

# Primary and Hygienic Packaging

## Paloma WD Feed Placer and Top Loader



- **High uptime availability.**  
The machine is ready for production immediately after a production change.
- **Fast production change.**  
All production changes are made within 5 minutes.
- **Easy machine operation.**  
With the new Gemini 5 user interface.
- **Flexible operating modes**  
System integration and modularity, compact layout.
- **Short cleaning time.**  
The entire machine is enclosed in stainless steel for easy and residue-free cleaning.

The main function of the PALOMA machine is to pick products on a conveyor and place them into containers. The products are conveyed from a belt in line or in random position. The containers are incoming into the machine by a parallel flow.

The machine is primarily designed for fresh or frozen food.

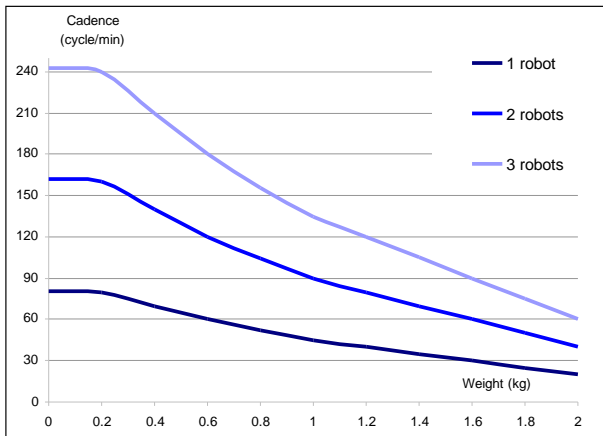
### PALOMA WD with 1, 2 or 3 arms

There are two machine sizes, one with 1 or 2 robot arms inside and one with 3 arms.



Product range		
Dimension	Min. [mm]	Max. [mm]
Product length	50	300
Product width	25	200
Product height	5	80

The Paloma WD is able to load a wide range of different packaging machines such as flowpack, thermoform or also boxes.



### Types of boxes and containers



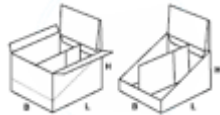
0200 Half slotted container (M/A).



0201 Regular slotted container (M/A).



0212 Regular bottom, tuck top (M/A).



0716 Display

The list above is not exhaustive.

Container range		
Dimension	Min.	Max.
	[mm]	[mm]
Box or case length	120	610
Box width	100	420
Box height	25	400

For very tall boxes with flaps, the flap should be bent and the product should accept to be dropped from a height of 200 mm.

### Product process:

The products are coming from up stream in line or random, from a belt or a modular belt conveyor. The physical interface with the upstream product conveyor is done with a small diameter of rollers.

The entry level is variable. The height is adjustable by steps of 25mm and fine tuning with the machine feet.

### Container process:

Usually the containers are coming on a conveyor. They are generally backlogged at the entry of the PALOMA-D2 carton conveyor. There are two possibilities to transport the containers inside the PALOMA-D2 conveyor:

- The containers are separate one of the other (the containers are not touching each other).
- The containers are touching each other.

The entry level of the conveyor is depending of the container height, to allow the top of the container to be in the working volume of the robot.

### Product patterns

The Paloma-D2 allows placing products by different layer patterns. The patterns can be different for each layer.



### Speed & cadence:

The basic speed curves displayed below are for a mono pick and place cycle on a diagonal trajectory of 600 mm long and two vertical trajectories of 50 mm.

For the SAB tool (simultaneous dual pick, no product rotation) the speed is: 150 for one arm, 300 for two arms and 450 for 3 arms PALOMA-D2. The product weight in this case must not exceed 200g.

### Format change time

One of the major advantages of the Delta robotics is the short changeover time. In normal operation it should take less than 5 minutes to change the production (recipe) and to start a new one. All mechanical adjustments between two productions fit to this requirement.

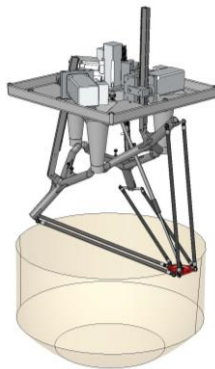
To help for format change, all the mobile tools of the machine, directly in contact with the product, are adjustable by guide marks (ruler).

