

**SIPLACE** 

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## **SIPLACE X-Series Supreme Placement Power**

Specification X-Series S from SC.708.1, 05/2015 Edition



# SIPLACE X-Series

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# SIPLACE X-Serie

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# SIPLACE X-Serie

## Content

**ESD certificate**

**85**

# SIPLACE X-Serie

## Content

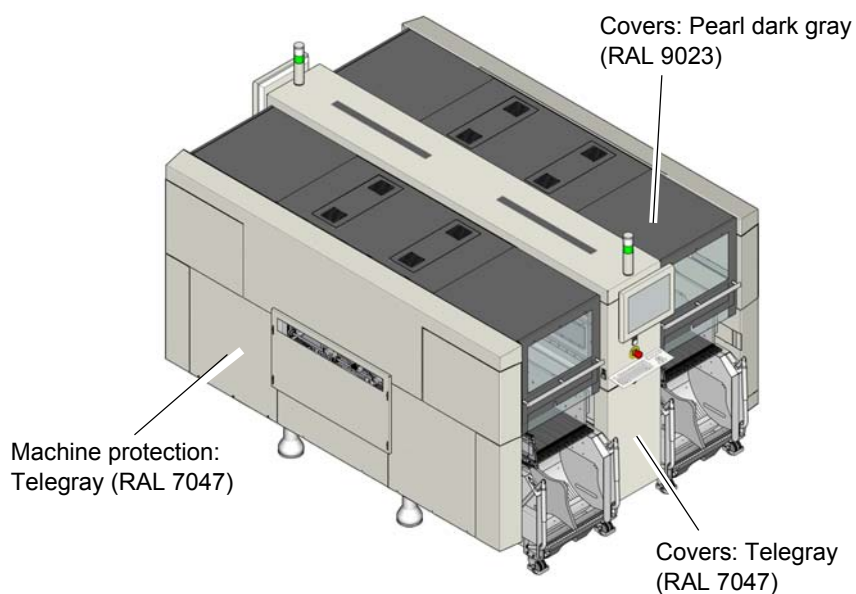
# Overview of technical data

## Maximum values

Placement performance <sup>a</sup>	
IPC value	125,000 comp./h
Benchmark value	150,000 comp./h
Theoretical value	200,000 comp./h
Component range	0201 (metric) - 200 mm x 125 mm
Placement accuracy <sup>b</sup>	
	± 22 µm, (3σ)
	± 30 µm, (4σ)
Feeder module types	Tape feeder modules, linear vibratory feeders, dip modules, application-specific OEM feeder modules
Feeding capacity (component trolley X)	160 feeder modules 8 mm X
Board format (length x width)	850 mm <sup>c</sup> x 560 mm
PCB thickness	0.3 - 6.5 mm
PCB weight	up to 3.0 kg
Camera	6 illumination levels

- a) Definition of performance values see page 15.  
 b) The SIPLACE benchmark value and accuracy are measured during the machine acceptance tests. It corresponds to the conditions set out in the SIPLACE scope of service and supply.  
 c) With license for "Long Board Option" and input/output conveyor extension.

### Machine colors



# SIPLACE X-Series

## Machine description

The X-Series placement machines are available in four different variants

- SIPLACE X2 S
- SIPLACE X3 S
- SIPLACE X4 S
- SIPLACE X4i S

The numbers in the type name indicate the number of gantries used. Each gantry has one placement head.

### Intelligent placement solutions for maximum standards

Maximum flexibility, top performance or placement quality: the SIPLACE X-Series has state-of-the-art technology to master any challenge arising in SMT production. It offers all the innovations and features to ensure efficient electronics production today and in the future, and provides previously unavailable ways to increase both efficiency and productivity.

### Maximum modularity for every need

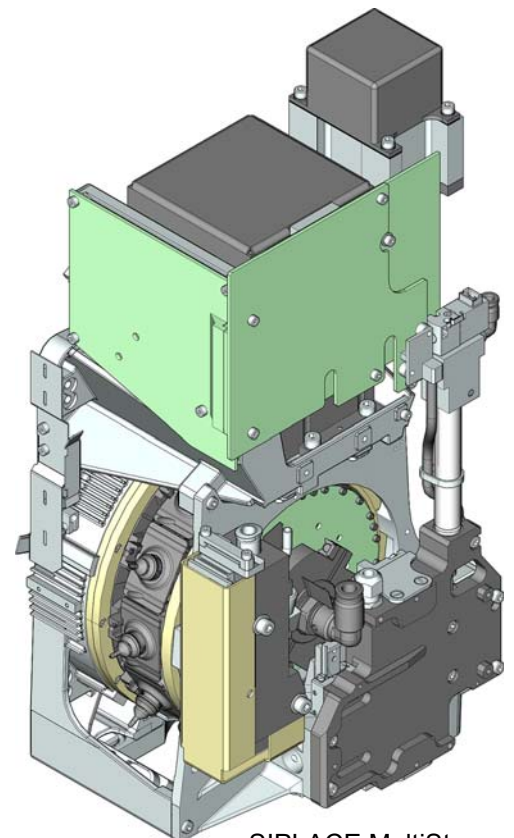
The compact design of the SIPLACE X-Series forms the ideal basis for new, future-oriented production concepts which keep pace with dynamically developing customer requirements, without the need for time-consuming conversion as in traditional SMT production lines.

The SIPLACE X-Series covers the entire range of common components with only three placement heads. The ideal addition to the proven **SIPLACE TwinStar** and the high speed **SIPLACE SpeedStar** 20 segment C&P placement head is the new **SIPLACE Multistar** head. Due to the patented CPP technology (Collect&Pick&Place), the **SIPLACE Multistar** is the first placement head worldwide which can not only switch between Pick&Place and rapid Collect&Place placement but can also combine both modes in one placement cycle (mixed mode). Software-controlled changeover of placement modes in a flash enables you to easily and perfectly balance out your production line in the event of rapidly changing requirements. Compared to conventional solutions, head changes are no longer needed and the overall productivity of the line increases significantly.

During placement, the placement heads pick up the components from the waiting supply and place these on the board waiting.

This established SIPLACE principle ensures reliable pickup of even the smallest components, prevents components sliding on the board and enables minimized travel paths.

The user also benefits from different **PCB conveyors**: The **single conveyor** and the flexible **dual conveyor**.



SIPLACE MultiStar



# SIPLACE X-Series

## Machine description

### **0201 (metric) and 03015 placement without compromise**

In its standard version, the SIPLACE X-Series is designed for placement of **0201 (metric)** and **03015** components.

Specially developed nozzles are available for use with 0201 (metric) and 03015 components. With these preparations, tiny components can be processed without any loss of quality and speed. These components can be placed with minimum pitch and irrespective of the larger components which are next to the 0201 (metric) or 03015 component. This equates to true 0201 (metric) and 03015 capability.

### **External setup configuration and SIPLACE Vision teaching for rapid introduction of new products (NPI)**

The SIPLACE X-Series proves its strength both in the high performance field and, above all, in the flexible production environment. As an example, NPI can be implemented speedily with the **SIPLACE Virtual Product Build**.

This NPI solution allows you to program offline, set up and check offline and to make adjustments offline with the **SIPLACE Pro software**.

This increases machine utilization and reduces waste. The **SIPLACE Vision Teaching Station** facilitates quick and easy offline generation of component shape descriptions, even for complex components. After the product has been optimized and all components have been defined in the programming system, the setup procedure begins. This is also performed externally (offline) and is verified with the help of barcodes and data transfer. As a result of these preparations, product changeovers are mere child's play: the program is sent to the line with all appropriate data and the new production run can begin. What could be faster or easier?

### **Lowest dpm with setup verification and sophisticated sensor technology**

The top quality of the SIPLACE X-Series leads to equally high product quality, guaranteed also by additional features.

Sensors check the presence and position of the components before and after each pickup and placement step on the head.

The digital **Vision system** recognizes components more rapidly and reliably than previously implemented analog technologies. Furthermore, setups are verified with the barcode on the component reel and by the intelligent **SIPLACE X feeder modules**. This network of checks considerably lowers dpm rates and increases the first pass yield.

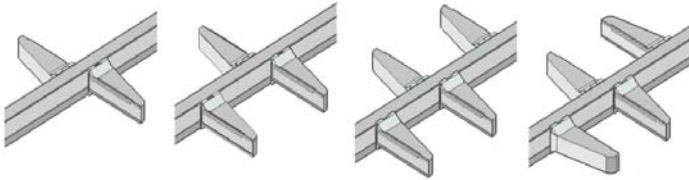
### **100% uptime with intelligent feeder modules**

The SIPLACE X-Series operates with intelligent feeder modules, which simplify the upgrade and conversion tasks considerably. For example, the SIPLACE X feeder modules can even be converted during production, thereby reducing machine stoppages.

With these advanced features, SIPLACE has established a class of its own for SMT production, which ranks way above all other placement solutions on the market.

# Modular machine concept

## Overview



### Placement machine without heads and component trolleys

X2 S  
X3 S  
X4 S  
X4i S



### Selection of placement heads

MultiStar (CPP)  
SpeedStar (C&P20 P)  
TwinStar (TH)



### Selection of conveyor

Single conveyor  
Flexible dual conveyor



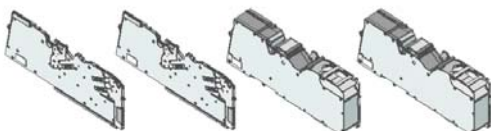
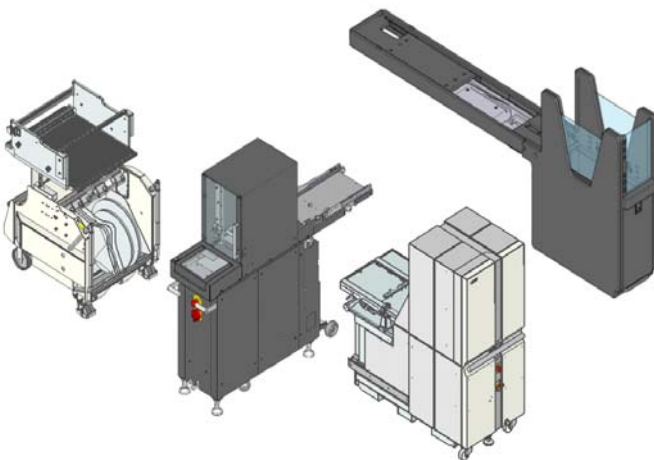
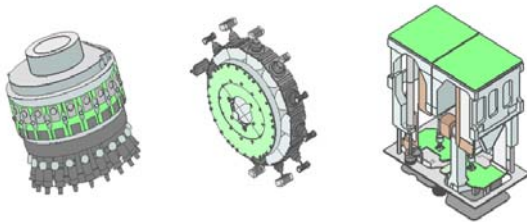
### Selection of component infeed

Component trolley  
WPC5 or WPC6  
MTC  
JTF-S/JTF-M



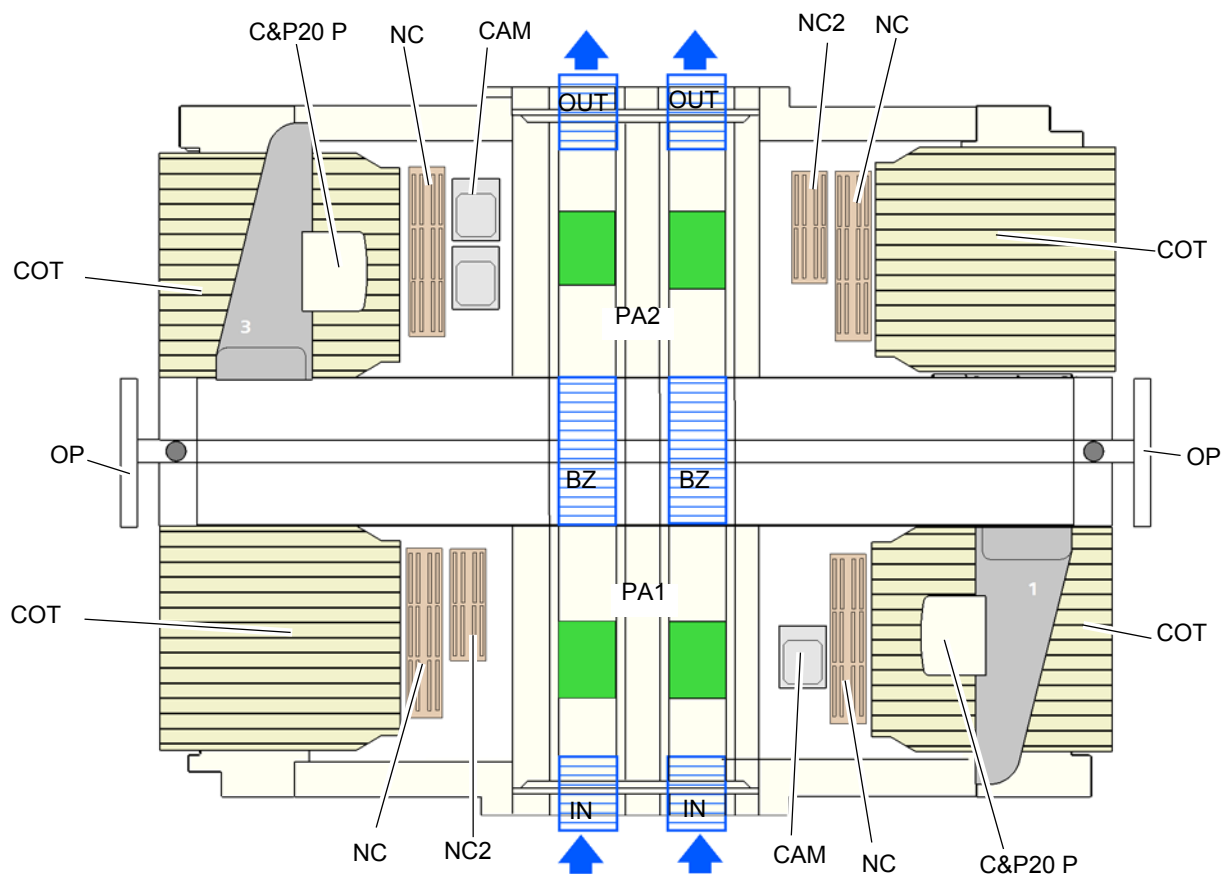
### Selection of feeder modules

X tape feeder modules  
Linear Dipping Unit X  
Label presenter  
Reject conveyor



# Modular machine concept

## Example of SIPLACE X2 S

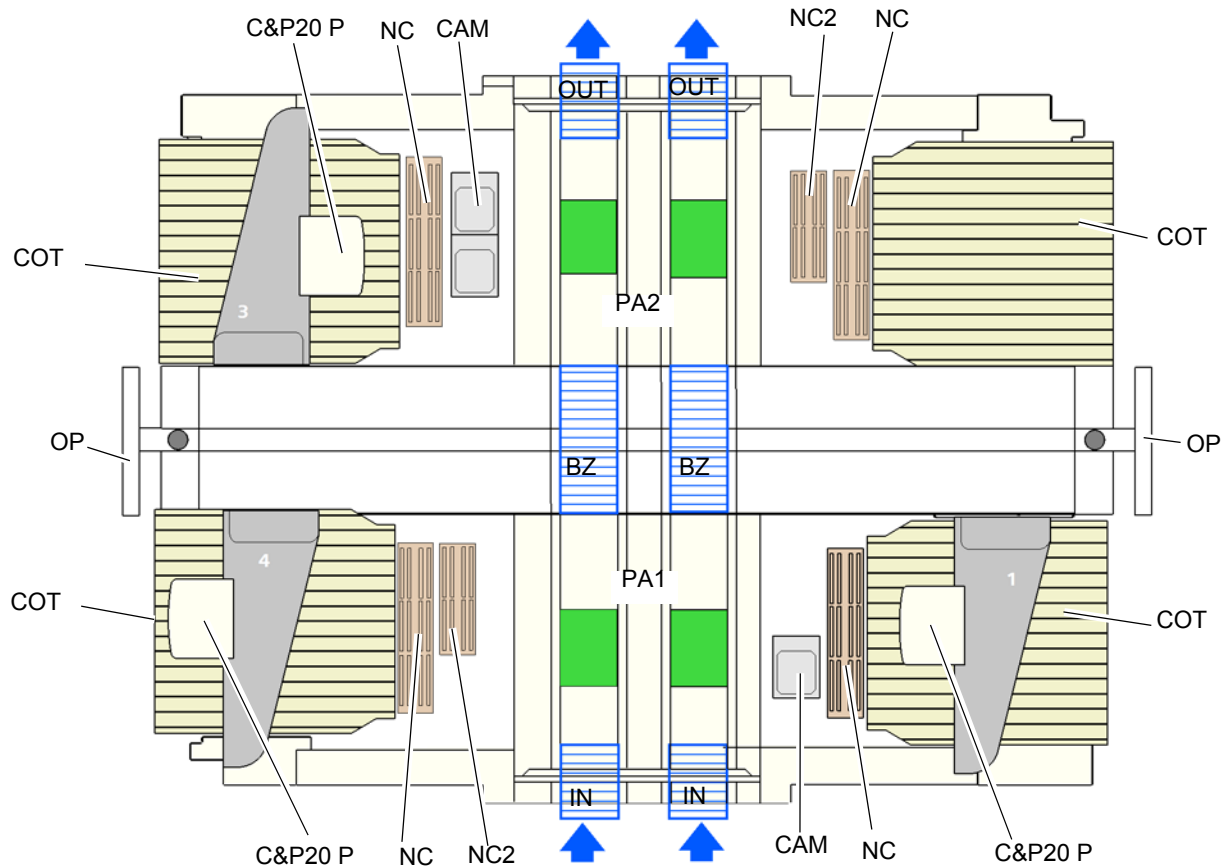


PLEASE NOTE: For all possible head configurations please refer to section Machine performance from page 15.

PA1	Placement area 1
PA2	Placement area 2
OP	Operator panel
C&P20 P	SIPLACE SpeedStar
NC	Nozzle changer
NC2	Nozzle changer "row 2"
CAM	Stationary cameras
BZ	Buffer zone
COT	Changeover table
IN	Input area - conveyor
OUT	Output area - conveyor

# Modular machine concept

## Example of SIPLACE X3 S

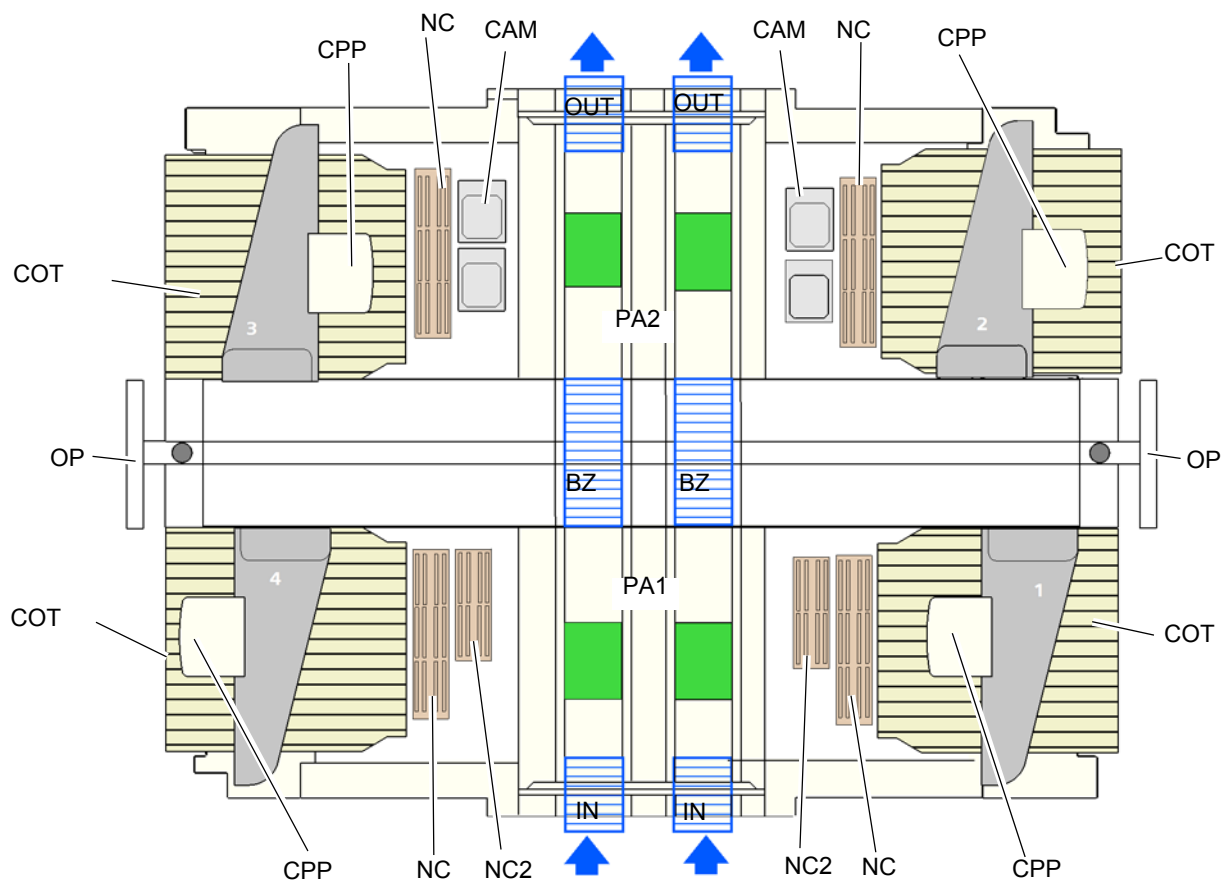


PLEASE NOTE: For all possible head configurations please refer to section Machine performance from page 15.

PA1	Placement area 1
PA2	Placement area 2
OP	Operator panel
C&P20 P	SIPLACE SpeedStar
NC	Nozzle changer
NC2	Nozzle changer "row 2"
CAM	Stationary cameras
BZ	Buffer zone
COT	Changeover table
IN	Input area - conveyor
OUT	Output area - conveyor

# Modular machine concept

## Example of SIPLACE X4 S

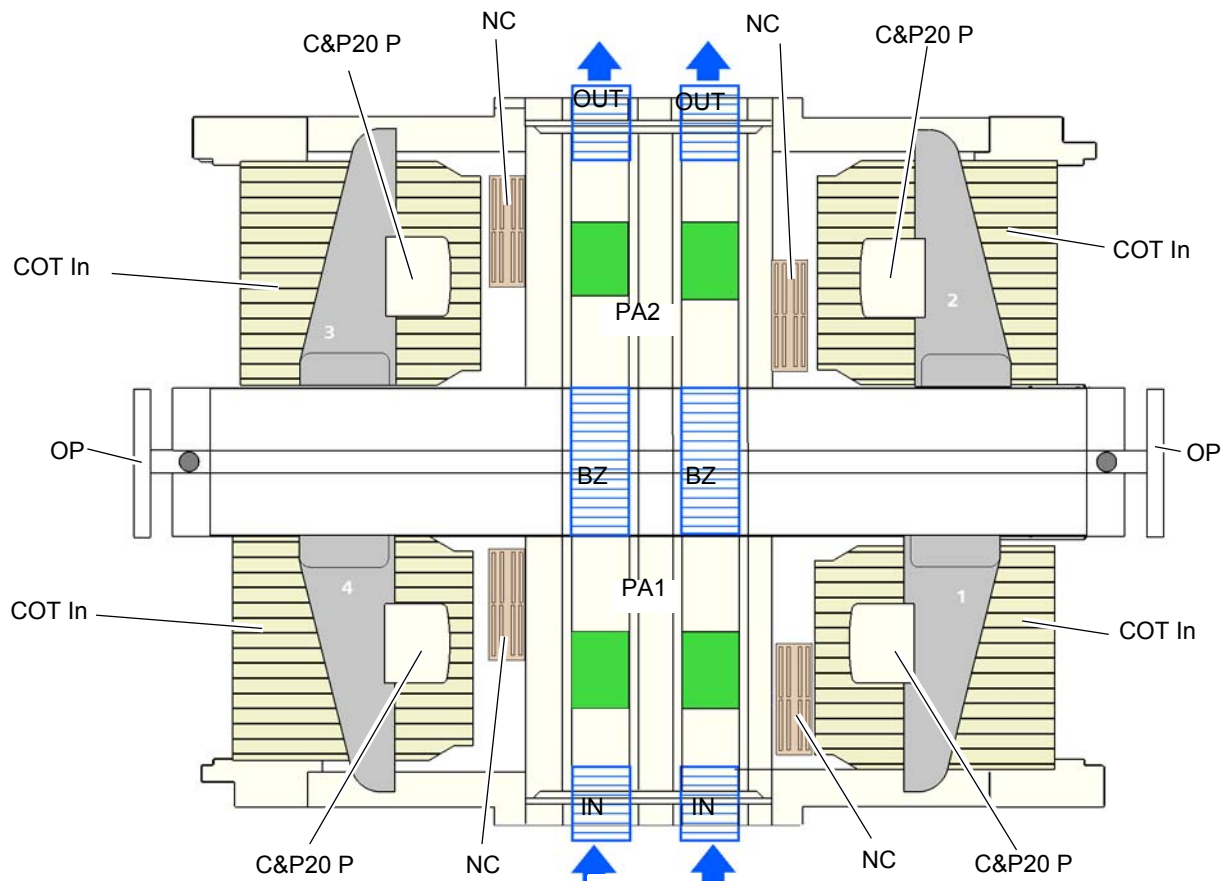


PLEASE NOTE: For all possible head configurations please refer to section Machine performance from page 15.

PA1	Placement area 1
PA2	Placement area 2
OP	Operator panel
CPP	SIPLACE MultiStar
NC	Nozzle changer
NC2	Nozzle changer "row 2"
CAM	Stationary cameras
BZ	Buffer zone
COT	Changeover table
IN	Input area - conveyor
OUT	Output area - conveyor

# Modular machine concept

## Example of SIPLACE X4i S



PLEASE NOTE: For all possible head configurations please refer to section Machine performance from page 15.

