline machine programming during machine operation
- Pre-requisite for CSM-OFF-CAD

### 3.3 CSM718 Air Drying Unit

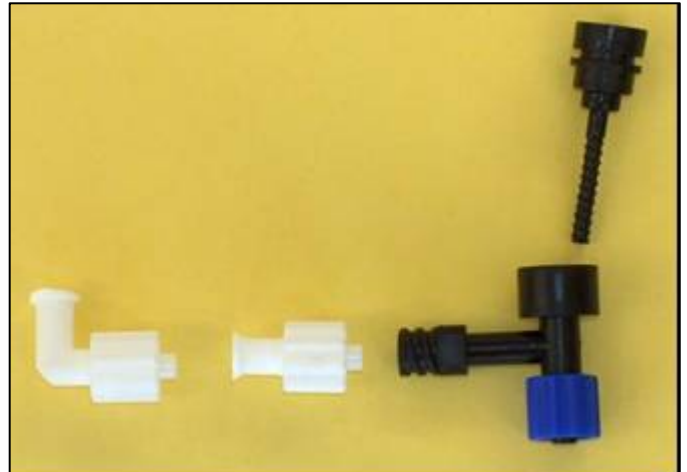
- Drying of compressed air
- Filter can be re-used, no consumables required

### 3.4 CSM704 Archimedean Screw Valve Dispenser

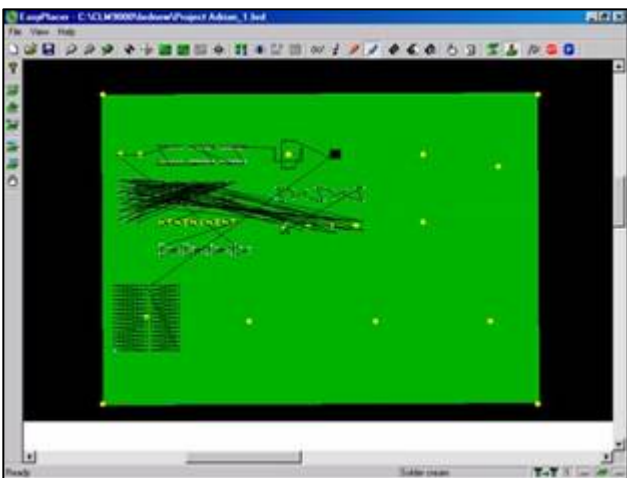
Maximum speed: 4'000 dots per hour  
 Z-axis: pneumatic, distance control with stand-off  
 Program generation: automatic  
 Application: Solder paste or glue  
 Z-axis control: pneumatic, standoff or fixed stop  
 Field upgrade: possible



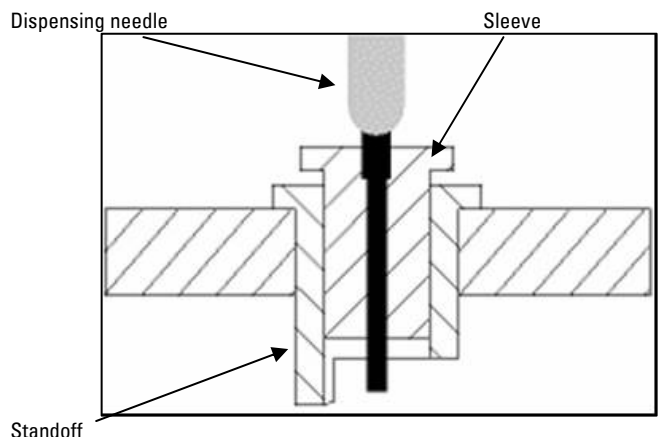
CSM704 is mounted next to the vision camera



The CSM704 can be completely disassembled for cleaning



The dispensing program is generated automatically from the pick+place program



Dispensing distance adjustment

### Specifications

Valves	DMP16-10	DMP8-10	DMP6-10
Included in standard delivery	2	0	0
Lead screw pitch (revolutions per inch)	16	8	6

**Be more flexible.**

Sleeves	95.60.00.025	95.60.00.026	95.60.00.28
Included in standard delivery	2	1	1
Inner diameter	0.8 mm	1.0 mm	1.3 mm
Fits needle	DSN40	DSN61	DSN84