### Machine characteristics

Frames	
Frame size	2
Frame material	Stainless steel
Washdown requirements	EN 1672-2 up to 1.5 m
Frame finish	Bead blasted
Frame construction	Beams and welded sheet metal
Harsh design	Yes
Roof or cover	Individual cover per robots
Height adjustment	+/-50 mm on feet
Security, height of the lower part of the frame.	Max 200 mm
Transport & lifting	Lifting eyes on the frame Fork lift points
Footprint	2000x1850 approx. for 2R 2900x1850 aprox. for 3R
Machine height	2717+/- 50 mm
Access	Front
Top access	Robot mechanic
Electrical enclosure	
On the back side	Yes
Size	One size for 1, 2 or 3 robots
Ingress protection	IP 65 up to 1.5 m and doors

	Over IP 54 Splash-proof (fans)
Transformer	Inside the electrical enclosure
Cell PC	Inside the electrical enclosure
Supervisor PC	Inside the electrical enclosure
<b>Design</b>	
Direction	Both hand (L to R and R to L)

The Delta robot is a parallel axis robot with 3 axis of motion as standard and 4<sup>th</sup> axis witch depending on the end-effector is used to rotate a product or to squeeze a group of two products for a group placement with a tight fit. The Delta robot components are made of high technology composite materials designed for strength, long life and low inertia.



Robots		
Number of robot	1 to 3	
Robot type	Delta C33 (V07)	
Material	Base & arms: Aluminium casting & Steel-It paint Forearms: carbon tubes Moving plate: aluminium & ceramic	
Splash proof version	Option	
4 <sup>th</sup> axis	Yes, as standard	Without 4 <sup>th</sup> axis as option
Motor axis 1 to 3	Tetra 85, 2 Nm nominal torque	
Motor axes 4	Tetra 56, 0.9 Nm nominal torque	
Max load	2 Kg	With 0,8 kg end-effector
Forearms & volume of work	LB770 / ø1000x300 mm	Standard
Other forearms	As option	Lb670, Lb620,
Forearms length change during operation	Yes	Software adaptation
Max robot speed	Up to 10 m/s	
Max robot acceleration	Up to 100m/s <sup>2</sup>	
Max tracking acceleration	Up to 5 m/s <sup>2</sup>	

#### Electrical enclosure

Electrical specifications	
Localized electrical specifications	Yes (European components)
Specification & standards	CE
Washdown requirements	Yes IP 65 (IP54 side aeration)
Heater (condensation control)	Yes as option
Power	3x400 V 50 Hz with or without N
<b>Cell PC</b>	
Standard Beckhoff PC	19" rack 3 units
Operating System	Windows CE embedded
PCI boards	3 boards max (18 axes)
Position	Fixed inside the EE, easy access
<b>Supervisor PC</b>	
Rexroth PC	Yes
Operating system	Windows XP
<b>Wiring</b>	
Standards	CE
Cable reference	On the connector block
<b>Miscellaneous</b>	
Main power switch	On the side of the EE
Emergency stop	Yes on the side
Main power supply	From the top as standard From the bottom as option
Material	Stainless steel
EE Finish	Bead blasted

#### Product conveyor

Conveyor size	2 length	
Conveyor material	Stainless steel	
Washdown requirements	Wet D2	
Conveyor finish	Bead blasted	
Conveyor construction	Sheet metal	
Harsh design	Yes	
Transportation device	Belt	
Conveyor length	See layout	
Conveyor width	One (approx. 500 mm)	
Transportation speed nominal	0.6 m/s (at 60Hz)	
Speed variation	Yes, with a frequency inverter	
Incoming height	900 mm	
Height adjustment	+/-100 mm	
Ingress protection	IP65	
Position tracking	Encoder	

#### Product tracking & vision

PEC product detection		
Photo eye control	Yes	
For in line products entry	Yes	Up to 3 columns
View from the top	Yes	See the belt
Infrared eye	Yes	
Laser	As option	
Adjustable guides	Yes	
<b>Vision</b>		
Product detection by vision	Option	
By backlighting	Yes	
Camera	Monochrome	
Quantity of camera	1	
Position of the camera	Outside of the frame	
Enlightenment parasite protections	Yes	
Lens focal	12 mm	
Manual focus	Yes	
Manual aperture	Yes	

Camera definition	640x480 (4/3) approx 300'000 pixels
<b>Lightings</b>	
Trough the belt	Yes
Lightning width	Belt width – 30 mm
Lightning length	Approx 500 mm
Lighting type	DEL
Ingress Protection	IP 65 Enclosed