PA1	Placement area 1
PA2	Placement area 2
OP	Operator panel
C&P20 P	SIPLACE SpeedStar
NC	Nozzle changer
BZ	Buffer zone
COT In	Changeover table at the inner position
IN	Input area - conveyor
OUT	Output area - conveyor

# Machine performance

<b>Placement head types</b>	SIPLACE SpeedStar (C&P20 P) SIPLACE MultiStar (CPP) SIPLACE TwinStar (TH)
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## Placement performance

The placement performance is influenced by the different head combinations and head positions, plus the conveyor configurations. Individual options and customized applications also influence the placement performance. On request, SIPLACE can calculate the actual performance of your product on your machine configuration.

### IPC value [components/h]

According to the vendor-neutral conditions of the IPC 9850 standard published by the Association of Connecting Electronics Industries.

### SIPLACE benchmark value [components/h]

The SIPLACE benchmark value is measured during the machine acceptance tests. It corresponds to the conditions set out in the SIPLACE scope of service and supply.

### Theoretical maximum output value [components/h]

The theoretical maximum output value is calculated from the most favorable conditions for each machine type and setting, and corresponds to the theoretical conditions normally used in the industry.

## SIPLACE X2 S

See the note above for definition of placement performance values.

Machine	Placement area 1	Placement area 2	IPC value	Benchmark value	Theoretical value
X2 S-A	C&P20 P	C&P20 P	52,000	64,000	85,250
	C&P20 P	CPP_L	45,500	54,000	73,300
	C&P20 P	CPP_H	43,000	51,500	69,220
	CPP_L	CPP_L	37,400	44,000	61,600
	CPP_H	CPP_H	33,500	39,000	55,500
	CPP_L	CPP_H	35,450	41,500	57,900
X2 S-B	C&P20 P	TH	30,800	37,000	49,450
	CPP_L	TH	24,000	25,000	37,450
	CPP_H	TH	20,600	24,500	32,900
X2 S-C	TH	TH	9,000	10,000	13,000

CPP\_H = Multistar CPP in high assembly position

CPP\_L = Multistar CPP in low assembly position

# Machine performance

<b>Placement head types</b>	SIPLACE SpeedStar (C&P20 P) SIPLACE MultiStar (CPP) SIPLACE TwinStar (TH)
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## SIPLACE X3 S

### Placement performance

For a definition of placement performance values, see the note on page 15.

Machine	Placement area 1	Placement area 2	IPC value	Benchmark value	Theoretical value
X3 S-A	C&P20 P / C&P20 P	C&P20 P	78,100	94,500	127,875
	C&P20 P / C&P20 P	CPP_L	73,200	84,500	117,500
	C&P20 P / C&P20 P	CPP_H	70,100	82,000	112,530
	CPP_L/ CPP_L	CPP_L	57,500	66,000	92,400
	CPP_H / CPP_H	CPP_H	49,750	58,500	78,250
	CPP_L/ CPP_L	CPP_H	54,000	63,500	85,000
X3 S-B	C&P20 P / C&P20 P	TH	57,000	67,500	92,070
	CPP_L/ CPP_L	TH	41,650	49,000	68,750
	CPP_H / CPP_H	TH	37,400	44,000	60,200
X3 S-C	CPP_H/TH	TH	25,500	29,500	41,250
X3 S-D	TH / TH	TH	11,900	14,000	21,450

## SIPLACE X4 S

### Placement performance

For a definition of placement performance values, see the note on page 15.

	Placement area 1	Placement area 2	IPC value	Benchmark value	Theoretical value
X4 S-A	C&P20 P / C&P20 P	C&P20 P / C&P20 P	105,000	125,000	170,500
	C&P20 P / C&P20 P	CPP_L/ CPP_L	90,500	106,500	145,250
	C&P20 P / C&P20 P	CPP_H / CPP_H	86,250	101,500	138,450
	CPP_L/ CPP_L	CPP_L/ CPP_L	74,800	88,000	123,200
	CPP_L/ CPP_L	CPP_H / CPP_H	70,550	83,000	112,500
	CPP_H / CPP_H	CPP_H / CPP_H	66,300	78,000	106,000
X4 S-B	C&P20 P / C&P20 P	CPP_H/TH	68,500	87,000	110,480
	CPP_L/ CPP_L	CPP_H/TH	57,800	68,500	95,700
	CPP_H / CPP_H	CPP_H/TH	53,550	63,500	85,650
X4 S-C	C&P20 P / C&P20 P	TH / TH	60,500	71,500	97,520
	CPP_L/ CPP_L	TH / TH	45,050	53,000	75,900
	CPP_H / CPP_H	TH / TH	40,800	48,000	65,250
X4 S-D	CPP_H/TH	TH / TH	28,050	33,500	48,400
X4 S-E	TH / TH	TH / TH	15,300	18,000	28,600

CPP\_H = Multistar CPP in high assembly position

CPP\_L = Multistar CPP in low assembly position



# Machine performance

<b>Placement head types</b>		SIPLACE SpeedStar (C&P20 P) SIPLACE MultiStar (CPP) SIPLACE TwinStar (TH)			
<b>SIPLACE X4i S</b>					
<b>Placement performance</b>					
For a definition of placement performance values, see the note on page 15.					
Machine	Placement area 1	Placement area 2	IPC value	Benchmark value	Theoretical value
X4i S-A	C&P20 P / C&P20 P	C&P20 P / C&P20 P	125,000	150,000	200,000
	C&P20 P / C&P20 P	CPP_L/ CPP_L	102,000	120,000	160,000
	C&P20 P / C&P20 P	CPP_H / CPP_H	100,300	118,000	157,300
	CPP_L/ CPP_L	CPP_L/ CPP_L	79,900	94,000	112,000
	CPP_L/ CPP_L	CPP_H / CPP_H	73,950	87,000	97,800
	CPP_H / CPP_H	CPP_H / CPP_H	68,000	80,000	90,000
X4i S-B	C&P20 P / C&P20 P	CPP_H/TH	85,000	101,500	133,200
	CPP_L/ CPP_L	CPP_H/TH	58,150	73,500	77,500
	CPP_H / CPP_H	CPP_H/TH	52,190	69,500	69,075
X4i S-C	C&P20 P / C&P20 P	TH / TH	70,900	85,500	114,000
	CPP_L/ CPP_L	TH / TH	49,300	58,000	65,900
	CPP_H / CPP_H	TH / TH	43,350	51,000	57,300

CPP\_H = Multistar CPP in high assembly position

CPP\_L = Multistar CPP in low assembly position

# Placement heads

## Overview

### Head modularity

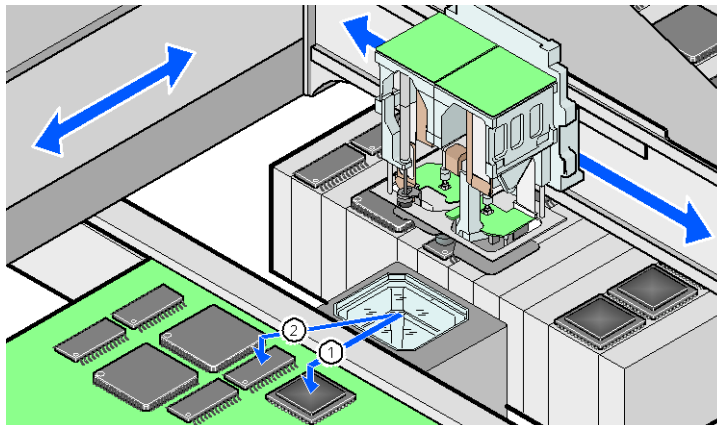
The SIPLACE placement machines are distinguished by maximum flexibility in the production process. This flexibility is in part due to the head modularity of the placement machines, which allows different placement head variants to be configured to suit the production requirements.

### Collect & Place principle

The SIPLACE SpeedStar operates according to the Collect&Place principle i.e. one cycle includes pickup or "collection" of 20 components, their optical centering on the board and their rotation into the required placement angle and position. They are then placed gently and accurately onto the PCB. This principle is particularly suitable for high-speed placement of standard components.

### Pick & Place principle

The high precision SIPLACE TwinStar, which consists of two Pick & Place modules of identical design, coupled to one another, functions according to the Pick&Place principle. Two components



are picked up by the placement head, optically centered on the way to the placement position and rotated into the necessary placement angle. This principle is ideally suitable for fast and precise placement of special components in the fine pitch or super fine pitch field, plus complex and heavy components which may need grippers.

### Mixed mode

The new SIPLACE MultiStar uses both the Collect&Place and the Pick&Place principle.

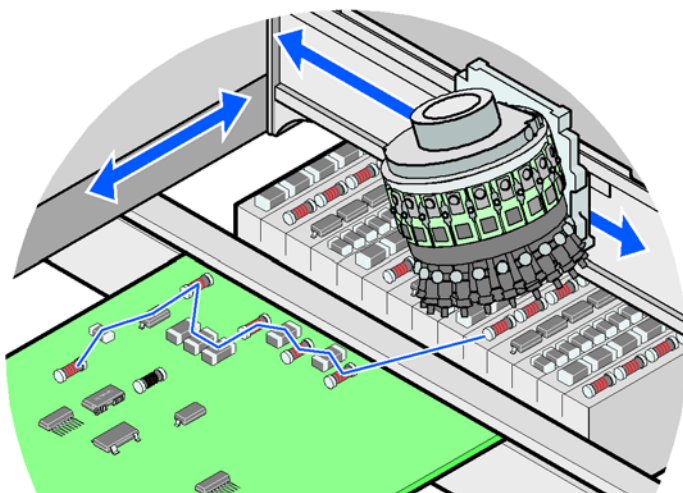
Mixed Mode allows combined use of these two modes, which were previously separated from one

another, in one placement cycle.

### Control and self-learning functions

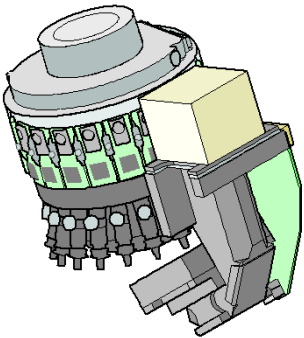
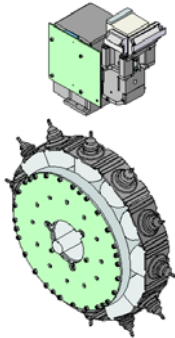
The reliability of the SIPLACE placement heads can be enhanced even further with various checking and self-learning functions.

- Component sensor  
Checks the presence of the components on the nozzle before the pickup and placement process
- Digital camera  
Checks the position of each component on the nozzle. This check is performed in a single step, with no extra time involved but with optimum scanning of each individual component.
- Force sensor  
Monitors the prescribed component set-down force. The sensor stop procedure enables compensation of height differences during pickup and PCB warpage during placement.
- Vacuum sensor  
Checks whether the component was correctly picked up or placed.

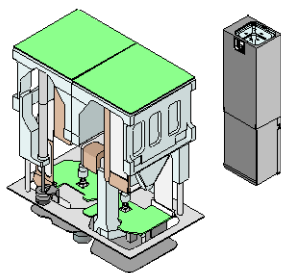


# Placement heads

## Standard functions / options

SIPLACE SpeedStar (C&P20 P)		SIPLACE MultiStar (CPP)	
			
Standard-functions	High-resolution camera, vacuum sensor, force measurement, component sensor, integrated turning station per segment, PCB warpage check, individual image of each component	Standard-functions	High-resolution camera, vacuum sensor, force measurement, component sensor, integrated turning station per segment, PCB warpage check, individual image of each component
Options	Nozzle changer, special nozzles	Options	Nozzle changer, special nozzles, stationary fine-pitch camera

### SIPLACE TwinStar (TH)

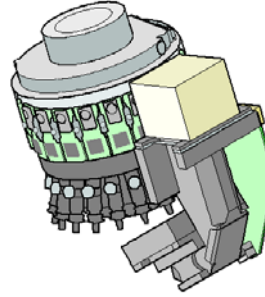


Standard-functions	Stationary fine pitch camera, vacuum sensor, force measurement, nozzle changer, PCB warpage check, individual image of each component
Options	Stationary flip chip camera, special nozzles, grippers

# Placement heads

## SIPLACE SpeedStar (C&P20 P)

SIPLACE SpeedStar (C&P20 P)



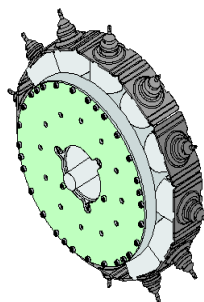
	With component camera type 23	With component camera type 41
Component range <sup>a</sup>	0201 (metric) to 2220, Melf, SOT, SOD	0201 (metric) to 2220, Melf, SOT, SOD, Bare-Die, Flip-Chip
Component spec.		
Max. height	4 mm	4 mm
Min. lead pitch	0.25 mm	0.08 mm
Min. lead width	0.1 mm	0.03 mm
Min. ball pitch	0.4 mm	0.10 mm
Min. ball diameter	0.2 mm	0.05 mm
Min. dimensions	0.4 mm x 0.2 mm	0.12 mm x 0.12 mm
Max. dimensions	6 mm x 6 mm	6 mm x 6 mm
Max. weight	1 g	1 g
Programmable set-down force	1.3 - 4.5 N	1.3 - 4.5 N
Nozzle types	40xx	40xx
X/Y accuracy <sup>b</sup>	± 36 µm/3σ ± 48 µm/4σ	± 36 µm/3σ ± 48 µm/4σ
Angular accuracy	± 0.5° / 3σ ± 0.7° / 4σ	± 0.5° / 3σ ± 0.7° / 4σ
Illumination level	5	5
Possible illumination level settings	256 <sup>5</sup>	256 <sup>5</sup>

- a) Please note that the placeable component range is also affected by the pad geometry, the customer-specific standards, the component packaging tolerances and the component tolerances.
- b) The SIPLACE benchmark value is measured during the machine acceptance tests. It corresponds to the conditions set out in the SIPLACE scope of service and supply.

# Placement heads

## SIPLACE MultiStar (CPP)

### SIPLACE MultiStar (CPP)



	With component camera type 30	With component camera type 33 (stationary camera)
Component range <sup>a</sup>	01005 mm to 27 mm x 27 mm	0402 to 50 mm x 40 mm <sup>b</sup>
Component spec.		
Max height <sup>c</sup>	6.0 mm	
Max. height <sup>d</sup>	8.5 mm	11.5 mm
Min. lead pitch	0.3 mm	0.3 mm
Min. lead width	0.15 mm	0.15 mm
Min. ball pitch	0.25 mm <sup>e</sup> 0.35 mm <sup>f</sup>	0.35 mm
Min. ball diameter	0.14 mm <sup>e</sup> 0.20 mm <sup>f</sup>	0.2 mm
Min. dimensions	0.4 mm x 0.2 mm	1.0 mm x 0.5 mm
Max. dimensions	27 mm x 27 mm	50 mm x 40 mm
Max. weight	4 g	8 g
Programmable set-down force	1.0 - 10 N	1.0 - 10 N
Nozzle types	20xx, 28xx	20xx, 28xx
X/Y accuracy <sup>g</sup>	± 41 µm/3σ ± 55 µm/4σ	± 34 µm/3σ ± 45 µm/4σ
Angular accuracy	± 0.4° / 3σ <sup>h</sup> , ± 0.5° / 3σ <sup>i</sup> ± 0.5° / 4σ <sup>h</sup> , ± 0.7° / 4σ <sup>i</sup>	± 0.2° / 3σ ± 0.3° / 4σ
Illumination level	5	6
Possible illumination level settings	256 <sup>5</sup>	256 <sup>6</sup>

- a) Please note that the placeable component range is also affected by the pad geometry, the customer-specific standards, the component packaging tolerances and the component tolerances.
- b) A diagonal of 69 mm is possible during multiple measurements (e.g. 60 mm x 10 mm).
- c) CPP head: in low installation position (stationary component camera not possible).
- d) CPP head: in high installation position
- e) For components < 18 mm x 18 mm
- f) For components ≥ 18 mm x 18 mm
- g) The SIPLACE benchmark value is measured during the machine acceptance tests. It corresponds to the conditions set out in the SIPLACE scope of service and supply.
- h) Component dimensions between 6 mm x 6 mm and 27 mm x 27 mm.
- i) Component dimensions smaller than 6 mm x 6 mm.

# Placement heads

## SIPLACE MultiStar (CPP)

### Increased performance and flexibility

The SIPLACE Multistar is the perfect SIPLACE solution:

- In an increasingly complex production environment
- For an increasing diversity of setup and production strategies
- For a wide spectrum of components
- For frequent product changeovers.

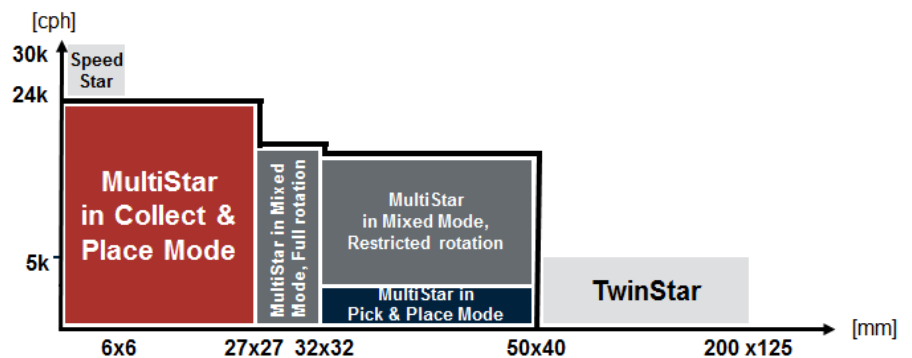
It is even possible to place larger components without a noticeable drop in performance. The SIPLACE Multistar is perfectly designed for integration into a flexible and speed-optimized production environment.

#### Elimination of bottlenecks

- A wider component spectrum
- Optimum performance utilization
- More feeder module tracks for the TwinStar
- Improved throughput due to perfect line utilization
- More products in one set-up family

#### Throughput

- Up to 23,500 components/h benchmark value
- Up to 19,000 components/h IPC 9850 performance



#### One head for all applications

- The SIPLACE MultiStar offers top flexibility
- It combines Collect&Place mode with Pick&Place mode

One head supports three placement modes:

#### Collect&Place mode



#### Mixed mode



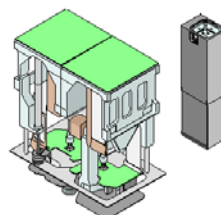
#### Pick&Place mode



# Placement heads

## SIPLACE TwinStar (TH)

SIPLACE TwinStar



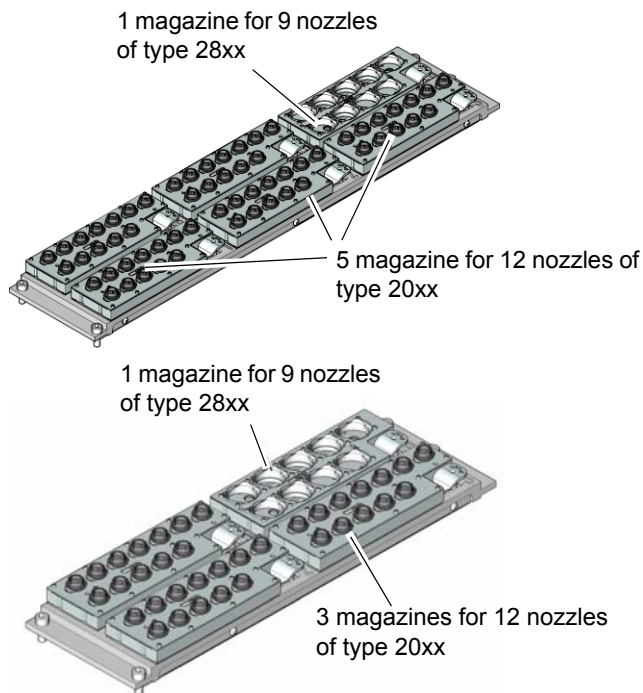
	With component camera type 33 (fine pitch camera)	With component camera type 25 (flip chip camera)
Component range <sup>a</sup>	0402 to SO, PLCC, QFP, BGA, special components, bare dies, flip-chips	0201 (metric) to SO, PLCC, QFP, sockets, plugs, BGA, special components, bare dies, flip-chips, shields
Component specs <sup>b</sup>		
Max. height	25 mm (higher available on request)	25 mm (higher available on request)
Min. lead pitch	0.3 mm	0.25 mm
Min. lead width	0.15 mm	0.1 mm
Min. ball pitch	0.35 mm	0.14 mm
Min. ball diameter	0.2 mm	0.08 mm
Min. dimensions	1.0 mm x 0.5 mm	0.6 mm x 0.3 mm
Max. dimensions	55 mm x 45 mm (single measurement) For use with two nozzles (multiple measurement) 50 mm x 50 mm or 69 mm x 10 mm <i>For use with one nozzle</i> 85 mm x 85 mm or 125 mm x 10 mm up to 200 mm x 125 mm (with restrictions)	55 mm x 55 mm (multiple measurement)
Max. weight <sup>c</sup>	100 g	100 g
Programmable set-down force	1.0 N - 15 N 2.0 N - 30 N <sup>d</sup>	1.0 N - 15 N 2.0 N - 30 N <sup>d</sup>
Nozzle types <sup>e</sup>	5xx (standard) 4xx + adapter 8xx + adapter 9xx + adapter Gripper	5xx (standard) 4xx + adapter 8xx + adapter 9xx + adapter Gripper
Nozzle spacing for P&P heads	70.8 mm	70.8 mm
X/Y accuracy <sup>f</sup>	± 26 µm / 3σ, ± 35 µm / 4σ	± 22 µm / 3σ, ± 30 µm / 4σ
Angular accuracy	± 0.05° / 3σ, ± 0.07° / 4σ	± 0.05° / 3σ, ± 0.07° / 4σ
Illumination level	6	6
Possible illumination level settings	256 <sup>6</sup>	256 <sup>6</sup>

- a) Please note that the placeable component range is also affected by the pad geometry, the customer-specific standards, the component packaging tolerances and the component tolerances.
- b) If the MultiStar and TwinStar are combined in the same placement area, the maximum component height may be restricted.
- c) If standard nozzles are used
- d) SIPLACE High-Force Head.
- e) Over 300 different nozzles and 100 gripper types are available, with an extensive nozzle database available online.
- f) The SIPLACE benchmark value is measured during the machine acceptance tests. It corresponds to the conditions set out in the SIPLACE scope of service and supply.

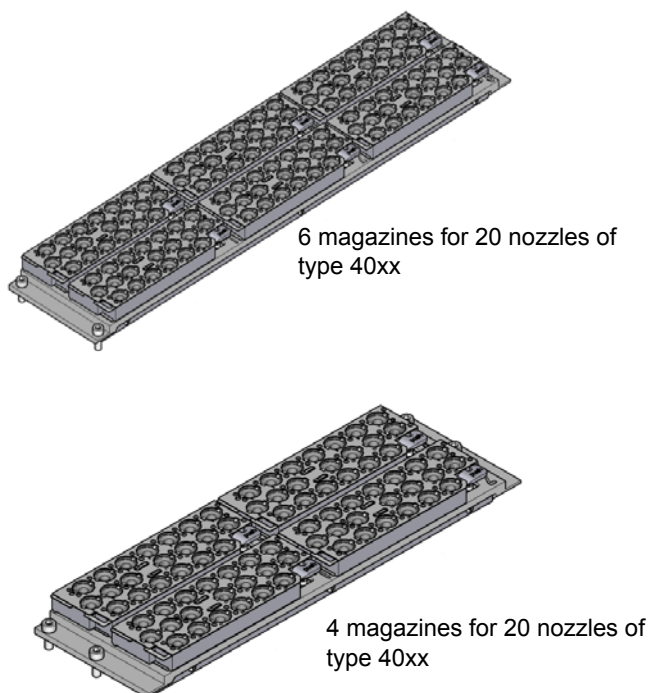
# Placement heads

## Nozzle changer

### Nozzle changer for the SIPLACE MultiStar



### Nozzle changer for the SIPLACE SpeedStar

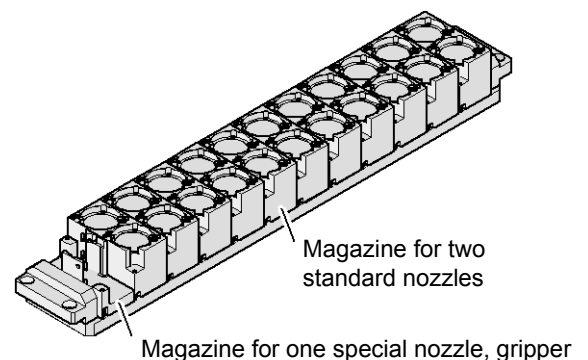


### Description

Nozzle changers increase the flexibility of the placement heads when it comes to processing different components. The nozzle configuration can be rapidly adjusted to changing placement jobs. Precisely defined positions and perfect nozzle seat in the garage ensure minimum radial eccentricity on the placement head.

The nozzle changer for the MultiStar is fitted with a monitoring device. This checks whether the nozzle magazine is seated correctly on the mount. In addition, the nozzle changers recognize whether the magazines are for 1xx, 20xx or 28xx nozzles by the code.