Needles	DSN40	DSN61	DSN84
Included in standard delivery	2	1	1
Inner needle diameter	0.4 mm	0.61 mm	0.84 mm

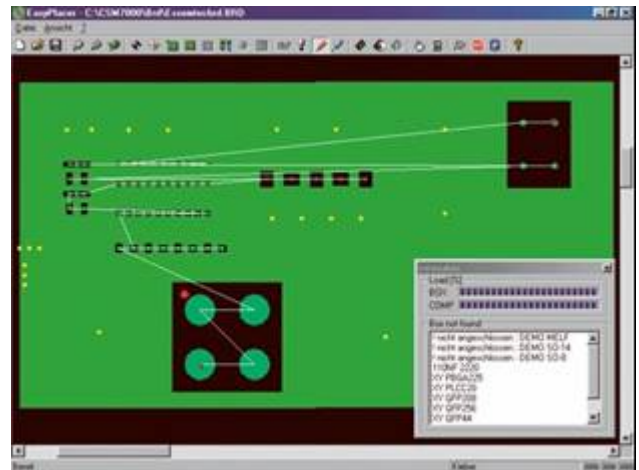
Distance gauges	23105.1200	23105.1800	23105.2000
Included in standard delivery	1	1	1
Thickness	0.2 mm	0.3 mm	0.4 mm

### 3.5 CSM701 Time/Pressure Dispenser

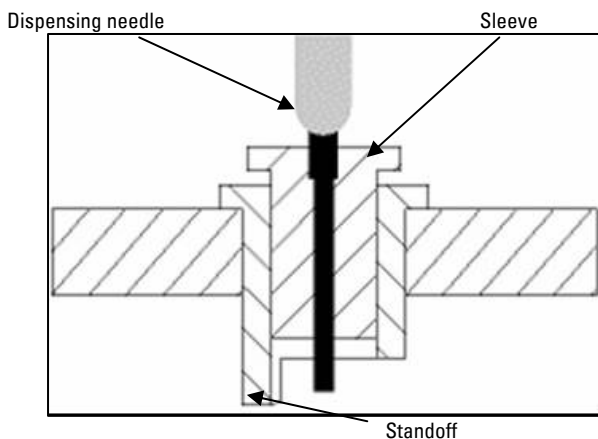
- Maximum speed: 4'000 dots per hour
- Z-axis: pneumatic, distance control with stand-off
- Program generation: automatic
- Application: glue
- Z-axis control: pneumatic, standoff or fixed stop
- Field upgrade: possible



CSM701 is mounted next to the vision camera



The dispensing program is generated automatically from the pick+place program



Dispensing distance adjustment

### Specifications

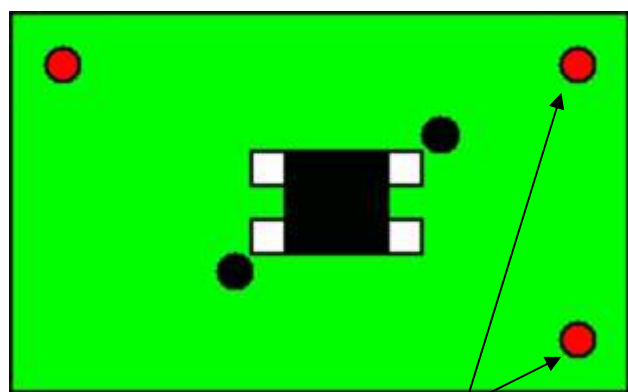
Sleeves	95.60.00.025	95.60.00.026	95.60.00.28
Included in standard delivery	2	1	1
Inner diameter	0.8 mm	1.0 mm	1.3 mm
Fits needle	DSN40	DSN61	DSN84

Needles	DSN40	DSN61	DSN84
Included in standard delivery	2	1	1
Inner needle diameter	0.4 mm	0.61 mm	0.84 mm

Distance gauges	23105.1200	23105.1800	23105.2000
Included in standard delivery	1	1	1
Thickness	0.2 mm	0.3 mm	0.4 mm