#### Container conveyor

Conveyor size	2 length
Conveyor material	Stainless steel
Washdown requirements	Wet D2
Conveyor finish	Bead blasted
Conveyor construction	Sheet metal
Harsh design	Yes
Transportation device	Side belts
Conveyor length	See layout
Conveyor width	450 mm
Transportation speed nominal	0.6 m/s (at 60Hz)
Speed variation	Yes, with a frequency inverter
Lowest speed	0.05 m/s
Outgoing nominal height	-100 mm (compared to incoming flow)
Height adjustment	+100 mm / -400 mm Set up once at the assembly, by step of 25 mm
Ingress protection	IP65
Construction	Made of reversible modules
Position tracking	Encoder
Gate	Yes
Continuous container	Yes, touch – touch as option
Gate type	Side
Width tolerance	The side belts must be self-adaptable to boxes width variation. Max tolerance +/-2.5 mm



#### End-Effector

<b>Basic end-effector</b>		
Single pick with rotation in line	Yes	
In line rotation end-effector	Yes if cost effective	Manufacturing in series could make it cost effective.
Reduction ratio	i = 4	
Rotation angle range	350° (+/- 175°)	Used for +/- 90° or 180°
Interchangeable fingers	Yes, quick change, bayonets mount. User friendly.	Commercial argument, makes tools affordable

Max product load	1.5 kg	With a 0.8 kg end-effector
<b>SAB end-effector</b>		
Dual adjustable mono-pick	Yes,	Max. pick two products
Interchangeable fingers	Yes	Clipped (no Bayonet mount)
Product rotation	No	

#### Pneumatics & vacuum

<b>Vacuum pump</b>		
One high pressure vacuum pump	Yes, Rietschle VLT 40 type like	
Position of the vacuum pump	On the machine top	For cleaning reasons
Filter	Option	Paper type
Ingress protection	IP 54	
Noise level	67 dBA	
Two vacuum pumps	Option	
Three vacuum pumps	Option	Remote
High flow vacuum pumps (side channel)	Option	Remote
<b>Valves</b>		
1 valve per robot	Yes, standard	Type MAC 56
2 valves per robot	Option	In case SAB end-effector
High flow valve	Option	One vacuum pump per robot
Position	On the top side or on robot base	
Cyclone filter	Option, one per vacuum channel	

#### HMI

Position	On the front right or on front left	Easily interchangeable
Height	1525mm +/- 50	
Height adjustment	No	
Ingress protection	IP 65	In the washdown area
Type	Only screen	
USB connector	Yes, 3	
Dallas key	Yes, 1	
Interface	Touch screen	
Enclosed	Yes	
Heat dissipation	Compatible with ingress protection level	

#### Machine noise level

The maximum noise level for the machine is: **75 dBA**.

#### Electrical characteristics

##### Requirements on electrical hardware

##### Wire colors

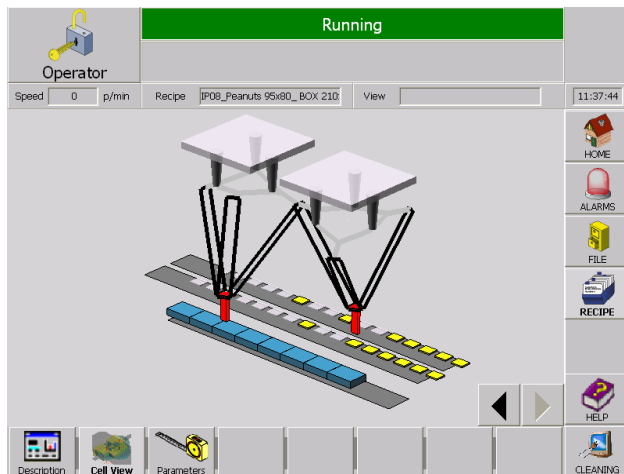
Power AC 3x400V	Black
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Neutral AC	Light blue
Power 230V AC	Black
Power 70V AC	Black
Control 5V DC	-
Control 24V DC	Dark blue
Control 0V DC	Dark Blue
External control	Orange
Ground	Yellow & Green
Wire types	Metric
Hardware components	Schneider
Transformer	3x400V AC

## Software

The software of the PALOMA-D2 is **GEMINI 3**.