### Nozzle changer for the SIPLACE TwinStar





# Placement heads

## Nozzle changer

### Technical data

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#### Nozzle changer for the SIPLACE SpeedStar

Number of magazines <sup>a</sup>	
SIPLACE X2 S/X3 S/X4 S	6
SIPLACE X4i S	4
Number of nozzle holders	
SIPLACE X2 S/X3 S/X4 S	120
SIPLACE X4i S	80
Standard configuration	
SIPLACE X2 S/X3 S/X4 S	6 magazines with 120 nozzle garages
SIPLACE X4i S	4 magazines with 80 nozzle garages
Option: Nozzle changer "row 2"	4 magazines with 80 nozzle garages
Nozzle types	40xx

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#### Nozzle changer for the SIPLACE MultiStar

Number of magazines <sup>a,b</sup>	
SIPLACE X2 S/X3 S/X4 S	6
SIPLACE X4i S	4
Number of nozzle holders	
SIPLACE X2 S/X3 S/X4 S	72
SIPLACE X4i S	48
Standard configuration	
SIPLACE X2 S/X3 S/X4 S	5 magazines with 60 x 20xx nozzle garages 1 magazine with 9 x 28xx nozzle garages
SIPLACE X4i S	3 magazines with 36 x 20xx nozzle garages 1 magazine with 9 x 28xx nozzle garages
Option: Nozzle changer "row 2"	4 magazines with 48 nozzle garages
Nozzle types	10xx, 11xx, 12xx 20xx, 28xx

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#### Nozzle changer for the SIPLACE TwinStar

Number of magazines	
Locations 1 and 3	max. 12 magazines for max. 24 nozzle garages
Locations 2 and 4	max. 10 magazines for max. 20 nozzle garages
Number of nozzle holders	may be freely configured
Standard configuration	3 magazines with two nozzle garages each 1 magazine with one nozzle garage
Nozzle types	4xx with adapter 5xx (standard) 9xx with adapter Special nozzle, gripper

a) All magazines in the nozzle changer must be configured.

b) With restrictions at location 2 for MTC/WPC

# Board conveyor

## Single conveyor

### Conveyor transport principle

When the board reaches the placement area, it is gently slowed down (braked). As soon as the board has reached its target position, the conveyor is stopped and the board is clamped from below. The placement process begins immediately afterwards. The transportation and clamping of the boards is monitored.

### Position of conveyor sides

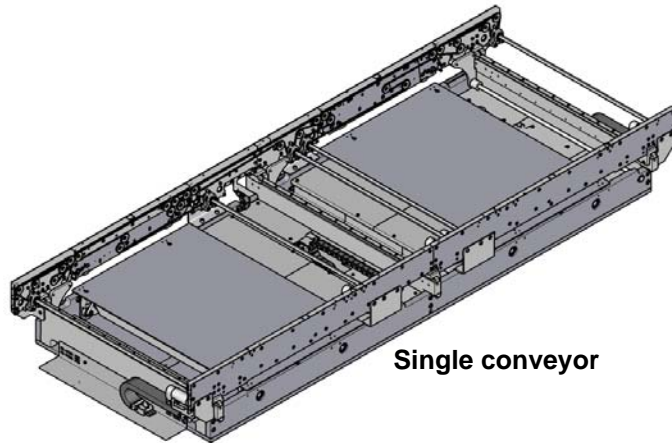
The conveyor can be easily adjusted with the automatic electrical width adjustment system, to accommodate various different board widths. Both the single and flexible dual conveyor allow you to set the fixed conveyor side on the right or left, as required.

### Alternating placement mode

In the sophisticated SIPLACE placement concept, the two heads operate alternately to process boards on both conveyor lanes. While the first head places components on both boards, the other head picks up new components.

### Single conveyor

When using a single conveyor, boards are moved behind one another, along a conveyor lane and into the placement machine, where they are placed. This conveyor variant is particularly suitable for very wide boards.



Single conveyor

# Board conveyor

## Flexible dual conveyor

### Flexible dual conveyor

To keep the range of PCBs to be processed as wide as possible - whilst maintaining maximum productivity - the flexible SIPLACE dual conveyor allows you to choose between single conveyor mode and dual conveyor mode. In the dual conveyor, two boards are moved into the placement machine and placed either at the same time (synchronous mode) or alternatively (asynchronous mode). This makes it possible to process the top and bottom sides of a board in one line.

### Synchronous mode

In synchronous mode, two PCBs of the same size are transported into the placement position at the same time. They are processed as a common panel. When using products with greatly differing placement content, common optimization of the whole content on both boards increases the overall performance.

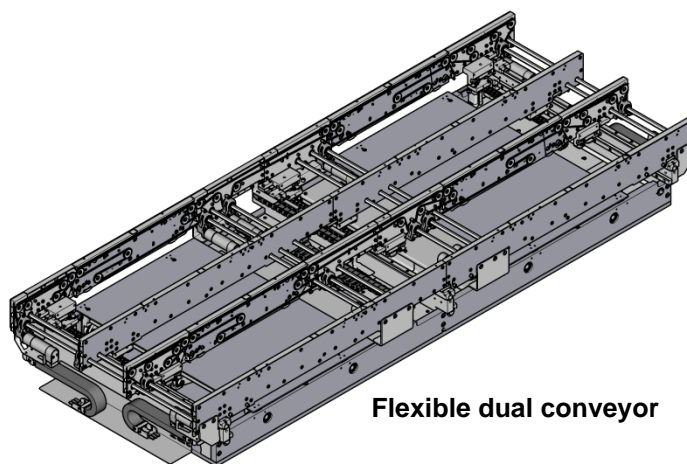
### Asynchronous mode

In asynchronous mode, only one PCB in a transport track is processed. At the same time, another PCB in the second transport track is moved into the placement position. This enables you to save the whole transportation time, leading to a considerable improvement in performance, especially for boards with lower cycle times. The placement process begins as soon as a board is transported into the processing area.

### I-Placement

In this mode, the two heads work simultaneously and populate a PCB totally independently of one another. This further increases the output.

The background: the placement heads and component feeder modules of the SIPLACE X-Series have accelerated component pickup to such a degree that it is now the transport path to the board and not the pickup procedure which has become the speed-restricting factor.



Flexible dual conveyor

# Board conveyor

## Technical data

	Single conveyor	Flexible dual conveyor	Dual conveyor in single conveyor mode
Board dimensions (length x width <sup>a</sup> )			
X2 S / X3 S / X4 S - standard	50 mm x 50 mm to 450 mm x 560 mm	50 mm x 50 mm to 450 mm x 320 mm	50 mm x 50 mm to 450 mm x 560 mm
X2 S / X3 S / X4 S - long board <sup>b c</sup>	50 mm x 50 mm to 850 mm x 560 mm	50 mm x 50 mm to 850 mm x 320 mm	50 mm x 50 mm to 850 mm x 560 mm
X4i S - standard <sup>d</sup>	50 mm x 50 mm to 380 mm x 560 mm	50 mm x 50 mm to 450 mm x 300 mm	50 mm x 50 mm to 450 mm x 510 mm
	50 mm x 50 mm to 450 mm x 510 mm	50 mm x 50 mm to 380 mm x 320 mm	--
X4i S - long board <sup>b</sup>	50 mm x 50 mm to 610 mm x 510 mm	50 mm x 50 mm to 610 mm x 300 mm	50 mm x 50 mm to 610 mm x 510 mm
Stationary conveyor side	Right or left	Right, left or outer	
Automatic electrical width adjustment	Standard		
PCB thickness Standard:	0.3 mm to 4.5 mm		
PCB warpage	See page 30		
PCB weight <sup>e</sup> Standard	Max. 3.0 kg	Max. 2.0 kg	Max. 2.0 kg
Clearance on PCB underside	25 mm		
PCB conveyor height Option:	900 mm		
Standard:	930 mm		
SMEMA option:	950 mm		
Type of interface: Standard:	SMEMA		
Option:	Siemens		
Component-free PCB handling edge	3 mm		
PCB changeover time Single conveyor	< 1.5 seconds		
Dual conveyor <sup>f</sup>	0 seconds		

a) When using board widths > 450 mm, make sure that the peripheral modules can also process these board widths.

b) The "long board option" requires a license.

c) Boards from 650 mm length require an additional input and output conveyor extension.

d) I-PLacement and alternating placement mode are possible with board lengths up to 380 mm. Only alternating placement mode is possible for boards longer than 380 mm.

e) The board weight value refers to the weight of the board plus the weight of the components.

f) 0 seconds in asynchronous mode, otherwise 1.5 seconds.

### Important notes

When setting up a machine (S; F-, HS-, HF-, X- or D-Series) next to a SIPLACE X-Series, be aware that there is limited room between the two machines. In these cases, use suitable conveyor extensions to create room of 0.5m for the operator between the two machines.

To achieve top placement performance, fit the first machine in a SIPLACE X-Series line with an input conveyor extension and the last machine in the line with an output conveyor extension.

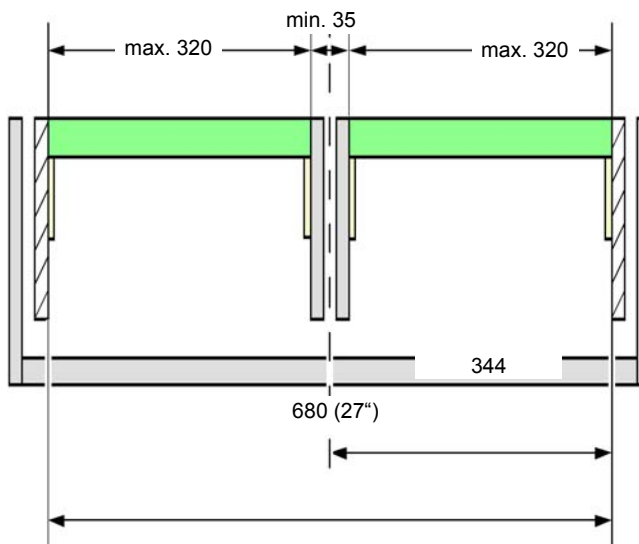
# Board conveyor

## I-Placement

### Alternating placement mode



#### Alternating placement or I-Placement mode

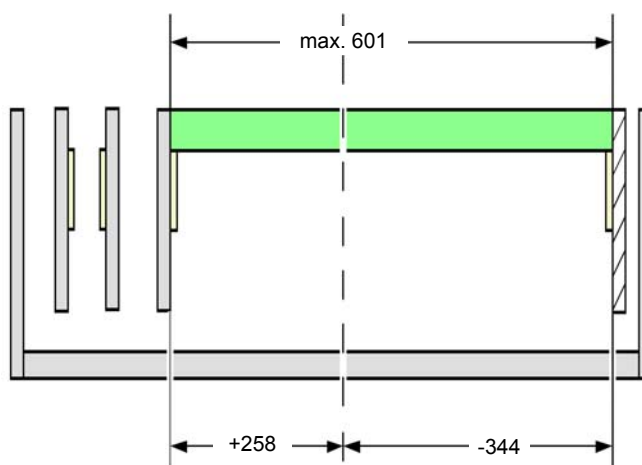
Distance of outer conveyor edges: 680 mm, 2 lanes, outer conveyor edges fixed



#### Alternating placement mode

Distance of outer conveyor edges: 601 mm, dual conveyor in single conveyor mode, right conveyor edge fixed<sup>a</sup>

 Movable conveyor side  
 Stationary conveyor side



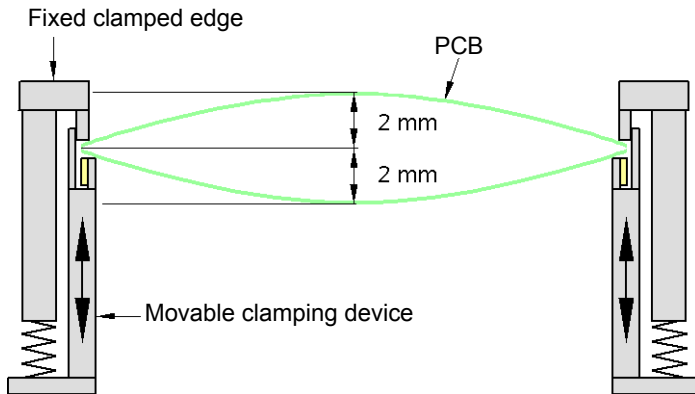
a) The diagram only shows settings with a fixed righthand conveyor edge. A setting with the stationary conveyor edge on the left is also possible. All dimensions in millimeters.

Adjustable conveyor side position and max. PCB width

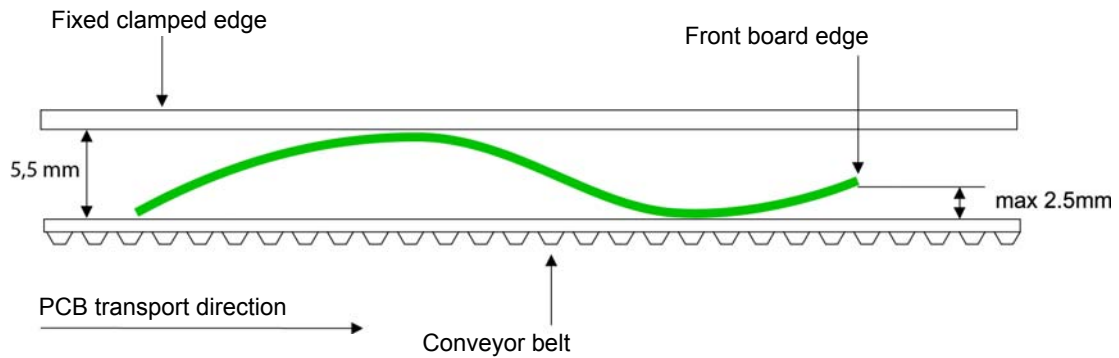
Conveyor side position	Max. PCB width
234.2 mm	216 mm
254 mm	236 mm
268 mm	250 mm
281 mm	260 mm
320 mm	300 mm
344 mm	320 mm
Customized (up to max. 344 mm)	320 mm

# PCB warpage

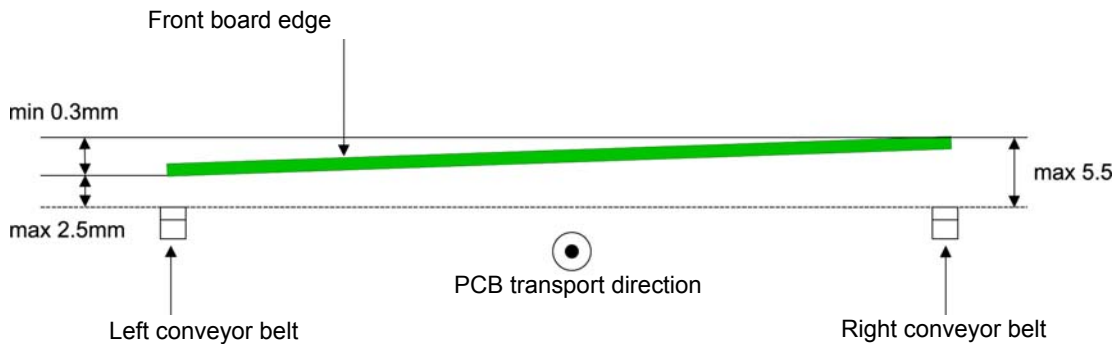
## PCB warpage on the conveyor



PCB warpage across the direction of travel  
max. 1 % of the PCB diagonal, but not  
exceeding 2 mm

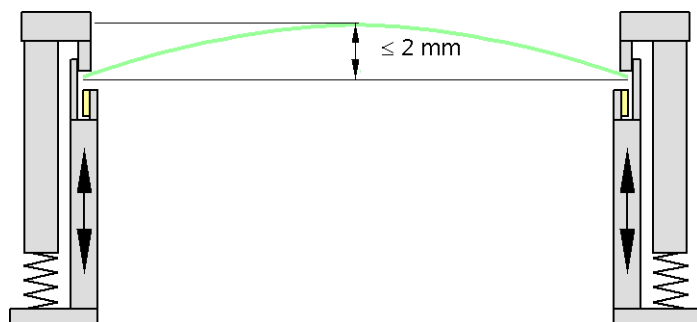


PCB warpage in direction of travel + PCB thickness < 5.5 mm  
Bending up of front board edge max. 2.5 mm



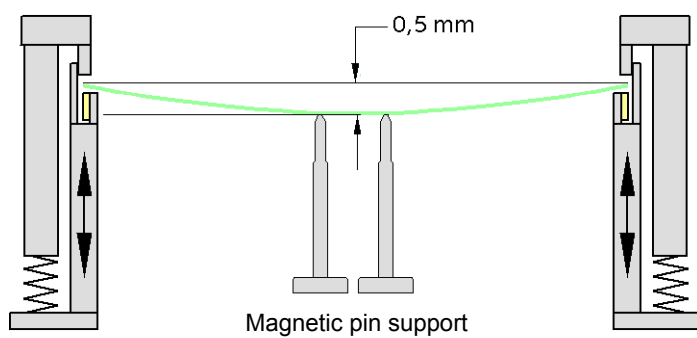
# PCB warpage

## PCB warpage during placement



When there is warpage under 2 mm, the inkspots in the center of the board are also within the focus of the digital camera. When all the tolerances are taken into account, this value is reduced to 1.5 mm.

You should also note that the warpage reduces the component height.



PCB warpage downwards max. 0.5 mm

Use the magnetic pin supports, to achieve this value.

# Smart Pin Support

## General

Wide boards tend to deflect during placement such that, under certain circumstances, the components can no longer be placed with the desired accuracy. Highly curved PCBs also affect the placement accuracy. This problem can be easily rectified by fitting support pins on the lifting table. The use of Smart Pin Support enables you to reduce the number of feeder locations by a maximum of 6 locations.

## Smart Pin Support

The support pins are automatically placed on the lifting table with the help of the **Smart Pin Support** option.

A gripper unit is used to pick the support pins up from special magazines and place

them in the prescribed positions.

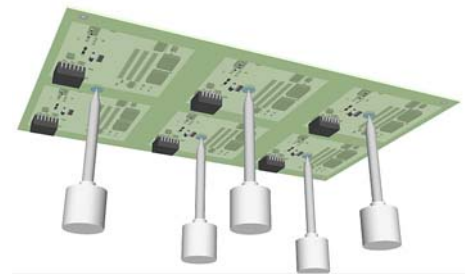
Before a smart support pin is placed, the position is cleaned of any contaminants with a gentle blast of air. In addition, the correct positioning of the support pin is checked after its placement, with the PCB camera.

## Magazine

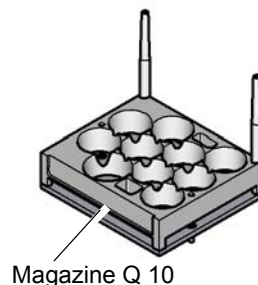
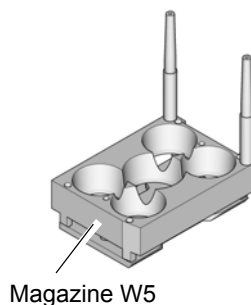
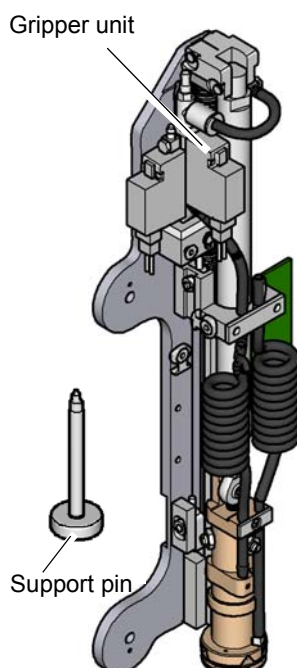
There are two different magazines available for automatic changeover of max. 5 or max. 10 support pins in the various machine configurations. These magazines are fixed to a magazine holder and are fitted to the COT insert.

## Programming

The positions of the support pins in the machine can be defined for each board side, in the SIPLACE Pro Board Editor.



A 3D image of the board and the support pins allows you to recognize and prevent any collision risks between the support pin and the components, even for stepped transportation of boards with excess length.



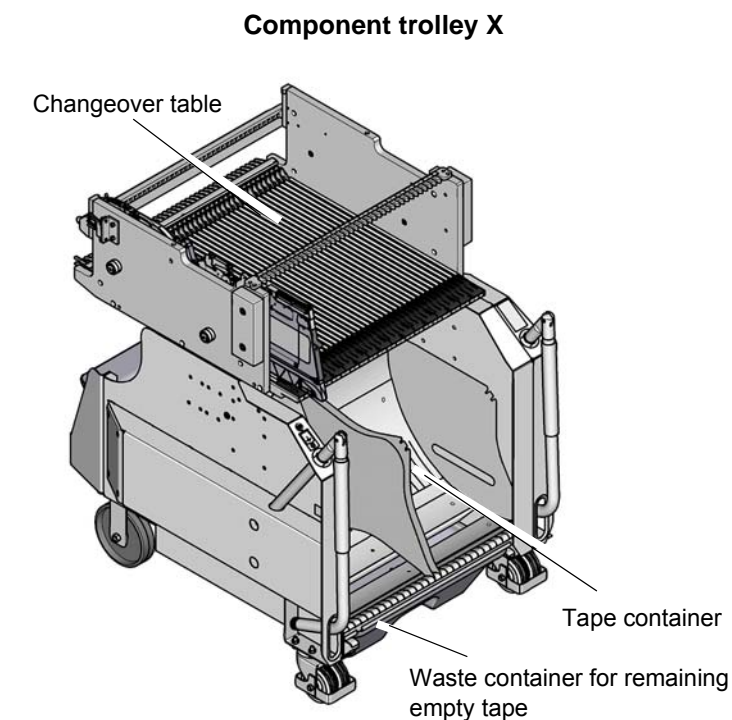


# Component feeding

## Component trolley X

### Component trolley X

The X component trolleys are independent and easily maneuverable modules. The tape reels are taken up into the tape container of the X component trolley. A cutting device on the machine automatically cuts up the used tape material. The X component trolleys can be set up directly on the machine or at an external setup area with feeder modules. The benefits of offline setup are that the configurations can be prepared without stopping the line. This allows the setup to be changed very quickly using the changeover table principle. The SIPLACE X component trolleys also support fast setting up and tearing down of feeder modules even during the placement process.



The component feeders are at rest during the placement process - allowing tapes to be spliced without stopping the machine. With the help of an optional component barcode reader and the Setup Center option, the barcodes on the tape reels can be read and checked.

This ensures the correct assignment of components to tracks and the traceability of PCB placement with the Traceability software.

For safety reasons, unoccupied locations are fitted with so-called dummy feeder modules.

# Component feeding

## Component trolley X

### Technical data

<b>Component trolley dimensions</b>	
X component trolley (length X width)	752 mm x 592 mm
<b>Height</b>	
900 mm (PCB transport height:	890 mm
930 mm (PCB transport height:	920 mm
950 mm (PCB transport height:	940 mm
<b>Weight of X component trolley</b>	
Without feeder modules	80.4 kg
fully configured with feeder modules	139.6 kg
<b>Tape reel diameter</b>	
Standard	to 432 mm (17")
maximum	483 mm (19")
Locations for feeder modules	max. 40 feeders, each 8 mm
Changeover time for X component trolley	max. 30 seconds
<b>Max. component feeding</b>	
4 component trolleys X on the SIPLACE X2 S / X3 S / X4 S	160 feeder modules, each with 8 mm X
4 component trolleys X on the SIPLACE X4i S:	148 feeder modules, each with 8 mm X
Alternative feeder modules with adapter X	Tape feeder modules, reject conveyors, stick magazine and label presenters.

# Component feeding

## X tape feeder modules

SIPLACE X tape feeder modules are intelligent tape feeder modules for flexible production environments, which simplify upgrading and conversion tasks considerably. All SIPLACE X feeder modules support tape splicing as a standard, which prevents machine stoppages when refilling.

The benefits at a glance:

### Conversion-friendly

- The SIPLACE X tape feeder modules are designed as single-track feeder modules. This minimizes any restrictions during conversion.
- Omega profiles on the tape feeder module and table facilitate safe and reliable upgrading and conversion of tape feeder modules during ongoing production.

### Robust

- Brushless motors extend the service life of the X tape feeder modules.

### Intelligent

- A unique tape feeder module ID ensures a precise assignment of the component to the tape feeder module. This makes reliable setup verification very simple.
- Component pitch, feeder speed and other functions are automatically set when the setup program is downloaded.

### High feeding accuracy

- Closed loop control path measurement ensures highly accurate component feeding, even for 0201 (metric) placement standard feeder can be used.

### Operator-friendly

- Contactless data and power transmission make it easier to attach/remove the tape feeder modules
- A multicolor status display signals the operating statuses of the X tape feeder module:
  - Green: "Ready for operation/in current setup"
  - Orange: "Component runs empty"
  - Red: "Malfunction"
  - LED off: "Tape feeder module is not in current setup and can be torn down"

### Technical data

Tape feeder module	L x H [mm]	Width [mm]	Location	Transport increment [mm]	Max. tape height [mm]
4 mm X	587x200	10,8	1	1	1,1
Smart Feeder 8 mm X	587x200	10,8	1	1/2/4/8	3,5
Smart Feeder 2x8 mm X	587x200	22,9	2	1/2/4/8	3,5
Smart Feeder 12 mm X	587x200	22,6	2	4 - 16 <sup>a</sup>	16
Smart Feeder 16 mm X	587x200	22,6	2	4 - 20 <sup>a</sup>	16
24 mm X	587x200	34,4	3	4 - 32 <sup>a</sup>	25
32 mm X	587x200	46,2	4	4 - 40 <sup>a</sup>	25
44 mm X	587x200	58,0	5	4 - 52 <sup>a</sup>	25
56 mm X	587x200	69,8	6	4 - 64 <sup>a</sup>	25
72 mm X	587x200	81,6	7	4 - 80 <sup>a</sup>	25
88 mm X	587x200	105,2	9	4 - 96 <sup>a</sup>	25
Tape reels 178 to 483 mm in diameter (7" - 19")					
Changeover time ≤ 8 s					

a) In 4mm steps

# Component feeding

## Alternative SIPLACE feeder modules

### Technical data

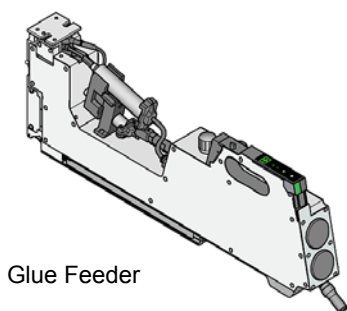
<b>Linear vibratory feeder, type 3</b>	Stick magazines X component trolley <sup>a</sup> 3 x ≤ 9.5 mm 2 x ≤ 15 mm 1 x ≤ 30 mm Occupies 3 locations of an 8 mm X feeder module
<b>Linear Dipping Unit (LDU X)<sup>b</sup> for X component trolley</b>	Occupies 9 locations of an 8 mm X feeder module
<b>SIPLACE Glue Feeder</b>	Occupies 5 locations of an 8 mm X feeder module, max. 1 per head

- a) With X adapter  
b) With restrictions

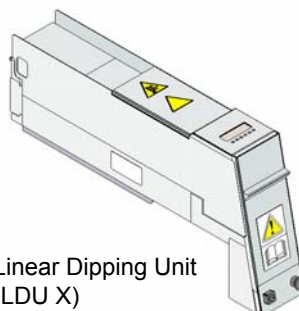
### Description

Linear vibratory feeders process components in stick magazines. These can be easily configured with the X adapter for use with the X component trolley. They can be refilled without stopping the machine. The X adapter also allows you to set up the **label presenter** and the **reject conveyor** on the X component trolley. The **LDU X** is suitable for dip fluxing of flip chips, CSP (Chip Scale/Size Packages) and for coating flip chip bumps with isotropic conductive adhesive.