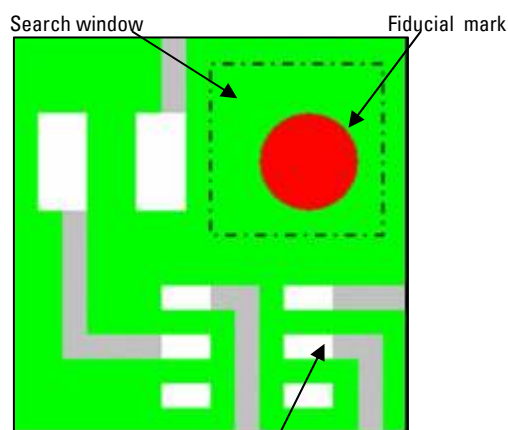
### 3.6 CSMFID Automatic Fiducial Recognition

CSMFID	Specification
Camera	1/3" CCD, CCIR 768 x 512 / Resolution <0.05mm / Pixel
Fiducial Range	Circle, square, triangle, butterfly, diamond, cross, min. 1mm (diameter, square, etc.)
Prerequisites	bright fiducials on dark background (optimum) contrast higher 20% no through holes, no connections to fiducials, no solder mask coating on fiducial
Illumination	LED ring light with diffuser
No. of PCB fiducials	3 per PCB
No. of local fiducials	2 per component
Search window size	programmable



Local fiducial

Board fiducials



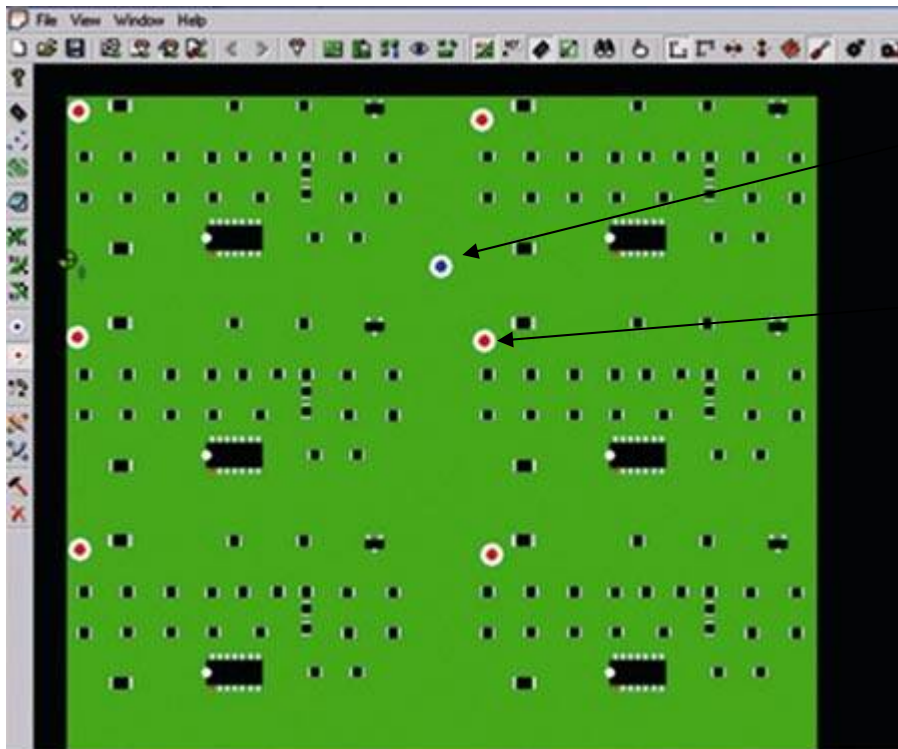
Other structure

### 3.7 CSM-BMS

(Pre-requisite: FLX-FID must be installed)

Bad mark sensing is used to automatically exclude some parts of a panel from being dispensed or assembled. Two type of marks are used:

Mark type	Check mark	Bad mark
Location	One per complete panel	One for each board of the panel
Action if not present	Not check any bad mark	Dispense and/or place
Action if present	Check all bad marks on each board of the panel	No dispensing nor placement