Emphasis was placed on the development of the user interface and in particular on the ergonomics of use. The goal was to make adjustments on a high-technology machine of the most intuitive manner which is.



From this viewpoint, the integration of a three-dimensional sight of the machine makes the access to the parameters very easy. Moreover, a new emulation core allows carrying out adjustments on a virtual machine.

Access to the various parameters is now done via a 3-D representation of the machine. A single click on the representation of a robot or a conveyor directly displays the list of parameters of the concerning element. The 3-D sight may be swivelled and oriented simply by slipping the finger on the touchscreen. It is also possible to display the work volume as well as the authorized picking and placing zones for each robot.

During the operation of the machine, the 3D display is refreshed in real-time. It is thus possible to follow live all movements of the robots as well as detected products. It thus becomes very easy to target the origin of a possible problem. For example, if a product does not appear on the 3D sight, that certainly means a detection problem (sensor, vision). On the other hand, if this product appears and that the robot does not pick it, it is possible that it is located apart from the picking zone. It can easily be checked by displaying the working areas of the robots in the 3D representation.

The new emulation core makes it possible to carry out adjustments on a virtual machine with an ultra-realistic behaviour.

The robots movements' algorithms' are identical to those used to control a true machine. The virtual product in-feed can be parameterized in order to fit the best to the real conditions. It is thus possible to parameter and adjust a virtual production since a simple laptop. That gives the opportunity to the customer to create a new recipe without stopping the current production. It can thus optimize the picking strategies and test new adjustments without risks of crash of the robot. It is also possible to test in accelerated mode several hours of production, in order to know the efficiency of an adjustment. When the customer is satisfied with the result obtained in emulation, it is enough for him to use the production created in virtual mode on the real machine.

## Operation

All operators' activities are made in English or in the local language when required.

All software adjustments are made in English. This is due to the robot driver that it is in English. A technician for maintenance or to create new recipes has to understand English.

## Cleaning

The cleaning of the machine could be done by an industrial pressure washer. The PALOMA-D2 machine is washable with pressure up to 1.5 m high ingress protection IP65. Up is a splashproof area IP54. The cleaning liquids could be highly aggressive acids or bases (e.g. sodium hydroxide @ 5% pH12.5).

## Certifications

CE Certification	
• 98/37/CE	Relating to the safety of the machines
• 2004/108/CE	Relating to electromagnetic compatibility
• 73/23/CEE	Relative to the low power
• EN 60204-1	Electric component of the machines
• EN ISO 12100-1	Safety of the machines
• EN ISO 12100-2	

## Machine documentation

The documentation is an evolution of the standard Paloma documentation. The documentation has to take into account the modularity of the PALOMA-D2 machine.

The form of the documentation follows the standard **Bosch** templates.

The standard languages of the documentations are:

- English
- French
- German
- Spanish

## Patents, licenses

The PALOMA-D2 machine is using a license of the Schubert patent for the counterflow EP0856465 (5th of August 1998).

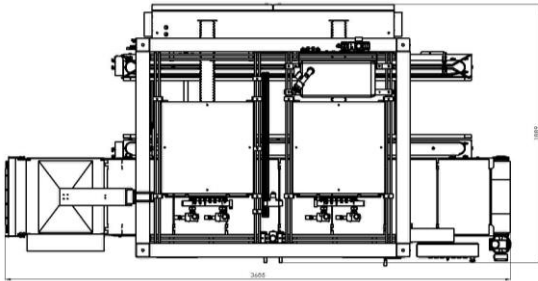
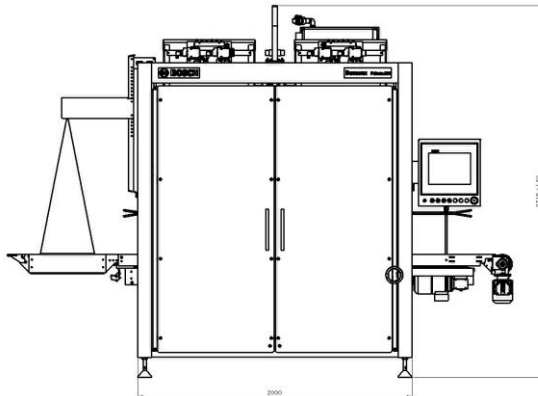


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Inspiring technology!

## Layout:

Paloma-2D /2R



Paloma-2D /3R