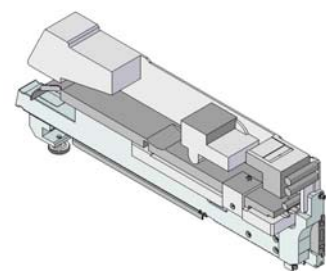
The **SIPLACE Glue Feeder** allows you to position dots of adhesive on a component, before it is placed.



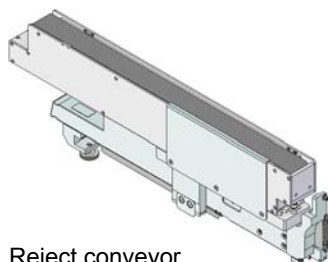
Glue Feeder



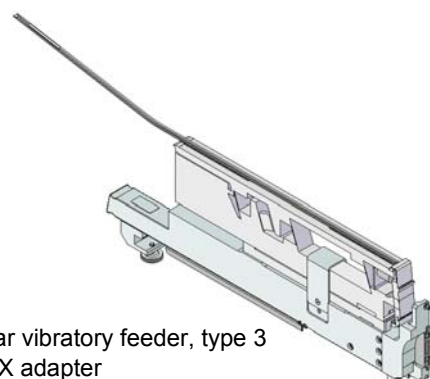
Linear Dipping Unit (LDU X)



Label presenter with X adapter



Reject conveyor with X adapter



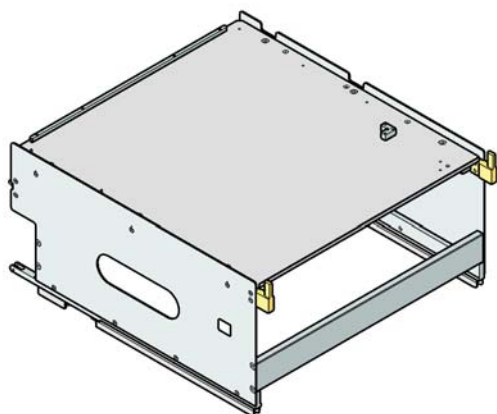
Linear vibratory feeder, type 3 with X adapter

# Component feeding

## Tray holders

### Technical data for waffle pack tray SIPLACE X

Dimensions LxWxH	429 x 376 x 200 mm <sup>3</sup>
Locations occupied on the SIPLACE X component trolley	32
Positioning options on X-Series placement machines	Locations 2 and 4
Placement head range	TwinStar, MultiStar
Max. waffle pack tray height including components	
MultiStar	16 mm
TwinStar	30 mm



Tray holder SIPLACE X

# Component feeding

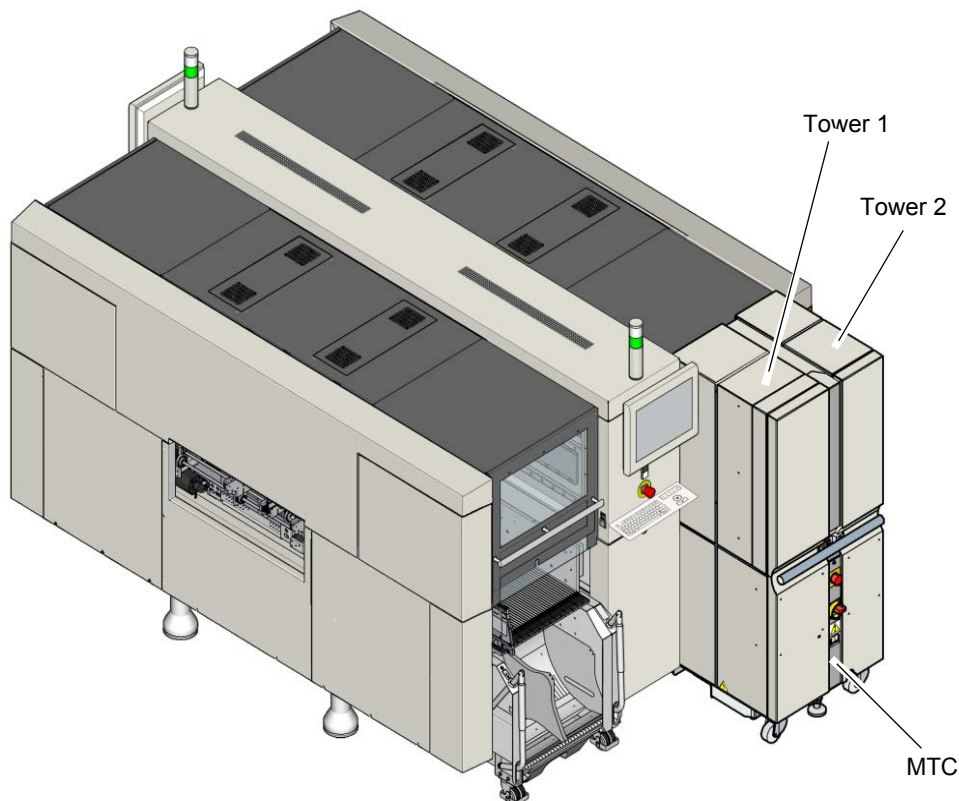
## Matrix Tray Changer (MTC)

If you need to provide components in multiple waffle pack tray for the placement process, we recommend using an automatic magazine changeover with the help of an Matrix Tray Changer (MTC).

In SIPLACE X2 S / X3 S / X4 S machines, an MTC can be docked onto location 2 in place of the component trolley. The service flap in the machine protection of the SIPLACE X2 S / X3 S / X4 S placement machine provides access to the front section of the feed axis.

The MTC setup is coordinated to the exact placement sequence to achieve a path-optimized and time-optimized working process. Two towers with waffle pack trays move independently of one another, in a vertical direction, until the required magazine reaches the access area of the feed axis. The horizontal feed axis transports the waffle pack tray from the tower to the access area of the placement head. The first magazine is made available as soon as a board is moved into the PCB conveyor and valid panel and setup data has been provided.

All other magazine changes are executed during the placement process without influencing the processing time. JEDEC magazines can be refilled without stopping the machine. Faulty components are placed back in the original magazine.



# Component feeding

## Matrix Tray Changer (MTC)

### Technical data

	Tower 1 (XL)	Tower 2
Dimensions		
Length x width	1305 mm x 600 mm	
Height	1560 mm for 900 mm PCB conveyor height 1590 mm for 930 mm PCB conveyor height 1640 mm for 950 mm PCB conveyor height	
Weight (basic package)	approx. 500 kg (with cassettes and waffle pack tray carriers)	
Weight (fully configured)	approx. 534 kg (with components)	
Weight (moving loads)	approx. 80 kg	approx. 43.5 kg
Cassette size (L x W x H)	391.2 x 305.6 x 93.3 mm <sup>3</sup>	352.7 x 154.8 x 133.8 mm <sup>3</sup>
Cassette weight (fully configured) (without waffle pack tray carrier)	approx. 11 kg approx. 1.7 kg	approx. 7.5 kg approx. 1.35 kg
Weight of the waffle pack tray carrier	850 g	150 g
Dimensions of waffle pack tray carrier (L x W x H)	386.5 mm x 295.8 mm x 11.1 mm	371 mm x 146 mm x 10.1 mm
Distance from cassette to cassette	96 mm	135 mm
Distance from level to level	12 mm	11.8 mm
Storage capacity	30 waffle pack tray carrier XL with 60 JEDEC or 30 special magazines of maximum size	40 waffle pack tray carriers with 40 JEDEC waffle pack trays
Changeover time (over 5 levels)	approx. 2 s	approx. 1.5 s
Max. height of component and waffle pack tray incl. tolerances		
All levels occupied	8.5 mm	8.5 mm
One level free	19.5 mm	19.5 mm
Two levels free	31.5 mm	–

#### Electrical ratings

Supply voltage	3 x 400 V~, 50 Hz (Europe) 3 x 208 V~, 60 Hz (USA)
Overall power	1.5 kW
Apparent power	3.85 kVA
Rated current	2.7 A at 3 x 400 V~ 4.2 A at 3 x 208 V~
Fuse	3 x 16 A
Rated current consumption of largest consumer	2 A



# Component feeding

## Wafflepack Changer (WPC5/WPC6)

The waffle pack changer makes flatpack ICs available in the waffle pack trays, to avoid unnecessary loss of time during storage and automatic changing of the waffle pack trays.

The WPC setup is coordinated to the exact placement sequence to achieve a path-optimized and time-optimized working process.

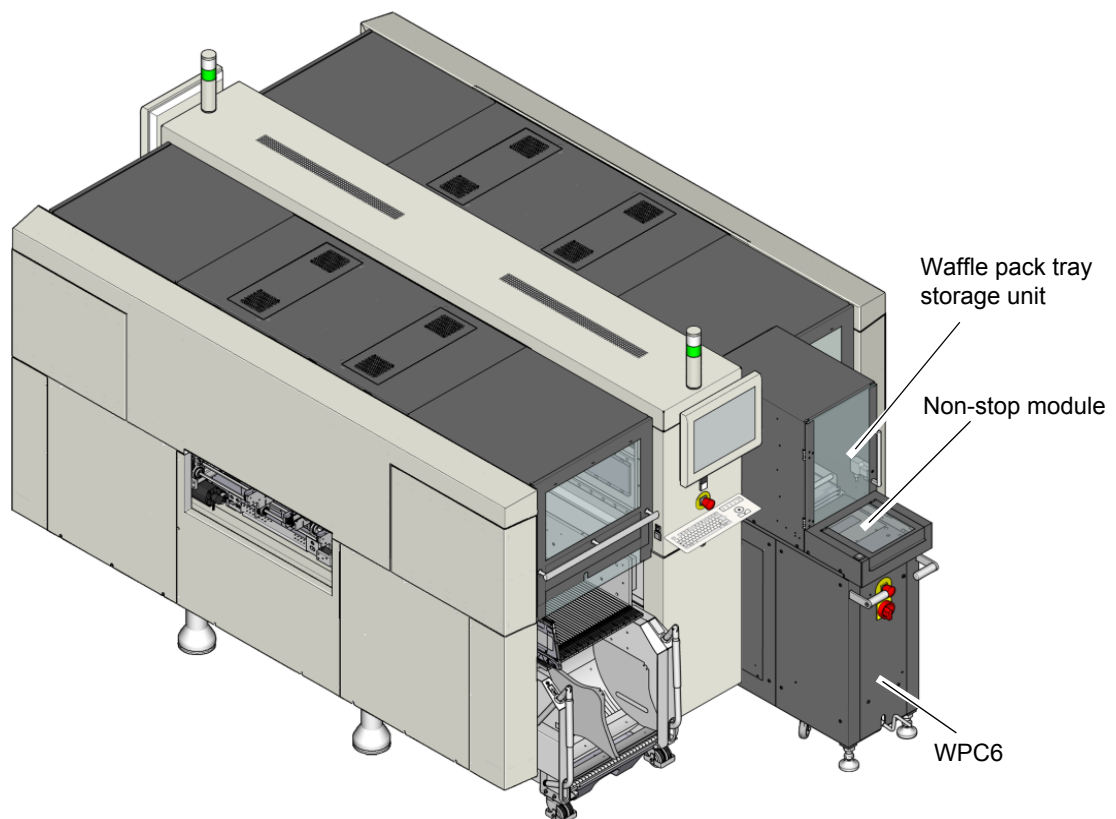
The waffle pack tray storage unit moves vertically until the required magazine is in the access range of the feed axis.

The horizontal feed axis transports the waffle pack tray from the tower to the access area of the placement head. The first magazine is made available as soon as a board is moved into the PCB conveyor and valid panel and setup data has been provided. All other magazine changes are executed during the placement process without influencing the processing time. JEDEC magazines can be refilled without stopping the machine. Faulty components are placed back in the original magazine.

The waffle pack changer cannot be used together with the SpeedStar (C&P20).

### WPC6

However, the WPC6 also has a non-stop module. This enables the user to refill waffle pack trays during ongoing operations. The nonstop module facilitates opening of the loading flap during operation, for insertion of waffle pack trays. Additional functions allow filling levels to be refreshed or individual levels to be manually refilled.





# Component feeding

## Wafflepack Changer (WPC5/WPC6)

### Technical data

WPC5/WPC6 dimensions	
Length x width	1520 mm x 360 mm
Height	
For 900 mm PCB conveyor height	1430 mm
For 930 mm PCB conveyor height	1460 mm
For 950 mm PCB conveyor height	1480 mm
WPC5 weight	
Basic configuration (with cassettes and waffle pack tray carriers)	approx. 270 kg
Fully configured (with WPTC and cassette with components)	approx. 320 kg
WPC6 weight	
Basic configuration (with cassettes and waffle pack tray carriers)	approx. 280 kg
Fully configured (with WPTC and cassette with components)	approx. 330 kg
WPC5/WPC6 surface load	$\leq 25 \text{ N/cm}^2$
Weight of the waffle pack tray carrier	0.8 kg
Dimensions of waffle pack tray carrier (LxWxH)	360 mm x 260 mm x 6 mm
Dimensions of waffle pack tray (LxWxH)	347 mm x 235 mm x 15 mm
Height of waffle-pack tray, including component	
<b>Standard (all levels occupied)</b>	
WPC5	15 mm
WPC6	15 mm
<b>High components (levels omitted)<sup>a</sup></b>	
WPC5 <sup>b</sup>	45 mm
WPC6 <sup>b</sup>	45 mm
Distance from level to level	17 mm ( $\pm 2$ mm)
Storage capacity	28 waffle pack tray carriers
Changeover time for waffle-pack tray carriers	
over 1 level	1.9 s
over 10 levels	2.3 s
over 27 levels	2.8 s

a) From serial number B3xxx (WPC5) / C3xxx (WPC6).

b) 29 mm (component height + height of waffle pack tray) with X-Series S.

### Electrical ratings

Supply voltage	3 x 200 V~ $\pm 10$ %; 50/60 Hz (Japan) 3 x 208 V~ $\pm 10$ %; 50/60 Hz (U.S.A) 3 x 230 V~ $\pm 10$ %; 50/60 Hz 3 x 380 V~ $\pm 10$ %; 50/60 Hz 3 x 400 V~ $\pm 10$ %; 50/60 Hz (Europe) 3 x 415 V~ $\pm 10$ %; 50/60 Hz
Nominal apparent power	1.5 kVA
Nominal active power	1.0 kW
Fuse	3 x 10 or 3 x 16 A

# Component feeding

## SIPLACE JTF-S/JTF-M

The SIPLACE JTF-S/JTF-M is an automatic and fast changer for standard JEDEC waffle pack trays. On SIPLACE X-Series S machines, a SIPLACE JTF-S/JTF-M can be installed on a fixed table instead of a component trolley. The SIPLACE JTF-S/JTF-M occupies a fixed area of tracks on the fixed table.

The SIPLACE JTF-S/JTF-M is available in two versions

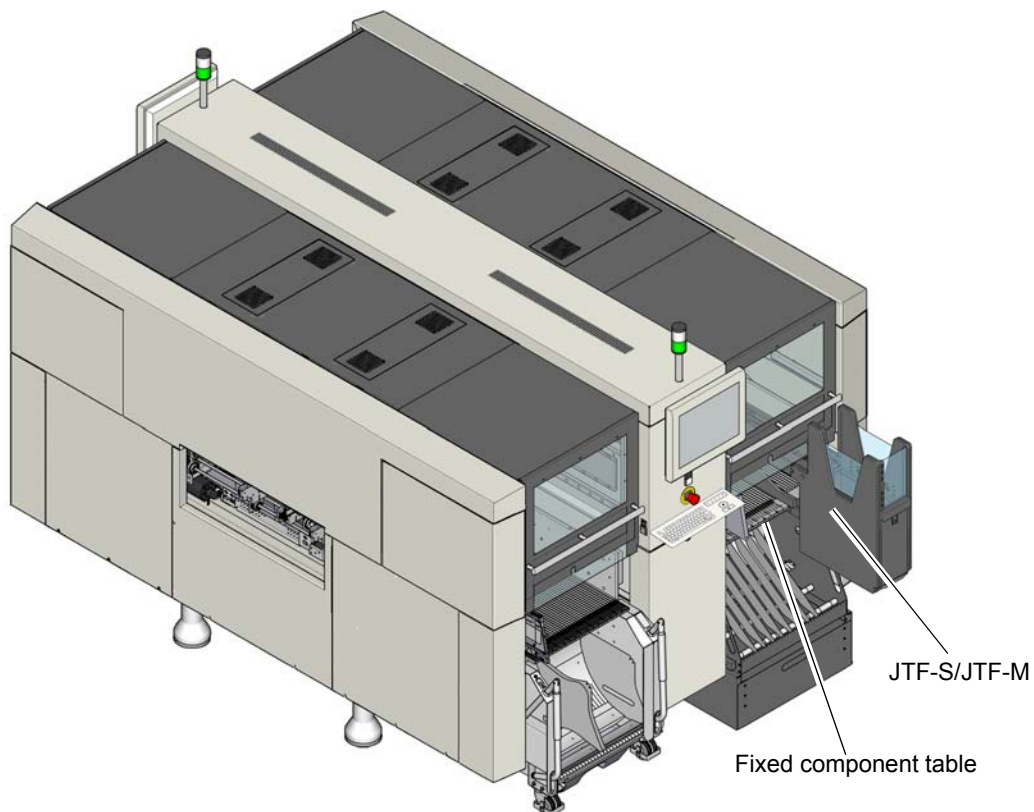
- SIPLACE JTF-S
- SIPLACE JTF-M

### SIPLACE JTF-S

The SIPLACE JTF-S stores a stack of up to 30 thin or 20 thick JEDEC waffle pack trays and supplies them in succession. The placement machine can be supplied with one component type at constant waffle pack tray changeover time.

### SIPLACE JTF-M

Depending on the magazine type, the SIPLACE JTF-M stores up to 18 thin or 14 thick JEDEC waffle pack trays in an exchangeable cassette and supplies them as required. The placement machine can therefore be supplied with different component types at variable waffle pack tray changeover times.



# Component feeding

## SIPLACE JTF-S/JTF-M

### Technical data

	SIPLACE JTF-S	SIPLACE JTF-M
Width	162 mm	177 mm
Height	587 mm	587 mm
JEDEC waffle pack tray specification	JEDEC Standard: 95-1 & IEC 60286-5	
Storage capacity		
Waffle pack tray, thin	30 JEDEC waffle pack trays	18 JEDEC waffle pack trays
Waffle pack tray, thick	20 JEDEC waffle pack trays	14 JEDEC waffle pack trays
Waffle pack tray changeover time	< 5 seconds (depending on application)	--
Slot n to n+1	--	3.5 seconds
Slot 1 to 18	--	10 seconds
Slot 18 to 1	--	8.9 seconds
Cassette		
Dimensions	--	approx. 330 mm x 150 mm x 230 mm
Max. load capacity	--	2.7 kg (150 g each for 18 slots)
Pneumatics	4.1 bar to 5.5 bar	5.2 bar to 9 bar
Compressed air consumption	< 28.3 NL/min.	< 28.3 NL/min.

# Digital SIPLACE Vision system

The digital Vision system ensures fast and reliable component recognition, coupled with user-friendly handling. The system identifies each individual component by its geometry and color. Even complex component shapes, such as flip chip or CCGA are detected with high reliability.

This component recognition check is performed in a single step, with no extra time involved but with optimum scanning of each individual component.

This digital Vision system is not only used in the component cameras but also in the PCB camera. In addition to the precise recognition of components, this also guarantees reliable detection of inkspots and PCB fiducials.

## Digital vision cameras

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SIPLACE SpeedStar camera, type 23

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SIPLACE SpeedStar camera, type 41

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SIPLACE MultiStar camera, type 30

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SIPLACE TwinStar standard camera, type 33

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SIPLACE TwinStar high resolution camera, type 25

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SIPLACE PCB camera, type 34

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## Examples of digital vision system analysis times

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03015	9 ms
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PLC44	17 ms
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BGA 225 balls	18 ms
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Evaluation times only play a role in the P&P process.

## The benefits at a glance:

- Extremely fast and reliable component recognition
- Shortest cycle times
- Robust measurement based on the geometry and color
- Straightforward programming
- Offline programming of component shapes
- Rapid introduction of new products (NPI)
- Open architecture allows you to quickly adapt to new requirements
- Optimum placement results based on individual measurement of each component

The SIPLACE Vision system offers inspection routines and functions to enhance the quality of component recognition.

## The benefits at a glance:

- Maximum placement quality
- High first pass yield
- Reduction of operating costs

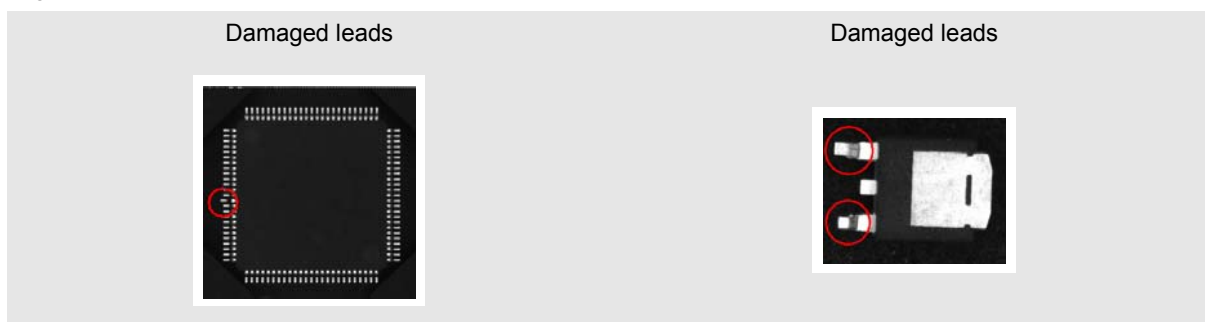
# Digital SIPLACE Vision system

## Checking the component quality

### Overview of key functions

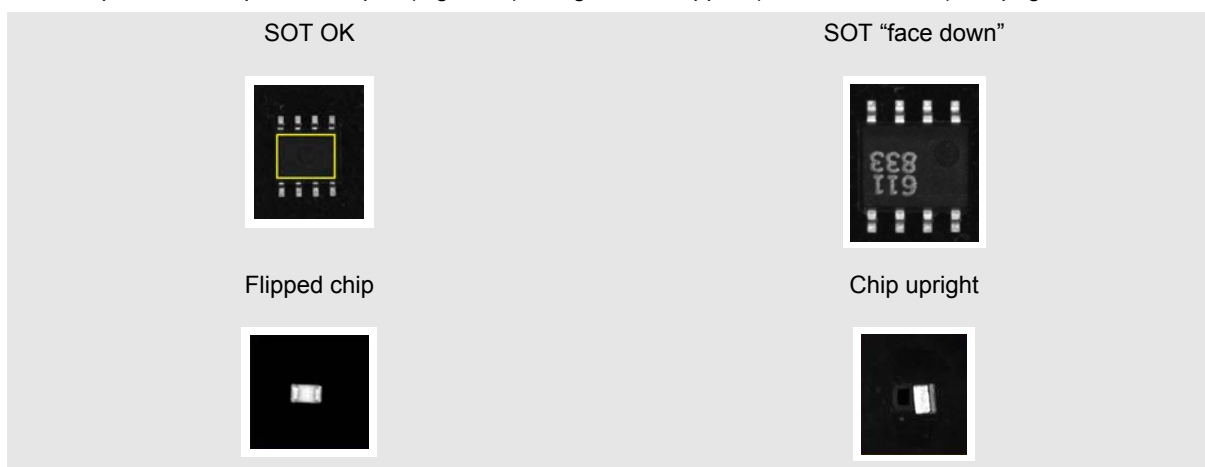
#### Recognizing the collinearity of components

Damaged or bent leads are recognized. This helps avoid solder-free connections during the subsequent soldering process.



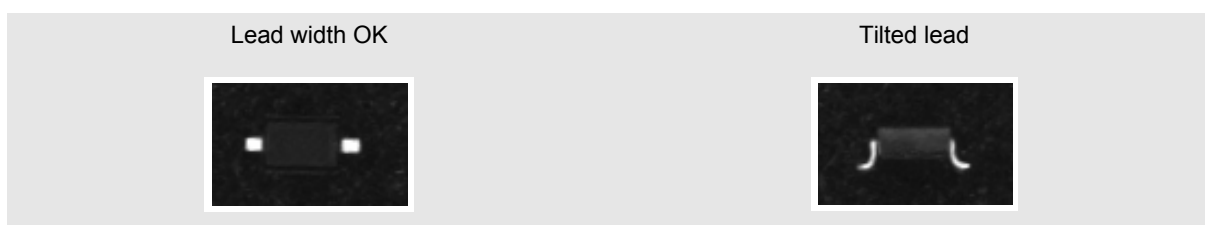
#### Recognizing flipped (face down) or upright components

Both chip and IC component shapes (e.g. SOT) recognized in flipped (turned face down) or upright state.