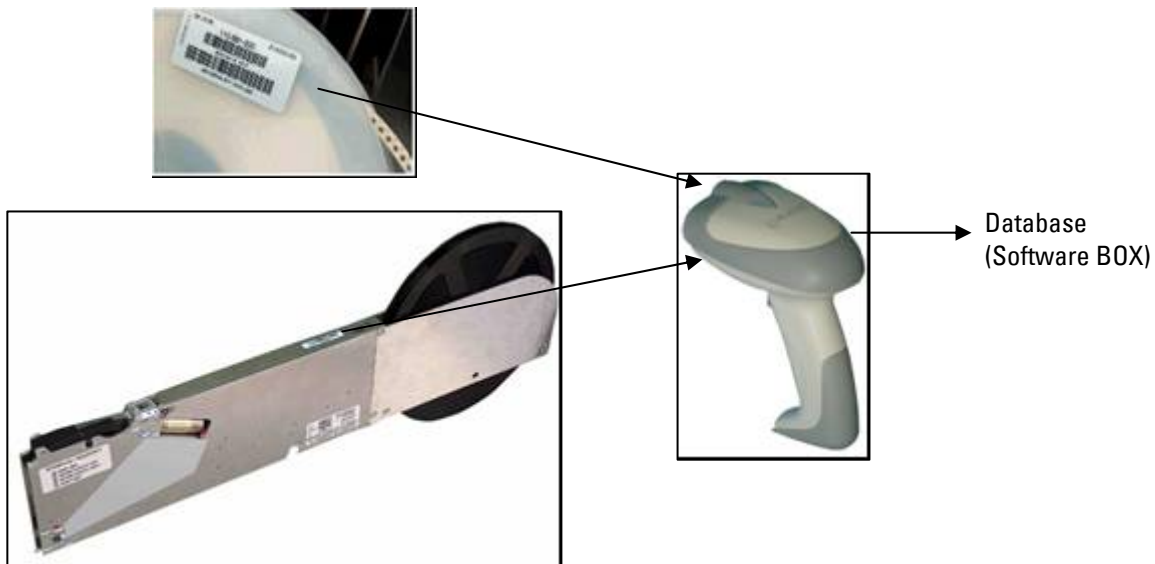


	CSM-BMS	CSM-BMS2
Application	CSM7000 and CSM7000-PLUS	CSM7100
Teach-in methode	"Bad" situation	"Good" situation
Bad mark	Sticker	Sticker or pen, anything to change the "good" image
Pre-Requisites	CSM-FID	Windows XP CSM-FID

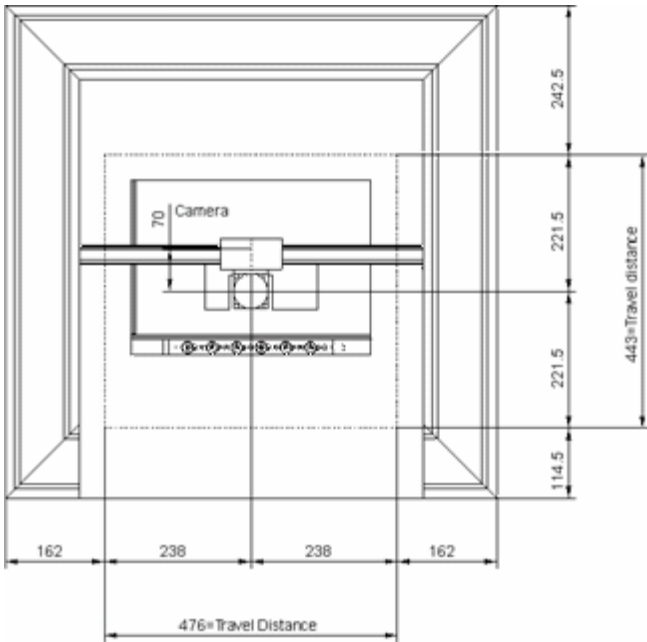
### 3.8 CSM-BAR Barce code based feeder setup

This radio barcode reader option reduces the feeder setup time and avoids any setup errors. Component reels, sticks, trays and feeders are identified with a barcode. For setup, only the barcode on the reel and the feeder is read.

- Pre-requisite for offline Feeder setup: CSM-OFF
- Pre-requisite for component identification: CSM-PRI
- Maximum distance from sender: 15 m



### 4. Dimensions and installation requirements



#### Installation requirements