#### Checking the lead width

The optical checking of the lead width recognizes tilted or damaged leads. This helps to recognize e.g. diodes with tilted leads.



# Digital SIPLACE Vision system

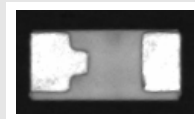
## Checking the component quality

### Overview of key functions

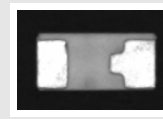
#### Checking the lead length

The lead length check determines whether the leads have been distorted. This inspection is possible by checking whether leads of the same type e.g. chip shapes have different lengths. Flipped and rotated components can also be detected.

Component OK in this position



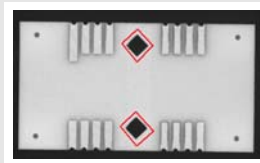
Rotated



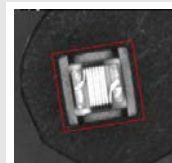
#### Detecting special shapes with rectangular functions

When using certain special component shapes, it is sometimes necessary to program parts on the components or outlines as rectangular shapes. This ensures that they can be processed more reliably.

Rectangular function on the component

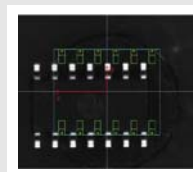


Rectangular component with irregular edges



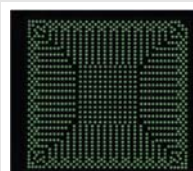
#### Detecting incorrect component descriptions

The Vision system checks whether the position of the component corresponds to the measured Vision data. The following example has more leads than were programmed in the component shape description.



#### Teaching complex BGA structures

Complex BGA structures can be taught within only a few seconds.



#### Placing when inkspot is not present

A fiducial can now be defined for the omission of panels. If a fiducial is found (cross, circle, etc.), this panel will be omitted.

#### Checking the inner area of circular fiducials

To differentiate circular fiducials from other structures on the board, a brightness check is performed in the inner area of these fiducials.

# Vision sensor technology

## PCB position recognition

### Description

The optimum fiducial shapes vary according to the condition of the surface. When using bare copper surfaces with low oxidation, it is advisable to take the single cross, as the high amount of infor-

mation provided helps achieve the greatest accuracy. Rectangle, square and circle are less "informative" but save space and can even be used when oxidation is at an advanced stage. Circle or square are advisable for tin-plated structures as

the ratio of the fiducial dimensions to the presolder thickness is particularly favorable.

### Fiducial criteria

Locate 2 fiducials Locate 3 fiducials	X-/Y-position, rotation angle, mean PCB distortion additional: shearing, distortion separately in X and Y direction	
Fiducial shapes	Synthetic fiducials: circle, cross, square, rectangle, diamond, circular, square and rectangular contours, double cross, pattern: any	
Fiducial surface Copper Tin	Without oxidation and solder resist Warpage of fiducial $\leq 1/10$ of structure width, both with good contrast to environment	
Dimensions of patterns min. size max. size	0.5 mm 3 mm	
Fiducial environment	Clearance around reference fiducial not necessary if there is no similar fiducial structure in the search area	
Dimensions of synthetic fiducials		
Min. X/Y size for circle and rectangle	0.25 mm	
Min. X/Y size for annulus and rectangle	0.3 mm	
Min. X/Y size for cross	0.3 mm	
Min. X/Y size for double cross	0.5 mm	
Min. X/Y size for diamond	0.35 mm	
Min. frame width for annulus and rectangle	0.1 mm	
Min. bar width / bar distance for cross, double-cross	0.1 mm	
Max. X/Y size for all fiducial shapes	3 mm	
Max. bar width for cross/double-cross	1.5 mm	
Minimum tolerances generally	2% of nominal dimension	
Max. tolerances generally	20% of nominal dimension	

# Vision sensor technology

## PCB position recognition

### Bad board recognition

#### Technical data for PCB position detection

PCB fiducials	Up to 3 (subpanels and multiple panels) Up to 6 for the long board option (optional PCB fiducials are output by the optimization.)
Local fiducials	Up to 2 per PCB (may be of different type)
Library of bad panel recognition	Up to 255 fiducial types per subpanel
Image analysis	Edge detection method (singular feature) based on gray scale values
Illumination type	Front lighting
Fiducial recognition time	0.1 s
Field of vision	5.78 mm x 5.78 mm

#### Description

In the cluster technology each subpanel is assigned an inkspot. If this is present

during the measurement via the PCB vision module, the corresponding subpanel is populated. This function helps prevent unnecessary

costs caused by placement of defective panels.

#### Ink spot criteria

Methods	<ul style="list-style-type: none"> <li>• Synthetic fiducial recognition method</li> <li>• Mean gray scale value</li> <li>• Histogram method</li> <li>• Template matching</li> </ul>
Shapes and sizes of fiducials/structures for synthetic fiducials	For dimensions of synthetic fiducials, see page 47
other methods	min. 0.3 mm max. 5 mm
Masking material	Good coverage
Recognition time	Depends on the method: 20 ms - 200ms

#### Virtual inkspot handler (option)

The virtual inkspot handler allows you to scan in inkspots from an external system. These inkspots can then be allocated to the relevant board.



## 0201 (metric) / 03015 Placement

In its standard version, the SIPLACE X-Series is designed for placement of 0201 (metric) and 03015 components.

The SIPLACE component library already contains the contours and dimensions of 0201 (metric) or 03015 components. Specially developed component nozzles of type 1005 are also available for the SIPLACE X-Series. These are adjusted to the shape and size of the 0201 (metric) or 03015 components and have - as with all other SIPLACE nozzles - a highly wear-proof ceramic tip and flexible nozzle seat. This guarantees maximum precision and process reliability. Optimized pickup is guaranteed by the ideal feeding conditions in the SIPLACE X feeder module. The smaller the elements to be picked up, the more accurate the pickup needs to be.

Pickup is performed contact-free to compensate minor inaccuracies e.g. from component or pocket tolerances and to prevent mechanical damage to the components.

The design of the SIPLACE X feeder modules takes this problem into account: new motors and the reduced use of fine mechanics help. Small components can be placed **without performance loss** with minimum pitch and irrespective of the larger components which are next to the 0201 (metric) or 03015 component. This equates to **true 0201 (metric) or 03015 capability**. As a rule with 0201 (metric) or 03015 placement, a finely tuned overall process is the basic requirement if you want to

achieve excellent results.

All the process parameters must be optimized. The SIPLACE team will be pleased to advise you on how to do this.

### 0201 (metric) / 03015 measurement results and ambient conditions

As the dpm values and pickup rates for 0201 (metric) or 03015 placement depend greatly on the respective measuring conditions, it is not advisable to specify these without considering the corresponding ambient con-

The following table shows typical values for 03015 placement, which can be achieved with a SIPLACE X4i S, provided the relevant underlying conditions are fulfilled:

Machine type	SIPLACE X4i S
Placement head	SpeedStar with component camera type 23 MultiStar with component camera type 30
Nozzle type	4008 (SpeedStar) 2005 (MultiStar)
Feeder module type	4 mm SIPLACE X feeder module or 8 mm SIPLACE X feeder module or 2x8 mm SIPLACE X feeder module
Station software	From 708.1
SIPLACE Pro	From 12.1
Pickup rate	≥ 99,97%
Dpm rate	≤ 5
Pad width	≥ 200 µm
Pitch	≥ 100 µm
Components (L x W x H)	400 µm x 200 µm x 200 µm (±20 µm)
Number of pixels for a 03015 component	275
Solder paste type	5
Template thickness	60 µm

# Machine maintenance

We recommend that you have your SIPLACE X-Series serviced on a regular basis to keep it in prime condition during productive use. The SIPLACE X-Series Maintenance Manual contains recommendations for the maintenance intervals. All maintenance tasks are explained in detail with clear diagrams.

The maintenance intervals are weekly, 3 monthly (only when the SIPLACE is configured with a C&P20 head), 6 monthly and annually.

For simpler organization of line maintenance during daily production operations, the degree of complexity is specified for each maintenance task. These levels are **minor** and **major** maintenance.

## Minor Maintenance

Minor Maintenance refers to weekly maintenance work. The weekly maintenance tasks can be performed with the help of the Maintenance Manual and do not require any additional training. This work is typically performed by the operating personnel. All maintenance tasks which need to be performed on a weekly basis are included in the Minor Maintenance.

The average time needed is approx. 1 hour per line, depending on the line configuration and on the number and experience of the persons performing the maintenance work.

## Major Maintenance

Major Maintenance refers to recommended maintenance tasks of greater complexity which are generally performed every 6 to 12 months. These tasks require special training.

This work is usually performed by specially trained operating or maintenance/service personnel. Major Maintenance is planned and executed on a 6 or 12 month basis (every 3 months for C&P20 heads). The scheduling of Major Maintenance for SIPLACE placement machines is generally linked to the scheduled major furnace maintenance for the production line.

# SIPLACE software suite

## General

SIPLACE provides comprehensive solutions based on modular software tools for SMT machines, lines and production management: **the SIPLACE software suite.**

### **Product definition, optimization and line control**

Fast, fault-free introduction of products and optimum utilization of production lines are essential to maximize production output. The programs from the SIPLACE software suite allow you to easily program products, fine-tune the programs you have created and then find the balance for them within your SMT production lines.

### **Production monitoring & process control**

To achieve the production targets that are set, it is important to constantly monitor and check the production facilities. The SIPLACE Software Suite contains monitoring products tailored to suit the user group. These signal immediately if limits are exceeded on the machine or the production line.

### **Setup verification & traceability**

Setup errors lead to series errors. The user-friendly SIPLACE software programs help you to avoid such errors, and thus ensure high quality in your electronics production.

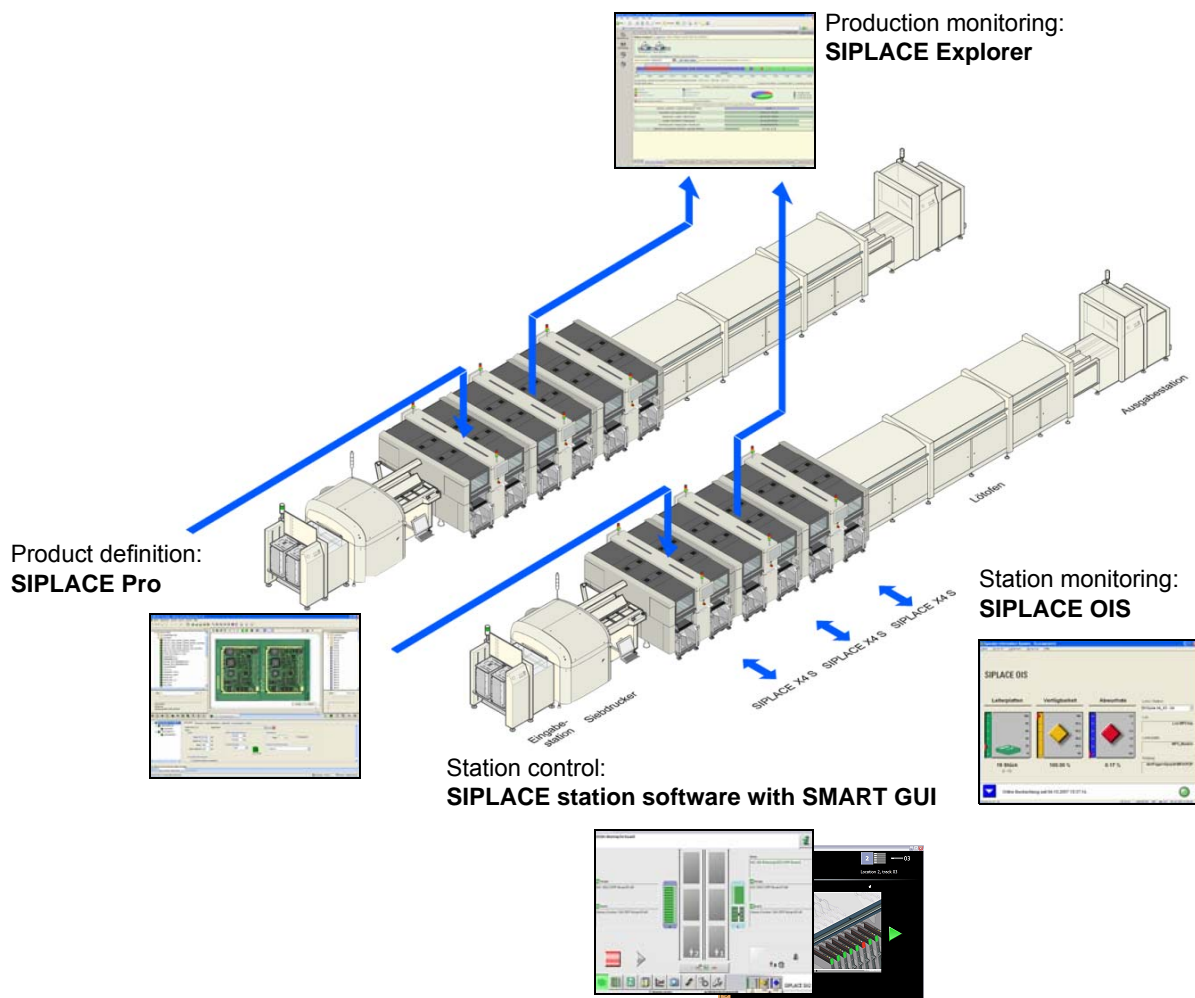
### **The benefits of the SIPLACE software suite at a glance:**

- User-friendly
- Simple operation
- Fast programming and error detection
- Reduces changeover times and stoppages
- Ensures optimum utilization of your production line's productivity
- Real-time information from the production area
- Incredibly fast distribution of information
- Optimum use of resources
- Timely notification when production materials need to be re-ordered
- Coordination of maintenance

# SIPLACE software suite

## Overview

	SIPLACE software product	Standard	Option
Station operation and control	SIPLACE station software with SMART GUI	X	
Product definition, optimization and line control	SIPLACE Pro One application for all programming tasks	X	
	SIPLACE ASCII Centroid Import Wizard Fast and easy data conversion	X	
	SIPLACE SiCluster Professional Fully automatic product grouping		X
	SIPLACE EDM Convenient data management for placement programs		X
Production monitoring & process control	SIPLACE OIS Operator Information System	X	
	SIPLACE Explorer Line monitoring system		X
Setup verification & traceability	SIPLACE Setup Center Avoid setup errors with reliable setup verification	X	
	SIPLACE Traceability Traceability of the placement processes		X



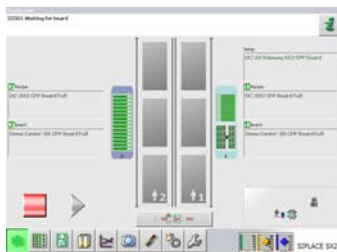
# SIPLACE software suite

## SIPLACE station software

### General

The diversity of functions and applications in the station software version 708.1 illustrates the extreme flexibility of the SIPLACE X-Series. This software supports operators in their daily work, helping them to simplify processes on the machine and to increase productivity along the line. Four different user levels ensure that each operator has access to the information and options required to perform his specific work on the machine.

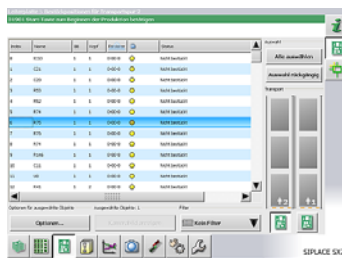
The benefits of the station software 708.1 at a glance:



- Simple and innovative user guidance, ideal for both inexperienced users (-> Smart GUI) and experts
- Fast, direct access to all machine functions and systems, as required.
- "Best in Class" NPI features
- Very user-friendly
- Highly robust in the placement process

#### User-friendly "new product introduction" process

The further enhanced options for quick and easy new product introduction (NPI) on the line is one of the key features in the SIPLACE station software 708.1.



New products need to be produced error-free right from the very first board. The SIPLACE station software satisfies this requirement by supporting users during product introduction with a range of functions, including the following.

#### Placement list at the station

The station always shows the placement list for the board currently being processed. This placement list includes the following information:

- The placements in the selected placement area
- The order in which the components are placed
- The placement head which places the components

- The feeder module from which the components are picked up
- The status of the placement position.

The status of the placement positions can be changed online at the station. If certain components on the line are to be omitted, the user can delay placement of these and perform it at a later time.

The status of the placement position is divided into the following categories (position options):

- Place
- Skip (The placement position will not be placed. This status can either be selected for the current board or for the complete job. This component will then be ignored on the following boards until a new job is sent to the line.)
- Postpone. (The component will be placed at the end of the placement cycle.)



# SIPLACE software suite

## SIPLACE station software

### General

#### Individual measurement data

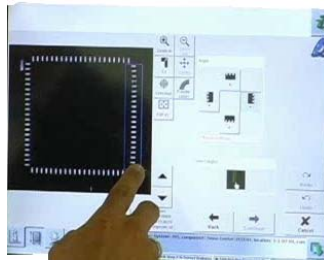
The individual measurement data determined by the SIPLACE station software (measurement contexts) can be saved at the station. This can be linked to the following conditions (Vision measurement options):

1. Unable to measure component and measurement data (measurement contexts) should be saved. These measurement data can then be used for optimization purposes in a subsequent analysis. As with other optical inspection systems, pseudo errors can be differentiated from other errors and the affected component shape can then be optimized.
2. Vision measurement logs should always be written for this component. Whenever there is general uncertainty about the quality of a component, the Vision logs can be written for all components.
3. As soon as Vision errors occur for the component, the placement machine will stop. If you want to avoid component rejection, particularly for very expensive components, this option can be used to correct all measurement errors occurring, without the need for any rejections. The machine waits with the component, in front of

the camera, so that the component can be checked.

In addition, pickup and place positions can be checked with the PCB camera. This makes 100% placement control possible in the machine.

#### Teaching components



Component shapes which are not part of the standard component shape library can be generated using the offline programming system SIPLACE Pro, with the help of data sheets, or with the offline Vision teach station and a sample component.

Alternatively, a component shape can be marked as incomplete and transferred to the station with this status. The description can be completed after the first pickup run on the line.

After completion of the description, a robustness analysis can be performed at the station, to ensure that this component is always recognized reliably, even under different conditions.

You can also program the placement positions on the board in the station software. This software provides advanced support functions which allow you, for example, to combine images from the PCB camera with data from the placement program. This boosts the productivity significantly for production environments with frequent new production introductions or product changeovers.

#### The SIPLACE station software makes daily work easier for users

Many other features in the station software make day-to-day work easier for the users and optimize the SMT production processes.

- Calibration process control is fully integrated into the SW
- Self-repair routines for nozzles and feeder modules
- Self-determination of feeder module cycle
- "Alarms" - at a glance
- "FaceDown" recognition
- Direct access to board conveyor functions, such as "nonstop board transport".



# SIPLACE software suite

## SIPLACE station software

### Software version 708.1 with SMART GUI

The interface between the operator and the placement machine has been enhanced with a range of advanced functions. However, the existing navigation system with "graphical soft buttons" on the touchscreen and the arrangement of these buttons has been kept, so that users accustomed to older versions will find their way around the new version with no trouble.

The changes are in the details:

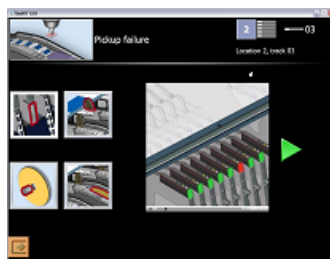
- Addition of "Smart GUI" for inexperienced users
- Second icon-based navigation bar on the right side of the screen for fast, direct access to other menu levels
- To prevent confusion during frequent changes between different main menus, the machine always returns to the last view visited
- Comprehensive and powerful assistants for user-guided programming of pickup positions, components shapes and placement positions.
- "Operator Guidance": In the event of an error, the user is guided to the required menu item.
- Quick, direct access to Vision data

#### SIPLACE Smart GUI

One of the most important new features is the SIPLACE Smart GUI. This is designed to help inexperienced users familiarize themselves with the software quickly and easily. In normal mode, the machine will only show the basic information needed:

- Product/recipe name
- Setup code
- Number of boards already produced

#### Animation videos as advanced assistants



In the event of a fault, the machine shows the user illustrations of the possible cause of the problem, providing a selection of one to four animated videos, depending on the problem. These guide the user step-by-step through the troubleshooting process. The animation can be stopped whenever needed and repeated either in part or as a whole.

These "video assistants" have been designed so that the Smart GUI usually covers over 95% of all malfunctions which could occur during normal operation.

#### Simple user guidance and fast direct access

The SIPLACE station software GUI therefore provides "the best of both worlds": simple user guidance, ideal for new users, and direct access to all the "bits and bytes" for experts.

Users can switch over between the Smart GUI and the existing "Expert GUI" whenever needed and with no delay, using a soft button always shown in the station software main menu. If need be, access to key parameters can be managed via passwords.

The new SIPLACE station software not only actively manages quick and reliable troubleshooting but also offers a great way to introduce new users more quickly to advanced tasks without overchallenging them in the beginning.

# SIPLACE software suite

## SIPLACE Random Setup

### SIPLACE Random Setup

simplifies the configuration of setups in the pre-setup area and the definition of setup changeovers in the SIPLACE line. In contrast to existing setup procedures, in which the feeder modules and components need to be configured exactly on the prescribed tracks of a changeover table, Random Setup allows you to configure feeders and components on any tracks of any changeover tables in the line.

This concept is based on the interrelationship between a clear assignment of components to feeder modules and the "intelligent" Random Setup software.

### SIPLACE Random Setup

improves the productivity especially in the following production conditions:

- Low volume production with high mix and frequent product changes
- Production with many new product introductions (NPI) or urgent projects
- Production with high flexibility and rapid product change requirements

### Benefits for the customer

SIPLACE Random Setup offers the customer many benefits. For example, you no longer need to sort your components by table or track, making it much quicker to configure components in the pre-setup area. Feeder modules can now be set up on any tracks of a changeover table and in any locations of a specific line.

Spare tracks can also be added without editing the setup. Configuration of spare tracks during ongoing production is supported from this version of SIPLACE Random Setup.

In **Split Table Mode**, you can prepare a new setup at the machine, while the line continues production. This **Floating Changeover Strategy** reduces line downtime. Another benefit is the reduced investment costs as no additional changeover trolleys are needed to change the setup. You simply change over the feeder modules on the tables.



# Maximum production quality

## **Maximum production quality**

The SIPLACE X-Series not only provides leading machine quality but also guarantees maximum product quality. through a combination of the following features:

### **100% placement process control**

In its standard form, the SIPLACE X-Series features various control mechanisms which ensure maximum placement reliability. Sensors checks whether the component was correctly picked up or placed. The set-down force of components is checked and height differences during pickup and PCB unevenness during placement are compensated.

## **Digital vision inspection**

The digital Vision system ensures fast and reliable component recognition, coupled with user-friendly handling. The system identifies each individual component by its geometry and color. With the help of different illumination levels and brightness stages, almost every component shape can be easily recognized. The system also saves images of the components, so-called "vision dumps", showing which components have been rejected.

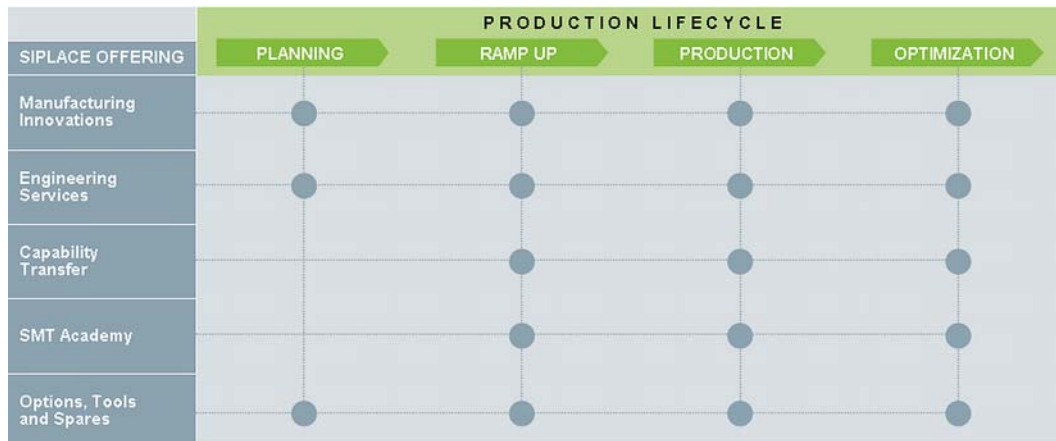
This supports the early recognition of faults in new products and increases process reliability. These vision dumps also serve as evidence in the event of defective component supplies.

## **Intelligent software for setup verification**

The SIPLACE X-Series setups are verified with barcodes on the component reel and by intelligent SIPLACE X feeder modules. This helps to avoid setup errors. This network of checks considerably lowers dpm rates and increases the first pass yield.

# SIPLACE service options

## Production life cycle



SIPLACE offers a worldwide, extensive portfolio of services to support customers throughout their production life cycle. This ranges from the planning of new factories or extension of existing production facilities to the rollout of new products and their series production, plus the optimization of equipment and production team performance. With over 20 years experience in the SMT sector and best practice projects around the globe, SIPLACE provides its clients with innovative and customized solutions. Your success is our mission! Contact your SIPLACE sales partner for a detailed offer of our services.

The SIPLACE service portfolio is tailored to your individual requirements and offers a range of alternative options to suit your specific needs.

### Manufacturing Innovations

SIPLACE customers are continually forced to review the efficiency and profitability of their production equipment and processes, in order to

keep pace with rapidly changing market conditions and remain a step ahead of the competition. SIPLACE Manufacturing Innovations involves close cooperation with the customer team, for the joint development of innovative, customer-specific best practice solutions. Initially, the individual challenge is defined, existing solutions or processes are analyzed and the corresponding values measured. During the next stage, the proposals for action are compiled and the potential for improvement identified. The SIPLACE team has a wealth of standardized optimization tools at its disposal to support this workflow.

### Engineering Services

Profit from individual support with your specific challenges and enjoy the specialist know-how, experience and SIPLACE quality standards provided by the experts from the SIPLACE Engineering Services team. Projects include the development of programming data for special components, customer-specific hardware solutions (such as nozzles, grippers, special feeders), machine servicing or calibration services as evidence of placement accuracy, plus repair services or hotline support. The SIPLACE service team and specialist R&D department are at hand to help The SIPLACE service team and specialist R&D department are at hand to help with their profound knowledge and expertise, whenever the need arises.

# SIPLACE service options

## Training courses

### Capability Transfer

Equip your team for its daily work with the training solutions from our Capability Transfer service. We teach your staff how to master a wide range of tasks, such as the verification of placement accuracy or the functionality of SIPLACE feeder modules in line with SIPLACE standards. We provide you with the relevant tools and test systems for the required period and can even train or coach your team in-house at your company. We also offer process certification to confirm that you verify in accordance with the SIPLACE standards. Our Capability Transfer solutions are available in standard service packages. Just tell us what you want and how often.

### SMT Academy

The SMT Academy provides technical training for your team, covering everything from basic SIPLACE operator courses to advanced follow-up training for your experts. Our courses can either be held at your company or at one of our SIPLACE training centers worldwide. In addition to standard training programs, we can also offer customized courses to meet your individual requirements. We recommend that you first perform a knowledge gap analysis, to best determine where there is a need for a knowledge refresh.

SIPLACE training units are always on a modular basis. This means that you can

either book a standard course or compile your own training program with the individual topics required for your production environment.

We also offer upgrade training, in which participants just learn the differences between your existing machine environment and the new machine platform to be installed.

If required, we can modify training contents to suit your specific needs.

All courses take into account the roles and responsibilities of the participants in the production environment and can be conducted either at a SIPLACE training center or at your company.

The training courses are provided in numerous languages. Ask us for more details.

### Options, Tools and Spares

Machine-related accessories and options (some specified in this document), tools for testing or setting your equipment, and original SIPLACE spare parts for top quality repairs are available with our Options, Tools and Spares service.

### Special training courses for SIPLACE X-Series

Special operator training, maintenance and technical (system configuration and repairs) courses are available for the SIPLACE X-Series.

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#### Standard training courses for SIPLACE X-Series

- SIPLACE operator training
- SIPLACE minor and major maintenance training for X-Series
- SIPLACE technical training for X-Series

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#### Advanced and customized training for SIPLACE X-Series

- SIPLACE X-Series advanced training module
- SIPLACE X-Series upgrade training module

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#### Other training courses

- SIPLACE programmer training for SIPLACE Pro
  - SIPLACE Vision Training
  - SIPLACE feeder care training
-

# Technical data

## SMEMA interface

### Connector assignment

#### Signal interface<sup>a</sup> (14 pin connection, interface standard "IPC-SMEMA-9851")

Predecessor station X1		Successor station X2	
Pin 1	MACHINE READY TO RECEIVE +	Pin 1	MACHINE READY TO RECEIVE +
Pin 2	MACHINE READY TO RECEIVE –	Pin 2	MACHINE READY TO RECEIVE –
Pin 3	BOARD AVAILABLE +	Pin 3	BOARD AVAILABLE +
Pin 4	BOARD AVAILABLE –	Pin 4	BOARD AVAILABLE –
Pin 5	Not in use	Pin 5	Not in use
Pin 6	Not in use	Pin 6	Not in use
Pin 7	FAILED BOARD AVAILABLE+	Pin 7	FAILED BOARD AVAILABLE+
Pin 8	FAILED BOARD AVAILABLE-	Pin 8	FAILED BOARD AVAILABLE-
Pin 9	Reserved	Pin 9	Reserved
Pin 10	Reserved	Pin 10	Reserved
Pin 11	Reserved	Pin 11	Reserved
Pin 12	Reserved	Pin 12	Reserved
Pin 13	Reserved	Pin 13	Reserved
Pin 14	Reserved	Pin 14	Reserved

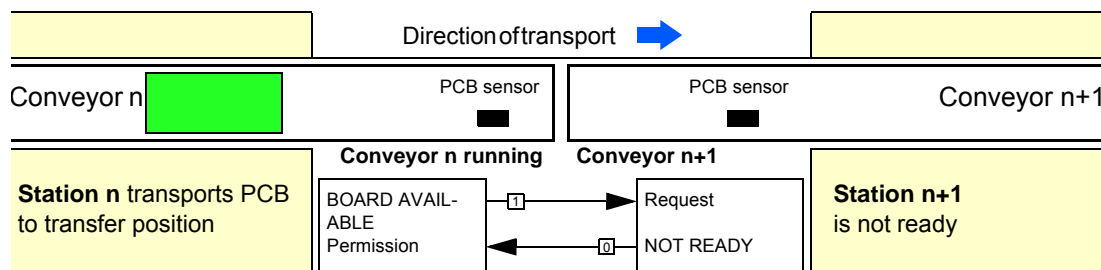
a) For more details, refer to the interface standard "IPC-SMEMA-9851".

# Technical data

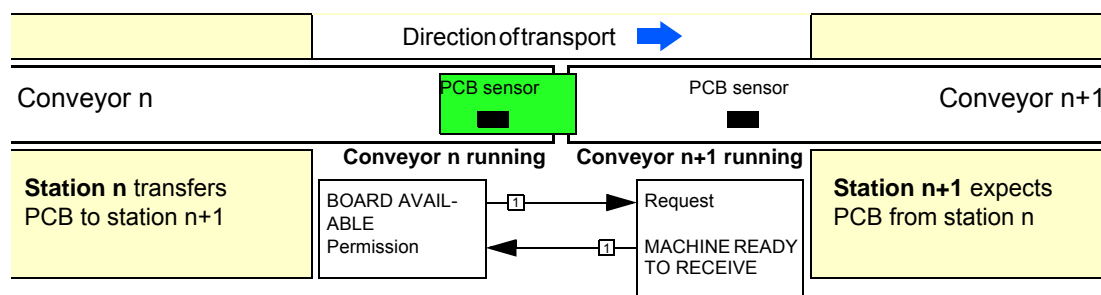
## SMEMA interface

### Signal path

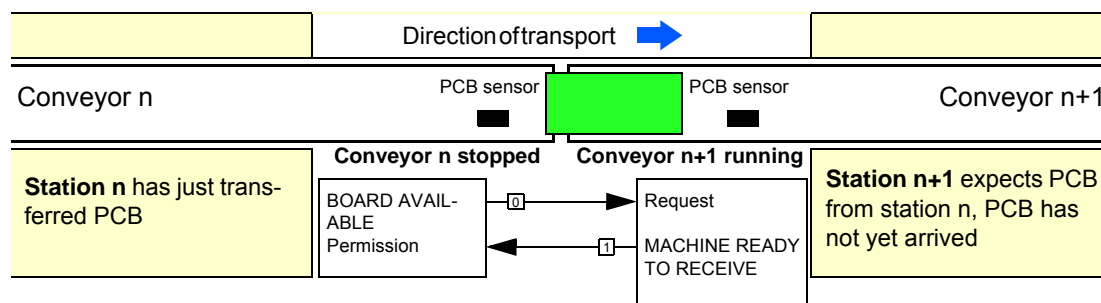
#### 1. After switching on the station



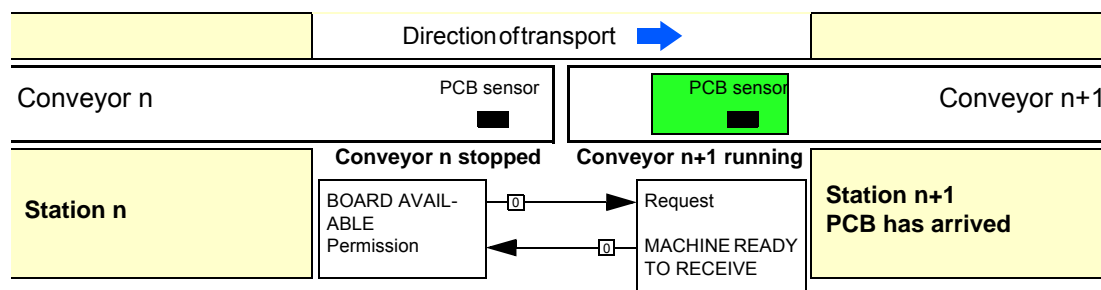
#### 2. PCB transfer has started



#### 3. PCB is transferred



#### 4. PCB transfer has been completed



To start a new PCB transfer, both signals must be at least 50 ms "0".

# Technical data

## Siemens signal interface

### Connector assignment

#### Signal interface (20 pin flat connector)

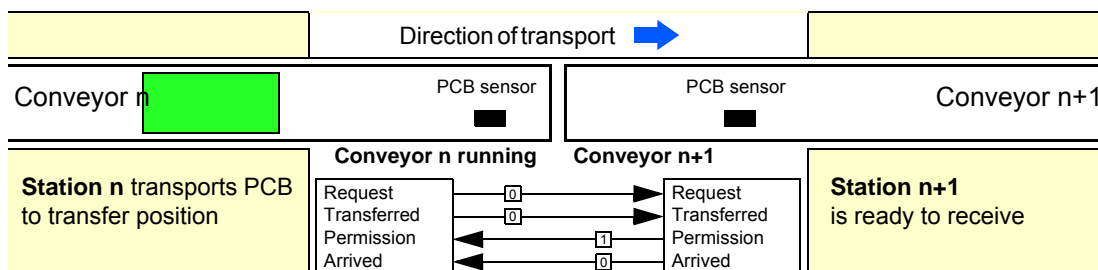
Predecessor station X1		Successor station X2	
Pin 1	Reserved	Pin 1	Reserved
Pin 2	GND 24 V-	Pin 2	Reserved
Pin 3	+ 24 V-	Pin 3	Reserved
Pin 4	Reserved	Pin 4	Reserved
Pin 5	Reserved	Pin 5	GND 24 V-
Pin 6	Reserved	Pin 6	+ 24 V-
Pin 7	Reserved	Pin 7	Reserved
Pin 8	Reserved	Pin 8	Reserved
Pin 9	Reserved	Pin 9	Reserved
Pin 10	Reserved	Pin 10	Reserved
Pin 11	Not in use	Pin 11	Not in use
Pin 12	Not in use	Pin 12	Not in use
Pin 13	GND 24 V-	Pin 13	GND 24 V- for permission / arrived (galvanic isolation)
Pin 14	Arrived	Pin 14	Arrived
Pin 15	Permission	Pin 15	Permission
Pin 16	Reserved	Pin 16	Reserved
Pin 17	Reserved	Pin 17	Reserved
Pin 18	Transferred	Pin 18	Transferred
Pin 19	Request	Pin 19	Request
Pin 20	GND 24 V- for request / transferred (galvanic isolation)	Pin 20	GND 24 V-

# Technical data

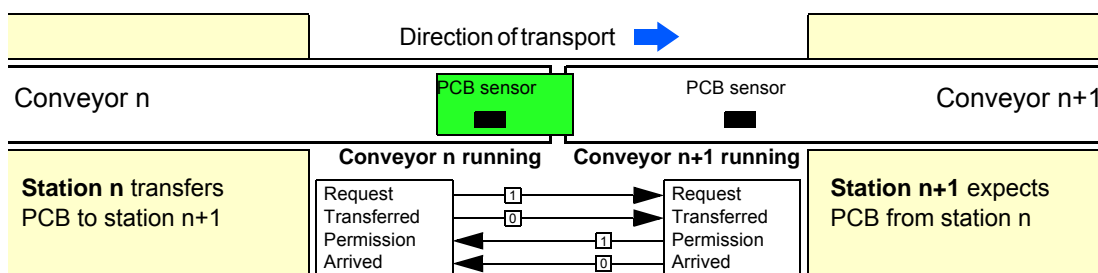
## Siemens signal interface

### Signal path

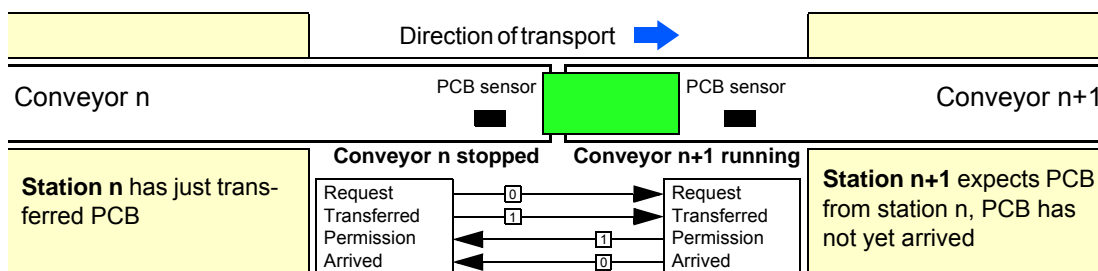
#### 1. After switching on the station



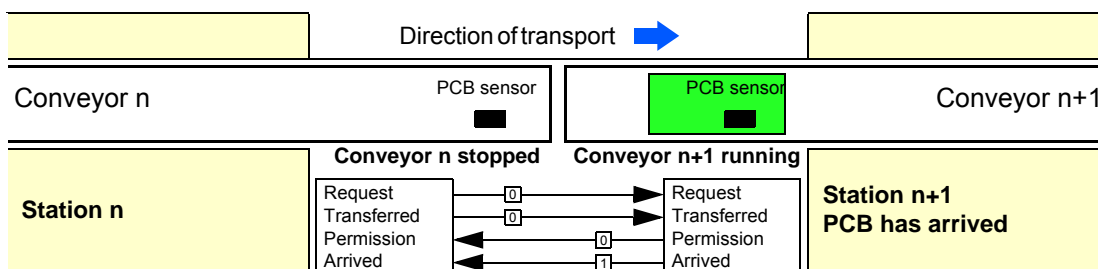
#### 2. PCB transfer has started



#### 3. PCB is transferred



#### 4. PCB transfer has been completed



## Technical data

### Electrical ratings and energy consumption

<b>SIPLACE X2 S</b>			
<b>Electrical ratings</b>			
	<b>Supply voltage</b>		<b>Fuse</b>
Main power supply	3 x 360 V~ to 3 x 480 V~ ± 10 %; 50/60 Hz 3 x 200 V~ to 3 x 240 V~ ± 10 %; 50/60 Hz <sup>a</sup>		3 x16 A characteristic C 3 x25 A characteristic C
Mains power connection	Cable 5 x 4 mm <sup>2</sup> 5 x 25 A with CEKON connector (3 x 360 V~ to 3 x 480 V~) Cable 5 x 4 mm <sup>2</sup> 5 x 25 A (3 x 200 V~ to 3 x 240 V)		
<b>Energy consumption</b>			
	<i>With a vacuum pump<sup>b</sup></i>	<i>With two vacuum pumps<sup>b</sup></i>	<i>Without vacuum pumps<sup>c</sup></i>
Nominal apparent power	2.50 kVA	--	1.30 kVA
Nominal active power	1.70 kW	--	1.00 kW
<b>SIPLACE X3 S / X4 S / X4i S / X4 S micron / X4i S micron</b>			
<b>Electrical ratings</b>			
	<b>Supply voltage</b>		<b>Fuse</b>
Main power supply	3 x 360 V~ to 3 x 480 V~ ± 10 %; 50/60 Hz 3 x 200 V~ to 3 x 240 V~ ± 10 %; 50/60 Hz <sup>a</sup>		3 x16 A characteristic C 3 x25 A characteristic C
Mains power connection	Cable 5 x 4 mm <sup>2</sup> 5 x 25 A with CEKON connector (3 x 360 V~ to 3 x 480 V~) Cable 5 x 4 mm <sup>2</sup> 5 x 25 A (3 x 200 V~ to 3 x 240 V)		
<b>Energy consumption</b>			
	<i>With one vacuum pump<sup>b</sup></i>	<i>With two vacuum pumps<sup>b</sup></i>	<i>Without vacuum pumps<sup>c</sup></i>
Nominal apparent power	2.50 kVA	3.85 kVA	1.3 kVA
Nominal active power	1.70 kW	2.45 kW	1.0 kW

- a) With options package
- b) Vacuum pump for C&P20 head only.
- c) Optional



# Technical data

## Compressed air supply

Compressed air supply			
Compressed air pressure values	0.5 MPa = 5.0 bar		
$P_{min}$	1.0 MPa = 10 bar		
$P_{max}$			
Operating pressure	0.48 MPa $\pm$ 0.025 MPa (4.8 bar $\pm$ 0.25 bar)		
Compressed air connection	R 3/4" inner thread (pipe thread) with 1/2" hose connection		
Compressed air consumption <sup>a</sup>			
	Placement head configuration	Compressed air consumption <sup>b</sup> with vacuum pump	Compressed air consumption without vacuum pump <sup>c</sup>
SIPLACE X4i S/X4 S	C&P20 P/C&P20 P/C&P20 P/C&P20 P	260 NI/min	990 NI/min
	C&P20 P/C&P20 P/CPP/CPP	370 NI/min	720 NI/min
	C&P20 P/C&P20 P/TH/TH	330 NI/min	680 NI/min
	C&P20 P/C&P20 P/CPP_H <sup>d</sup> /TH	350 NI/min	700 NI/min
	CPP/CPP/CPP/CPP	480 NI/min	480 NI/min
	CPP/CPP/CPP_H/TH	460 NI/min	460 NI/min
	CPP/CPP/TH/TH	440 NI/min	440 NI/min
	CPP/TH/TH/TH	420 NI/min	420 NI/min
	TH/TH/TH/TH	400 NI/min	400 NI/min
SIPLACE X3 S	C&P20 P/C&P20 P/C&P20 P	185 NI/min	720 NI/min
	C&P20 P/C&P20 P/CPP	230 NI/min	600 NI/min
	C&P20 P/C&P20 P/TH	230 NI/min	590 NI/min
	CPP/CPP/CPP	360 NI/min	360 NI/min
	CPP / TH	340 NI/min	340 NI/min
	CPP/TH/TH	340 NI/min	340 NI/min
	TH/TH/TH	300 NI/min	300 NI/min
SIPLACE X2 S	C&P20 P / C&P20 P	130 NI/min	480 NI/min
	C&P20 P/CPP	185 NI/min	360 NI/min
	C&P20 P/TH	165 NI/min	340 NI/min
	CPP / CPP	240 NI/min	240 NI/min
	CPP / TH	220 NI/min	220 NI/min
	TH / TH	200 NI/min	200 NI/min
Compressed air specification			
Particle size	0.1 $\mu$ m		
Particle density	0.1 mg/m <sup>3</sup>		
Maximum oil content (class 1)	Particle density 0.01 mg/m <sup>3</sup>		
Pressure dewpoint (class 4)	Dewpoint + 3°		

a) Average consumption values.

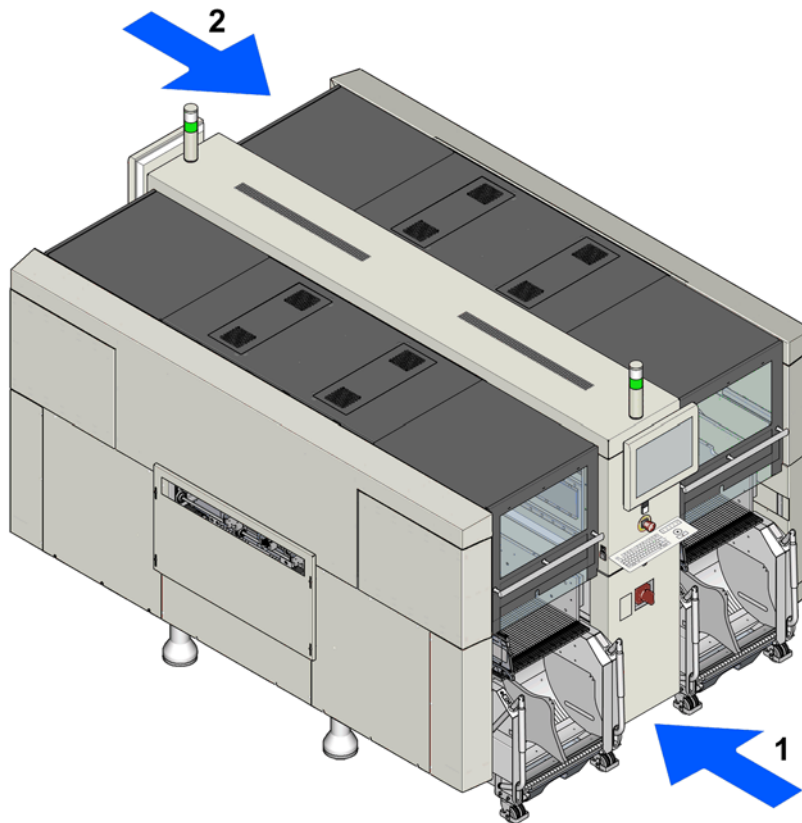
b) Under normal atmospheric conditions at 20°C and 1013 hPa.

c) Optional

d) CPP\_H = Multistar CPP in high assembly position

## Technical data

### Electrical connection and compressed air supply



1 = Electrical connection

2 = Compressed air connection

The connections are run into the machine from below and then connected to the power supply or pneumatic unit.

# Technical data

## Dimensions and setup conditions

<b>Length<sup>a</sup></b>	
Without conveyor extension and without hand guard	1,915 mm
Without conveyor extension and with hand guard	1,948 mm
With conveyor extension (one end)	2,191 mm
With conveyor extension (two ends)	2,433 mm
<b>Width</b>	
Outer contour of machine protection	2,647 mm
With monitor and keyboard	2,940 mm
On the component trolley and table position "outermost" (handle folded in)	2,890 mm
On the component trolley and table position "outermost" (handle folded out)	3,640 mm
<b>Height of machine (for PCB conveyor height 930 mm)</b>	
Up to upper edge of monitor	1,630 mm
With 2-color indicator lamp	1,852 mm
With 3-color indicator lamp	1,893 mm
Without indicator lamp (height of packaging)	1,658 mm
With folded-up protective covers	2,120 mm
<b>Machine ground clearance</b>	
(for PCB conveyor height 900 mm)	195 mm ± 15 mm
(for PCB conveyor height 930 mm)	225 mm ± 15 mm
(for PCB conveyor height 950 mm)	245 mm ± 15 mm
<b>Weight</b>	
SIPLACE X4i S (machine without component trolley)	3,430 kg
SIPLACE X4i S (fully equipped with feeder modules)	4,000 kg
SIPLACE X4 S (machine without component trolley)	3,430 kg
SIPLACE X4 S (fully equipped with feeder modules)	4,000 kg
SIPLACE X3 S (machine without component trolley)	3,410 kg
SIPLACE X3 S (fully equipped with feeder modules)	3,970 kg
SIPLACE X2 S (machine without component trolley)	3,390 kg
SIPLACE X2 S (fully equipped with feeder modules)	3,950 kg
<b>Location<sup>b</sup></b>	5.73 m <sup>2</sup>
<b>Load per unit area</b>	
X-Series with 4 component trolley X	6.1 kN/m <sup>2</sup>
<b>Number of machine feet</b>	6
<b>Max. noise emissions</b>	75 dB (A)
<b>Room temperature</b>	Between 15°C and 35°C
<b>Atmospheric humidity</b>	30% to 75 % (no higher than 45% on average to prevent any possibility of condensation on the machine)

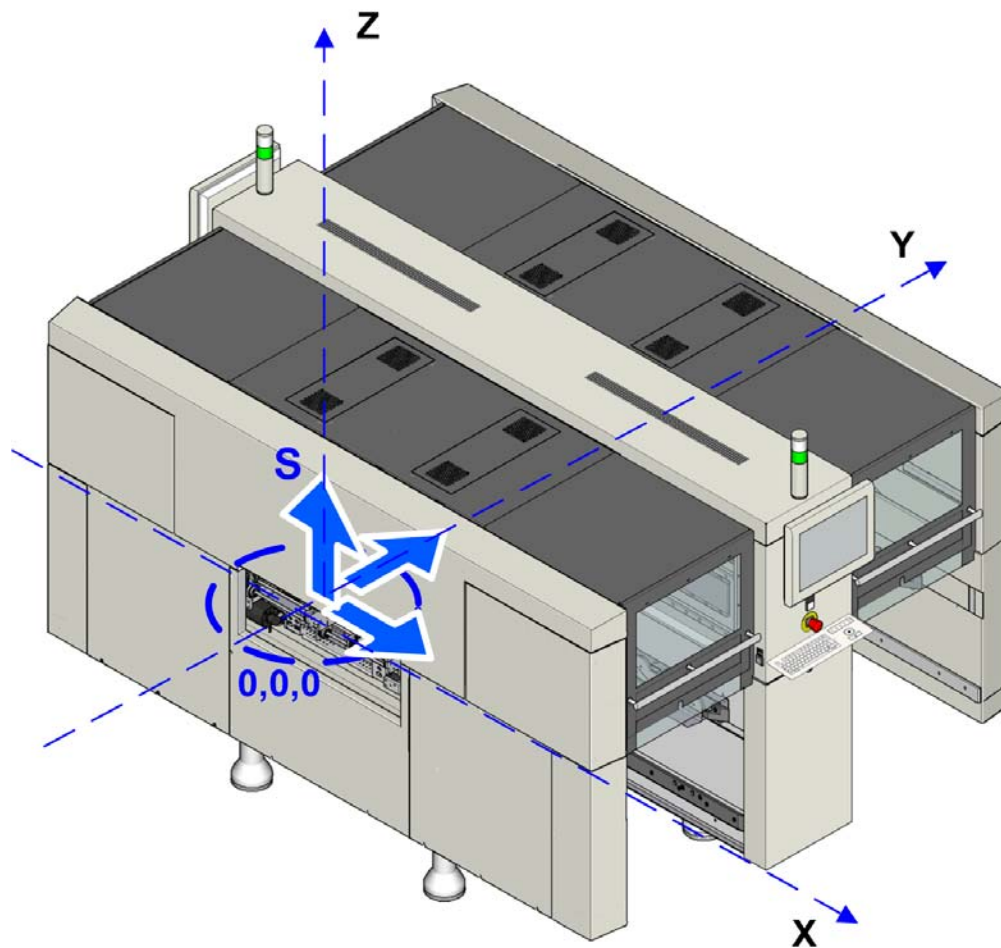
a) Measured at the outer contour of the machine protection.

b) Measured at the outer contour of the machine protection and at the keyboard (without conveyor extension).

## Technical data

Placement machine dimensions

Placement machine center of gravity



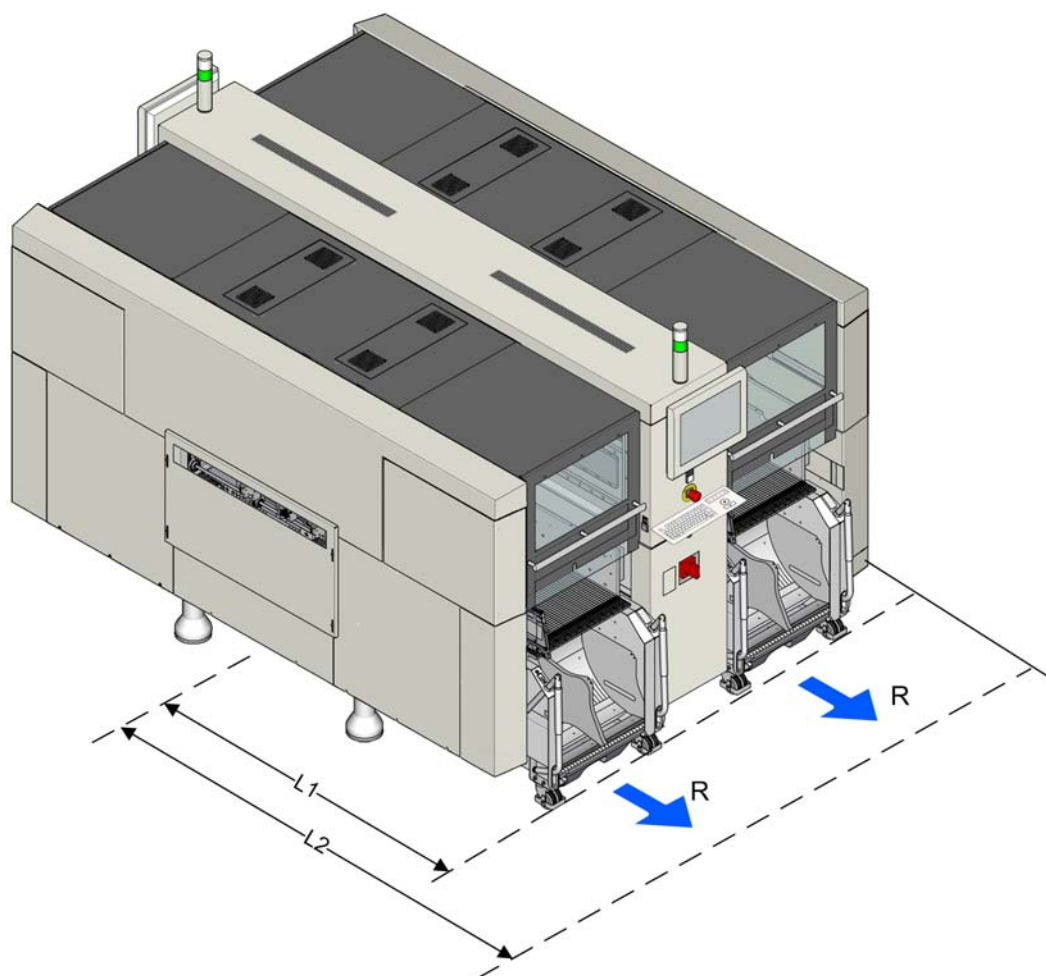
X = 0 mm

Y = 0 mm

Z = 630 mm

## Technical data

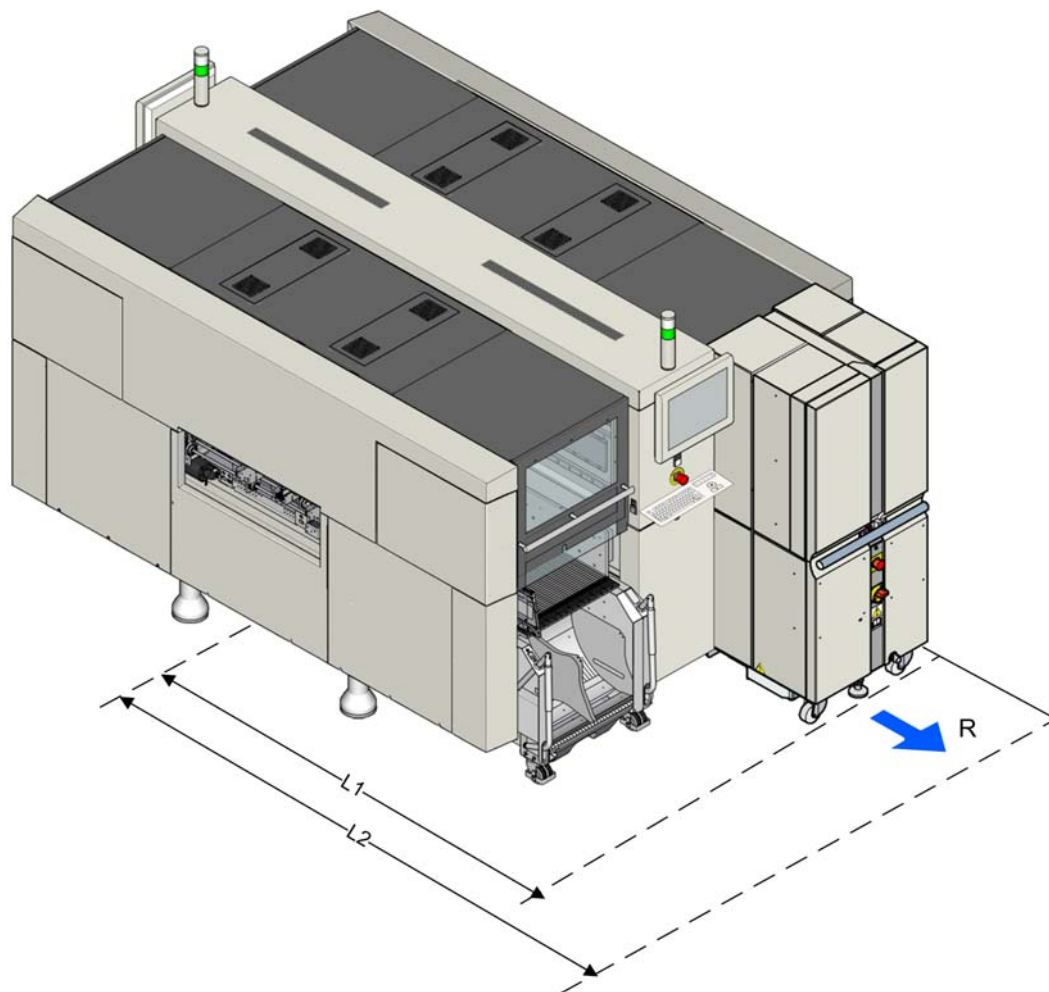
### Maneuvering radii for the X component trolleys



Maneuvering radius R	600 mm
Distance L1: Machine center to outer edge of X component trolley	1470 mm
Distance L2: Machine center to wall	2070 mm

## Technical data

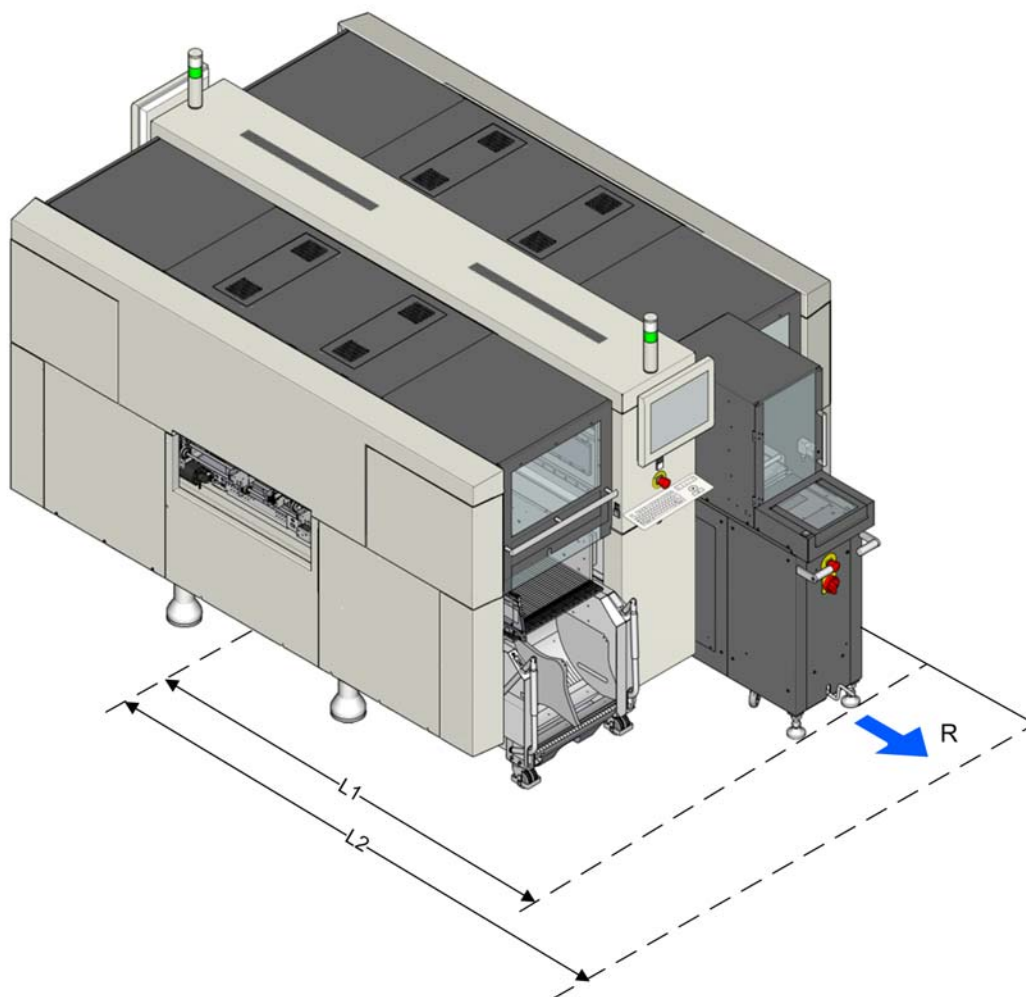
### Maneuvering radii for MTC



Maneuvering radius R	750 mm
Distance L1: Machine center to outer edge of MTC	1938 mm
Distance L2: Machine center to wall	2688 mm

## Technical data

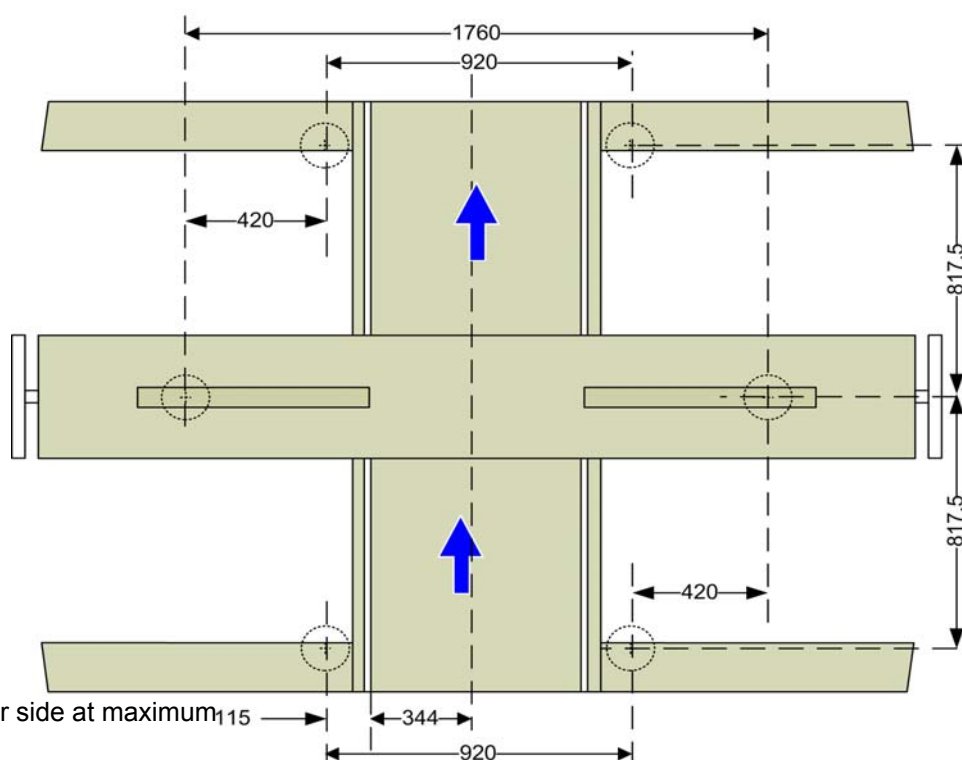
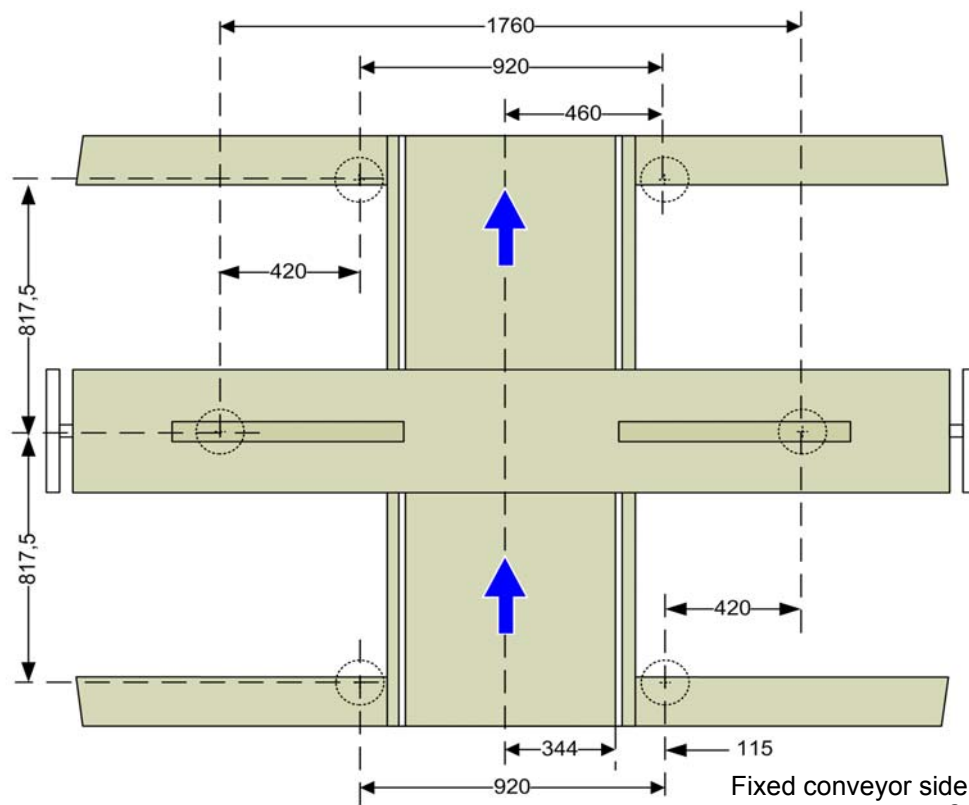
### Maneuvering radii for the WPC



Maneuvering radius R	750 mm
Distance L1: Machine center to outer edge of WPC (handles)	2100 mm
Distance L2: Machine center to wall	2850 mm

## Technical data

### Spacing distances for single conveyor



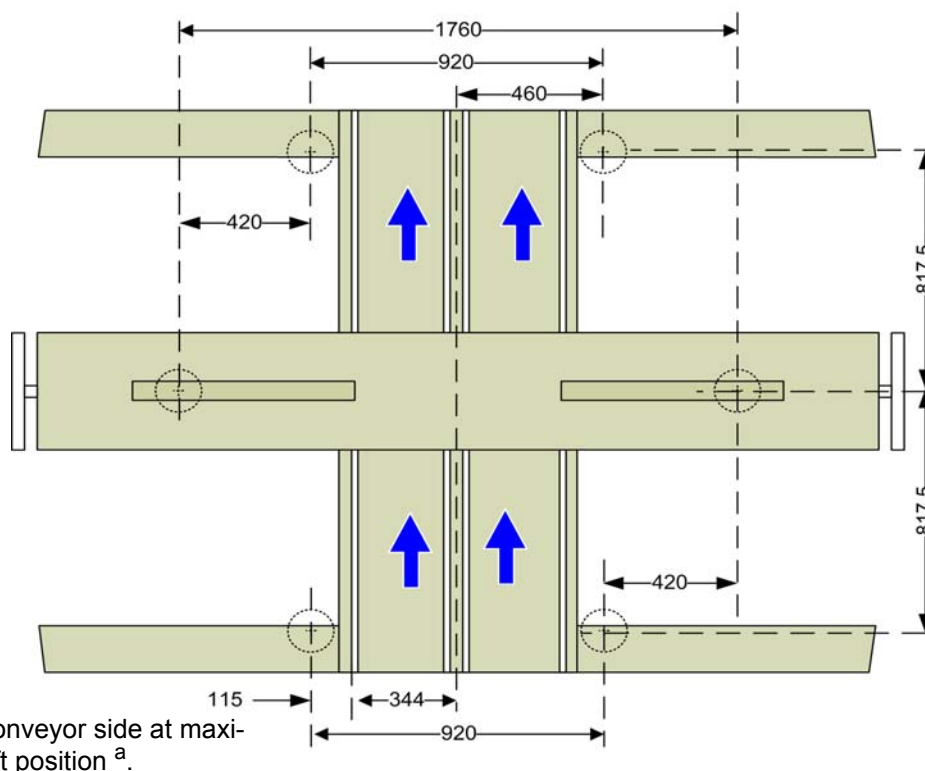
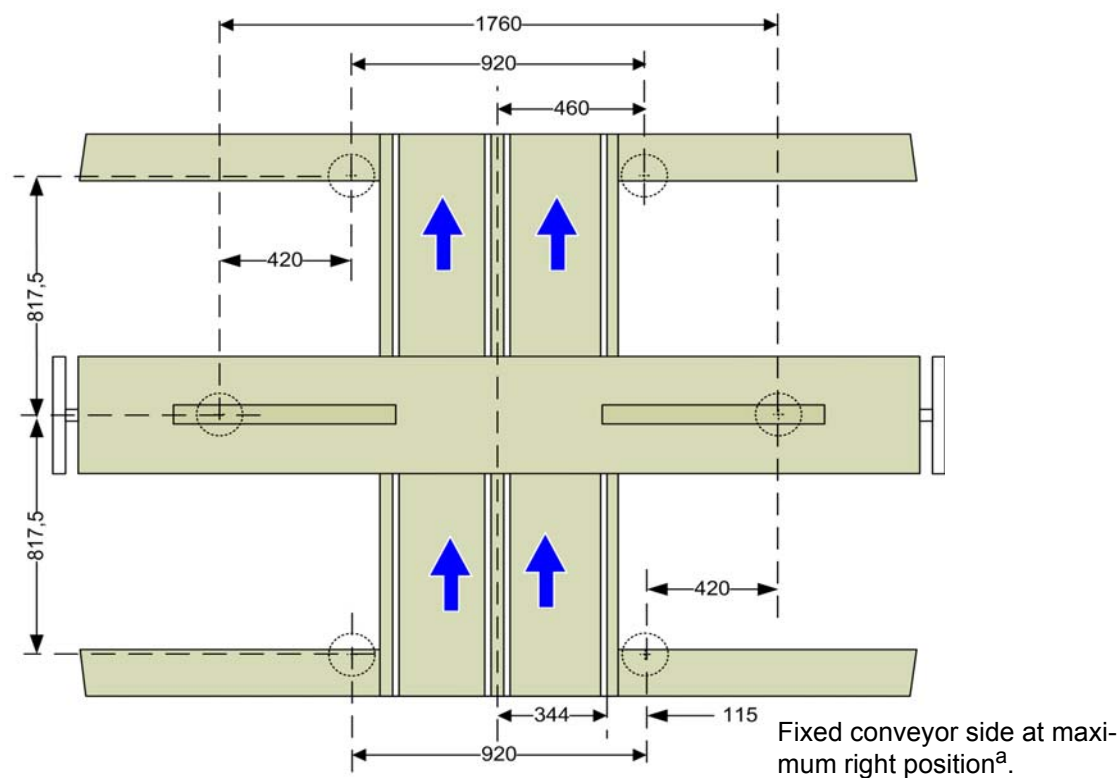
a) The value depends on the position of the fixed side. See table of adjustable side positions on page 29. All dimensions in millimeters.

a) The value depends on the position of the fixed side. See table of adjustable side positions on page 29. All dimensions in millimeters.



## Technical data

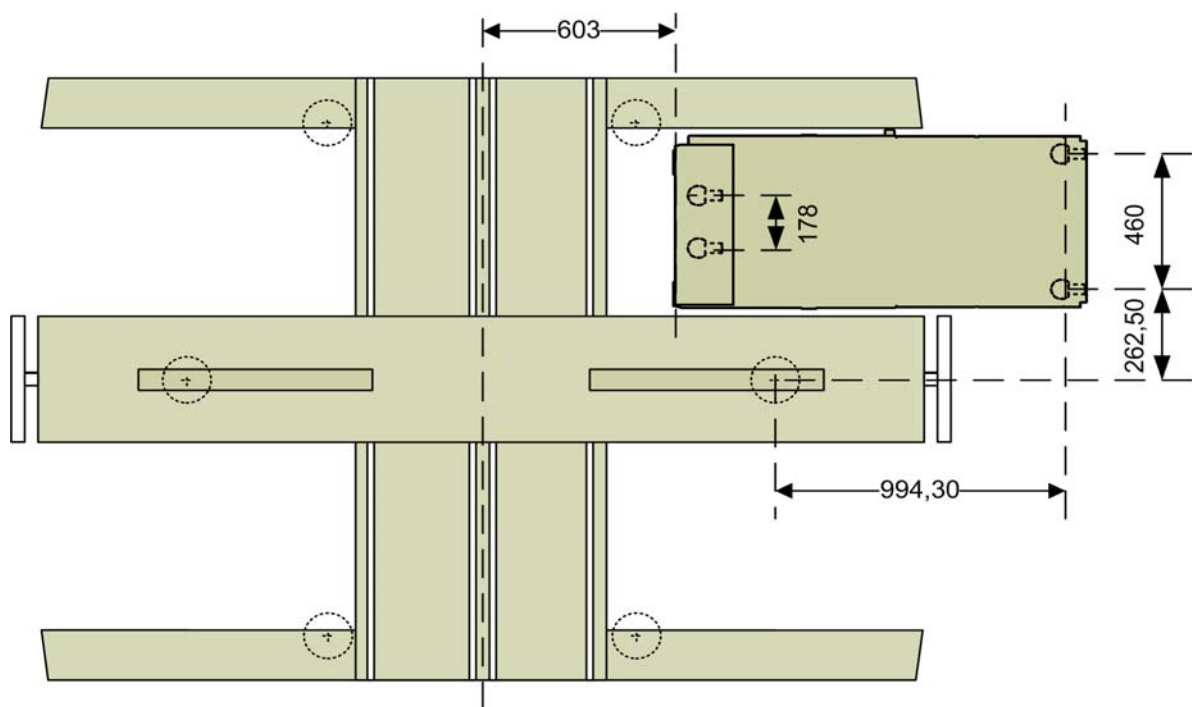
### Spacing distances for the flexible dual conveyor



a) The value depends on the position of the fixed side. See table of adjustable side positions on page 29. All dimensions in millimeters.

## Technical data

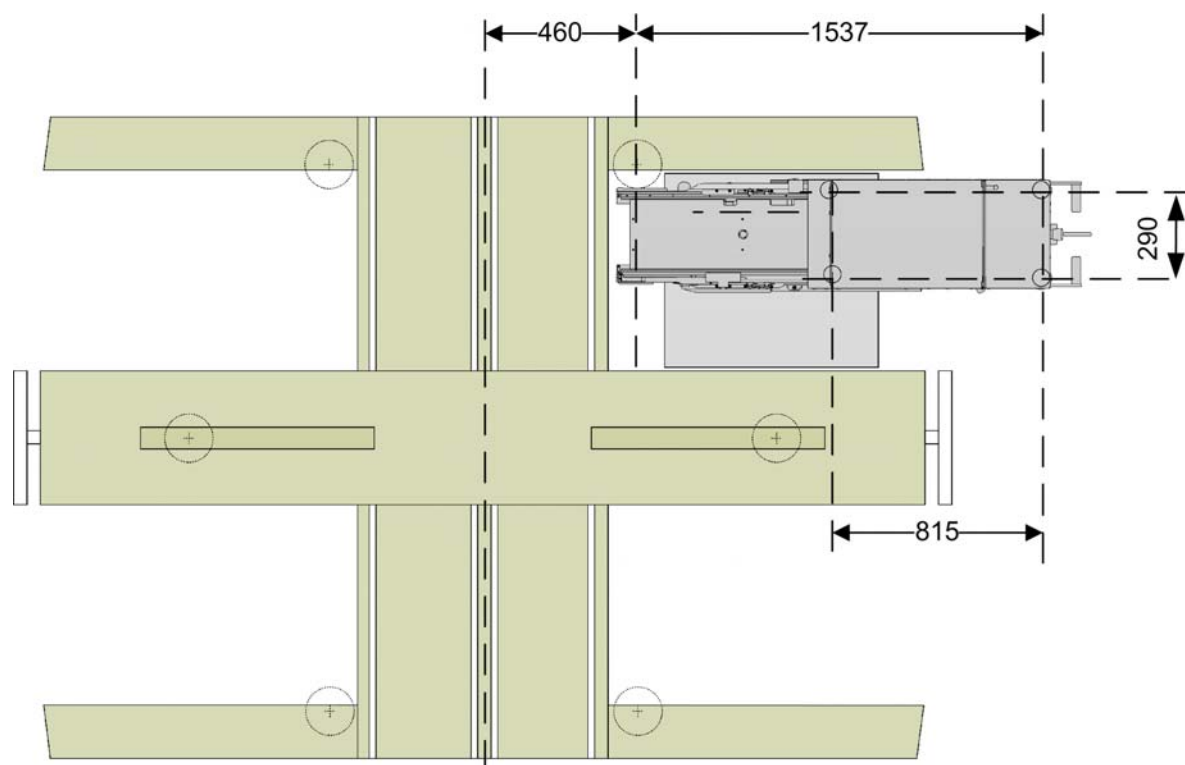
### Spacing distances with MTC



All dimensions in millimeters.

## Technical data

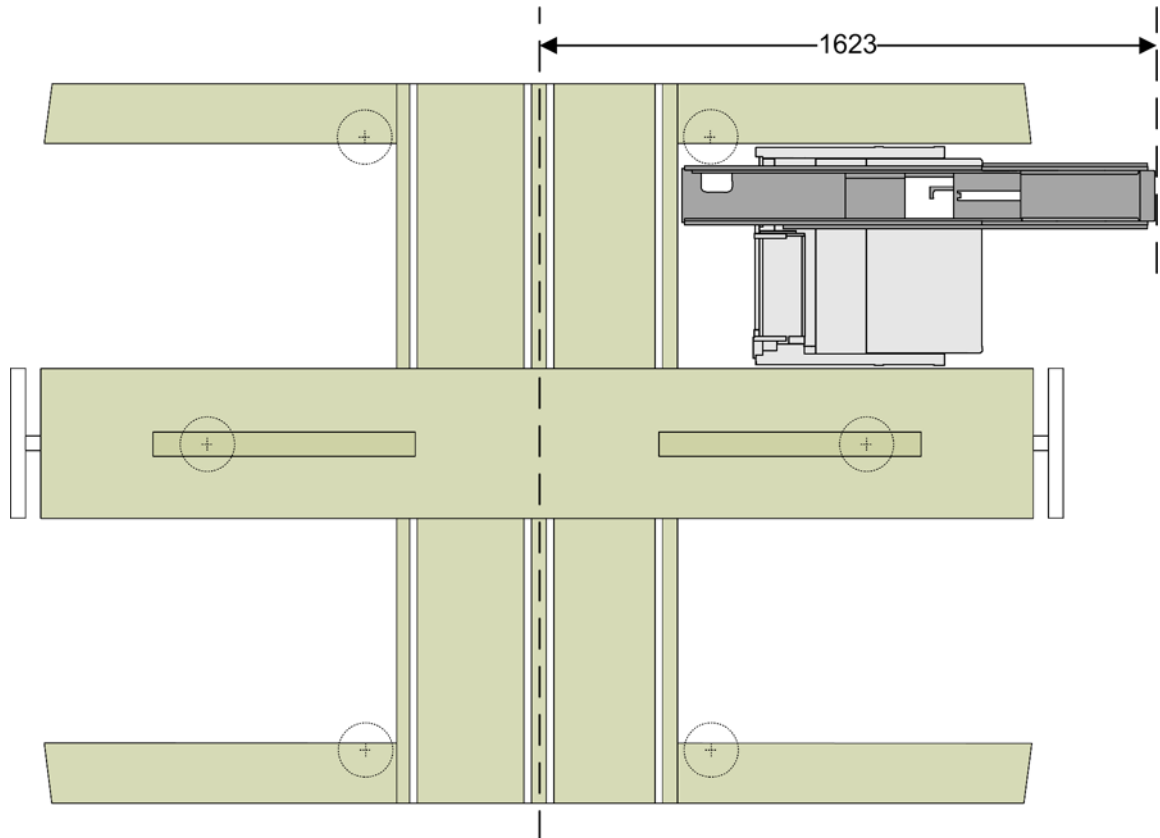
### Spacing distances with WPC



All dimensions in millimeters.

## Technical data

### Dimensions with JTF-S/JTF-M



All dimensions in millimeters.

## Technical data

### Transportation and delivery configuration

#### Transport dimensions and weight

Length	2000 mm	
Width	2960 mm	
Height	1620 mm	
Weight	Dispatch within Europe	Dispatch overseas
	3,859 kg	4,359 kg

#### Means of transport

A fork-lift with the following specification will be needed to carry the machine in its crate:

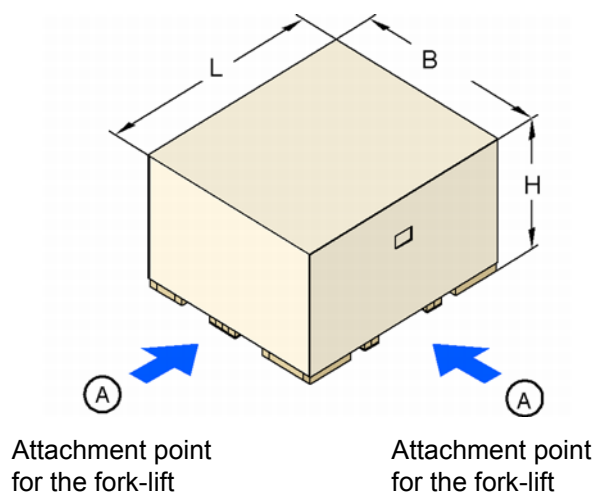
Fork length	Min. 1800 mm
Lifting power	Min. 6000 kg
Clear fork width	Min. 350 mm

#### Description

Within Europe, the machine is delivered on a robust wooden pallet. If sent overseas, the machine is packaged in a wooden crate.

#### Configuration when delivered

- The dual conveyor has a preset width for lane 1 of 100 mm and for lane 2 of 210 mm.
- Both keyboards, the operating panel and the monitors are dismantled.
- The indicator lamp is dismantled.



## Standard list

The following functions are included in the standard SIPLACE X-Series package:

Standard features	X2 S	X3 S	X4 S	X4i S	Notes
Vacuum sensor	X	X	X	X	
Force measurement	X	X	X	X	
Force sensor	X	X	X	X	
Fiducial & ink spot detection	X	X	X	X	
Nozzle changer for the TwinStar	X	X	X	X	
Set of TwinStar nozzles	X	X	X	X	
Set of standard nozzles per head	X	X	X	X	
Service box	X	X	X	X	
Automatic electrical PCB width adjustment	X	X	X	X	
Operation on both sides	X	X	X	X	
LCD monitors	X	X	X	X	
Touch-screen monitor	X	X	X	X	
2-part or 3-part signal lamp with buzzer	X	X	X	X	Select white/green or red/yellow/green
Tape cutter with reject bin	X	X	X	X	
Tape separating plates	X	X	X	X	
0201 (metric) / 03015 placement	X	X	X	X	
Support pins	X	X	X	X	
Vacuum pump for the SpeedStar	X	X	X	X	
Sensor for the component reject bin	X	X	X	X	

## List of options

Available options	X2 S	X3 S	X4 S	X4i S	Notes
Flexible dual conveyor fixed side right	X	X	X	X	
Flexible dual conveyor fixed side left	X	X	X	X	
Long board (LBO)	X	X	X	X	
Thick board	X	X	X	X	
SpeedStar C&P20 P	X	X	X	X	In the two gantry area, only available in combination with a second SpeedStar.
Reconfiguration kit for SpeedStar	X	X	X	X	
MultiStar CPP	X	X	X	X	
Reconfiguration kit for MultiStar	X	X	X	X	
Stationary component camera, type 33, 55 x 45 digital	X	X	X	X	For the MultiStar CPP and placement area 2.
TwinStar	X	X	X	X	Placement area 2 only for X4i S.
High-Force Head	X	X	X	X	Placement area 2 only for X4i S.
Reconfiguration kit for TwinStar or High-Force head	X	X	X	X	Placement area 2 only for X4i S.
Stationary component camera, type 25, 16 x 16 digital	X	X	X	X	Only for the TwinStar or High-Force Head.
Vision teaching station	X	X	X	X	
Nozzle changer	X	X	X	X	Depends on placement head.
Nozzle changer "row 2"	X	X	X	X	Depends on placement head.
Component trolley X	X	X	X	X	
X feeder modules, 4 mm and 24 mm to 88 mm	X	X	X	X	
Smart Feeder, 8 mm, 2x8 mm, 12 mm, 16 mm	X	X	X	X	
Splice point recognition for X feeder modules	X	X	X	X	
Linear Dip Module LDU X	X	X	X	X	With pickup area restrictions.
Mount for additional tape reel	X	X	X	X	
Smart Pin Support (SPS)	--	X	X	X	SIPLACE X2 S on request
Virtual inkspot handler	X	X	X	X	
Second level tape reel	X	X	X	X	

## List of options

Available options	X2 S	X3 S	X4 S	X4i S	Notes
Adapter X	X	X	X	X	Roadrunner, S linear vibratory feeder and label presenter can be configured on a component trolley X with this adapter.
110/208 V conversion kit	X	X	X	X	
2D board barcode readers	X	X	X	X	
PCB barcode reading with PCB camera	X	X	X	X	
External pre-setup area	X	X	X	X	
3D coplanarity sensor	X	X	X	X	Only for the TwinHead or High-Force Head.
Tray holder for SIPLACE X	X	X	X	X	Only at location 2, not in combination with the SpeedStar.
Wafflepack Changer (WPC)	X	X	X	--	Only at location 2, not in combination with the SpeedStar.
Matrix Tray Changer (MTC)	X	X	X	--	Only at location 2, not in combination with the SpeedStar.
Service flap	X	X	X	X	Required in conjunction with the MTC
JTF-S/JTF-M	X	X	X	X	Only in connection with the fixed component table.
Component table, fixed installation	X	X	X	X	For JTF-S/JTF-M and LDU-X.
Input conveyor extension	X	X	X	X	
Output conveyor extension	X	X	X	X	
Hand guard for conveyor	X	X	X	X	
Dummy feeder module	X	X	X	X	
Barcode-controlled production including WDTL	X	X	X	X	
WDTL inkspots	X	X	X	X	
Station-wise download	X	X	X	X	
Borrow performance	X	X	X	X	
Interior lighting	X	X	X	X	



## Overview of languages

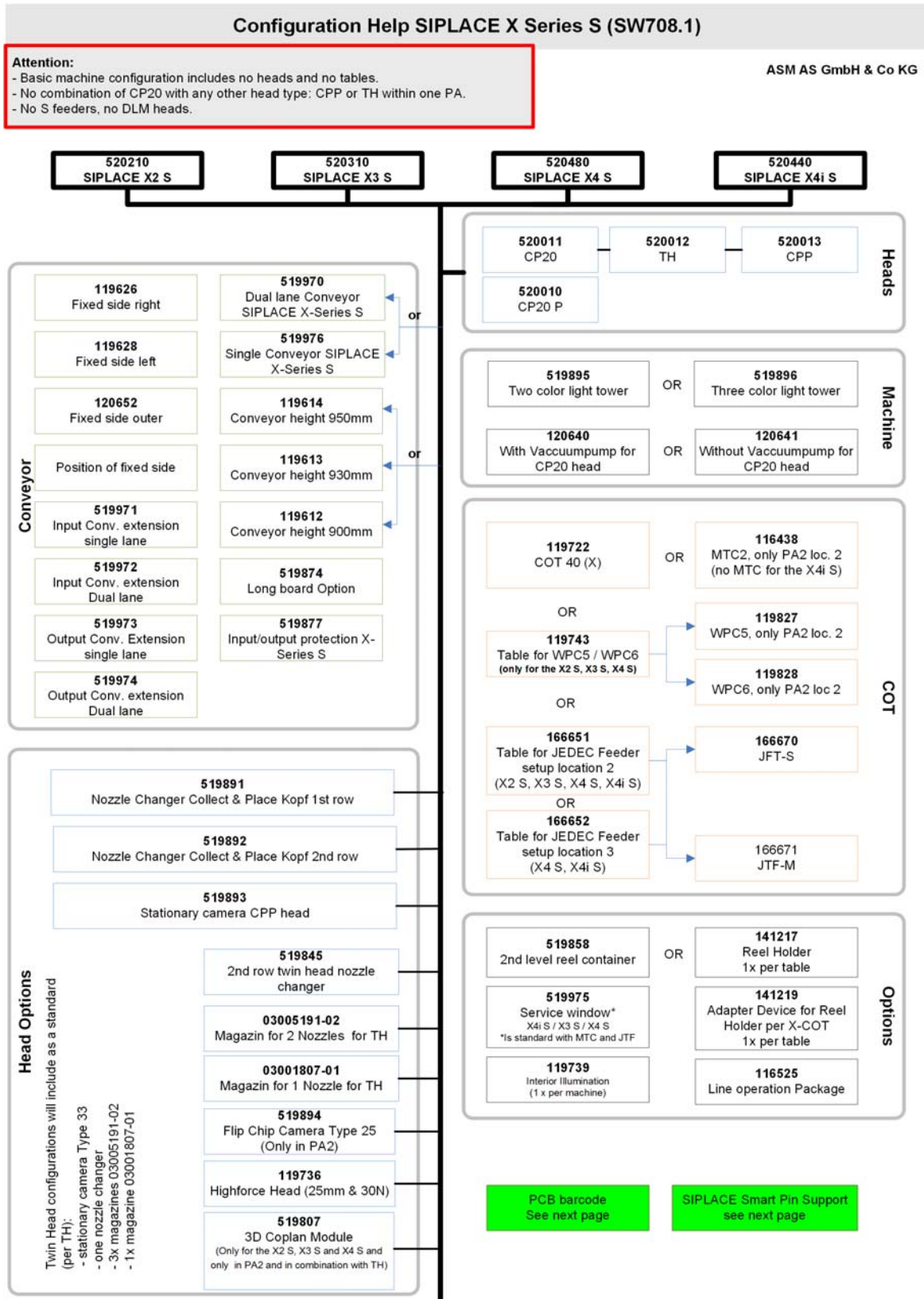
	Documentation package	SIPLACE Pro from 12.1	OIS from 12.1	Station software from 708.1
German	X	X	X	X
English	X	X	X	X
French	X	X	X	X
Italian	X	X	X	X
Spanish	X	X	X	X
Portuguese	X	X	X	X
Hungarian	X	X	X	X
Czech	X	X	X	X
Russian	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>	X
Polish	X	X <sup>a</sup>	X <sup>a</sup>	X
Estonian	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>
Romanian	X	X <sup>a</sup>	X <sup>a</sup>	X
Bulgarian	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>	X
Finnish	X	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>
Swedish	X	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>
Danish	X	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>
Dutch	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>
Chinese	X	X	X	X
Korean	X	X	X	X
Japanese	X <sup>a</sup>	X	X	X
Vietnamese	X <sup>a</sup>	X <sup>a</sup>	X <sup>a</sup>	X

a) On request.

Other languages can be realized on request.

# Configuration help

## SIPLACE X-Series S, SR 708.1



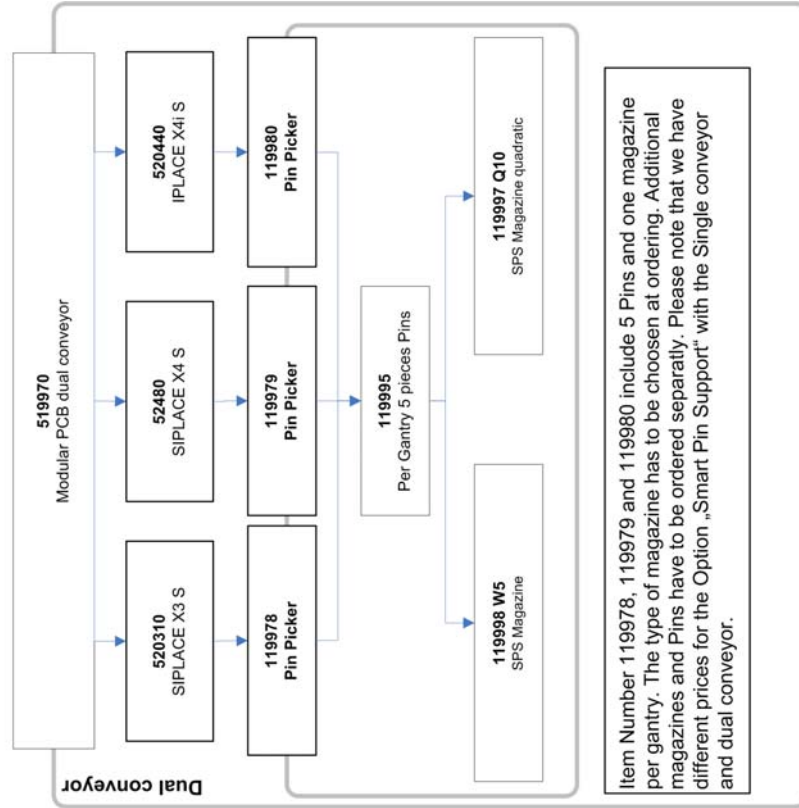
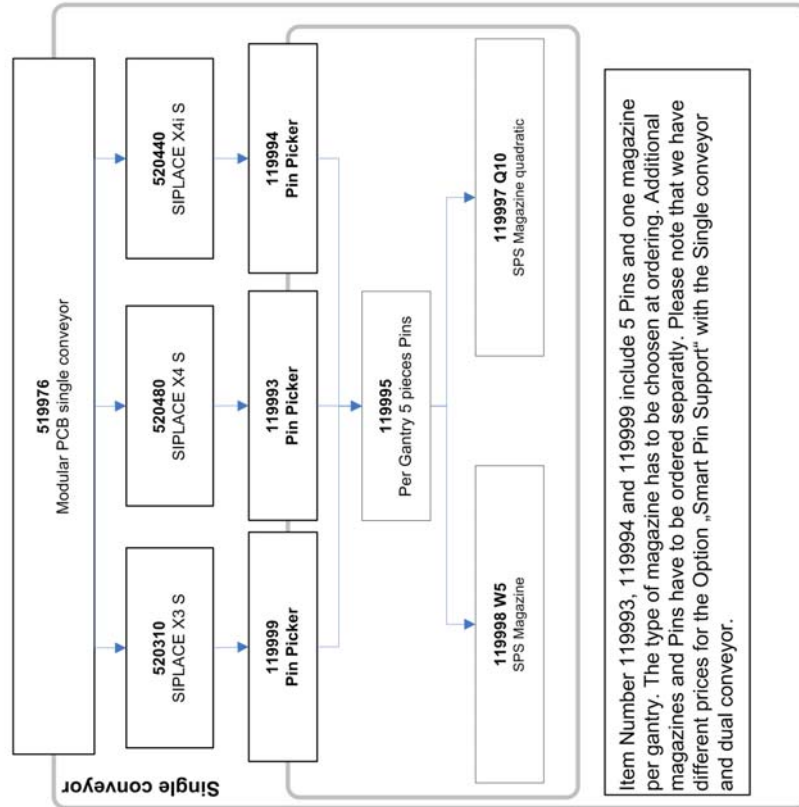
# Configuration help

## SIPLACE Smart Pin Support

### SIPLACE X Series S Smart Pin Support configuration help

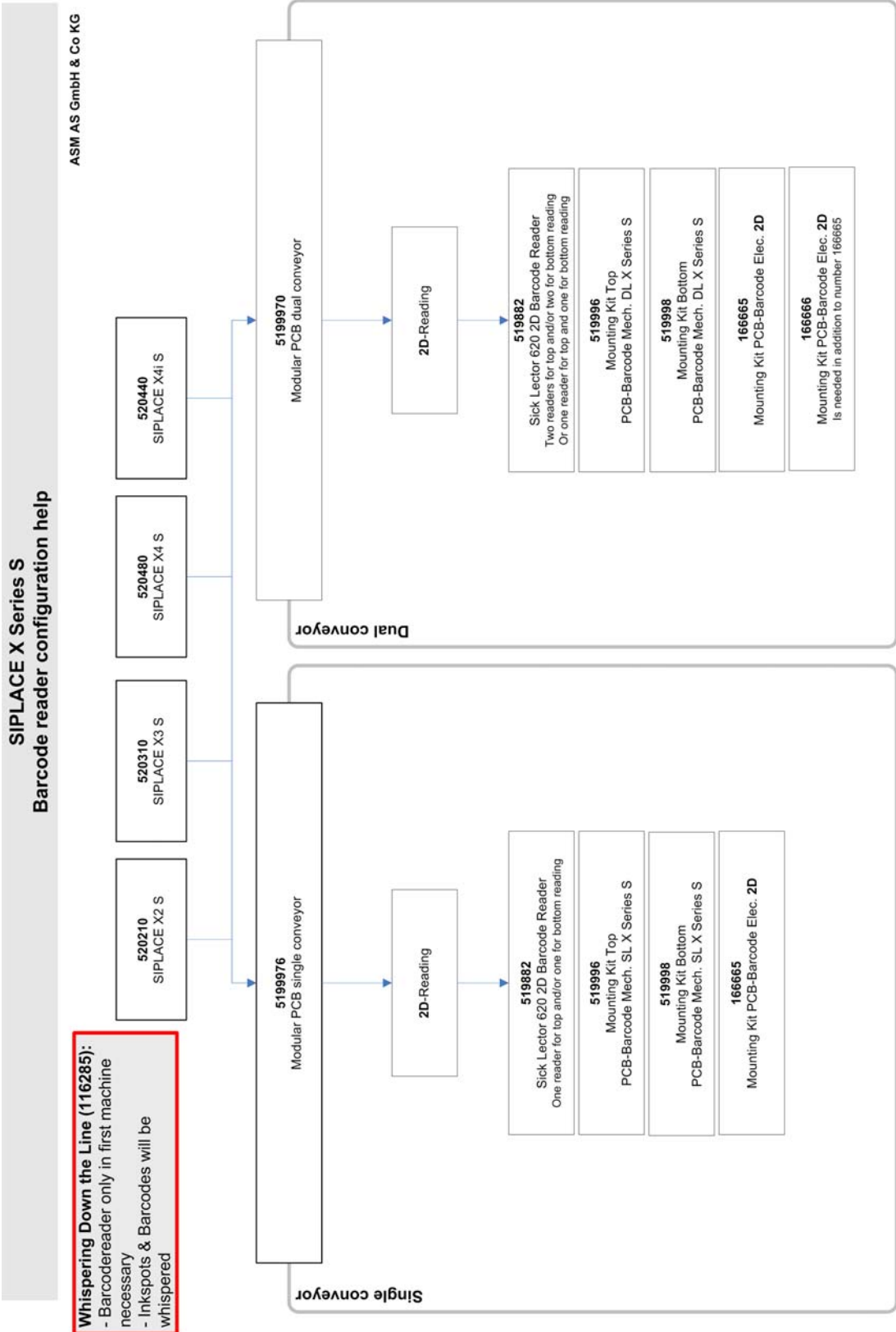
ASM AS GmbH & Co KG

**Note: Smart Pin Support is not yet available for the X2 S**



# Configuration help

## SIPLACE PCB barcode



# ESD certificate

Analysis of the manufacture, of its Static Control Equipments  
Examination of Equipments and Materials

**B.E.STAT**  
group®

## Certificate for ESD Equipment

Report - no: **05-324-2015**

**Company:** ASM Assembly Systems GmbH & Co. KG  
Rupert-Mayer-Str. 44  
81379 Munich, Germany

**Equipment:** Automatic Placement Machine **SIPLACE X-series S**

Measurements were conducted on May 11<sup>th</sup> 2015. The measured results on the automatic placement machine **SIPLACE X4i S** fulfil the requirements of IEC 61340-5-1; IEC 61340-5-2 and ANSI/ESD S20.20-2014

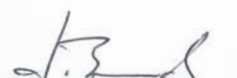
**Validation:** The Certificate is valid until Mai 30<sup>th</sup> 2017

**As conclusion it can be stated that the presented Automatic Placement Machine SIPLACE X-series S meet the requirements of the standard IEC 61340-5-1 and ANSI/ESD S20.20-2014.**

**Creation of the report through:** **B.E.STAT** European ESD competence centre  
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Kesselsdorf, May 12<sup>th</sup> 2015

  
Dipl.-Ing. Hartmut Berndt

**B.E.STAT** European ESD competence centre is member of **ESDA** (ESD Association) and **ESA** (Electrostatic Society of America. and certified after **ISO 9001:2008**.

Mr. Dipl.-Ing. Hartmut Berndt is additional Expert in the national and International Standard committee of IEC and DKE. Mr. Berndt is Secretary of the IEC standard committee TC 101 Electrostatics and Leader of the national ESD expert committee „Fachausschusses 7.3 Elektrostatik at the VDE GMM.

### Analysis – Trainings – Qualifications – Audits

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The information in this brochure is merely a general description and lists performance features that will not necessarily be present as described in the specific application, or that may be modified if the product is further developed. The desired performance features are only binding if expressly agreed when the contract is concluded.

All technical data according to our Scope of Service and Delivery.  
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