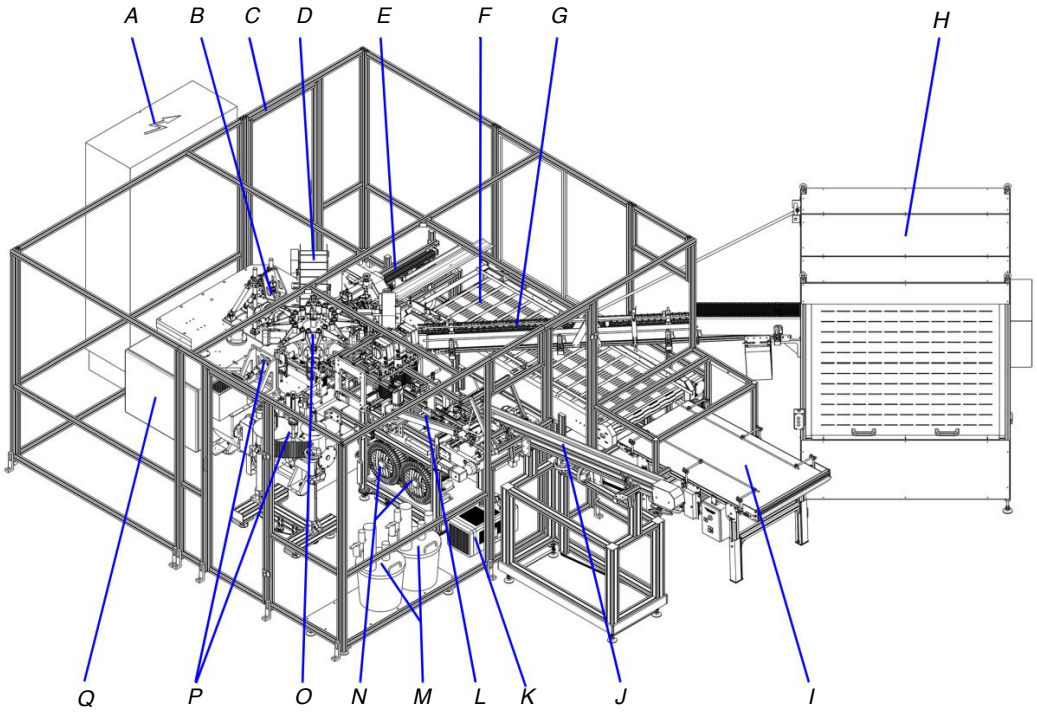
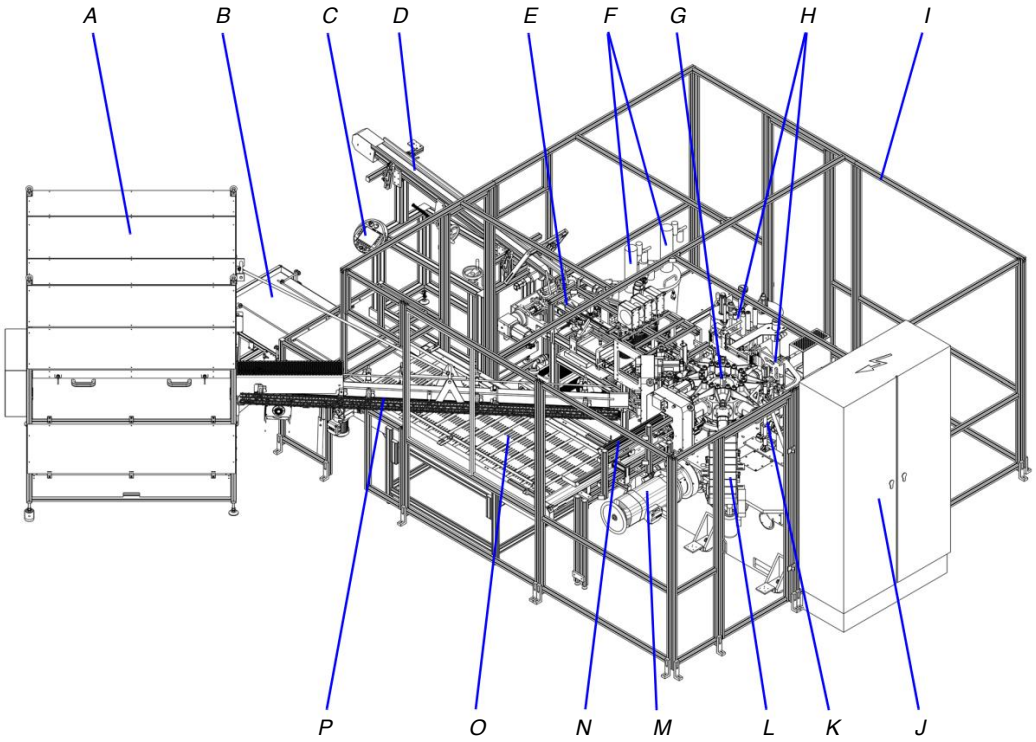
3. Machine description

3.1 Overview

3.1.1 3D views of the CBU-ISO

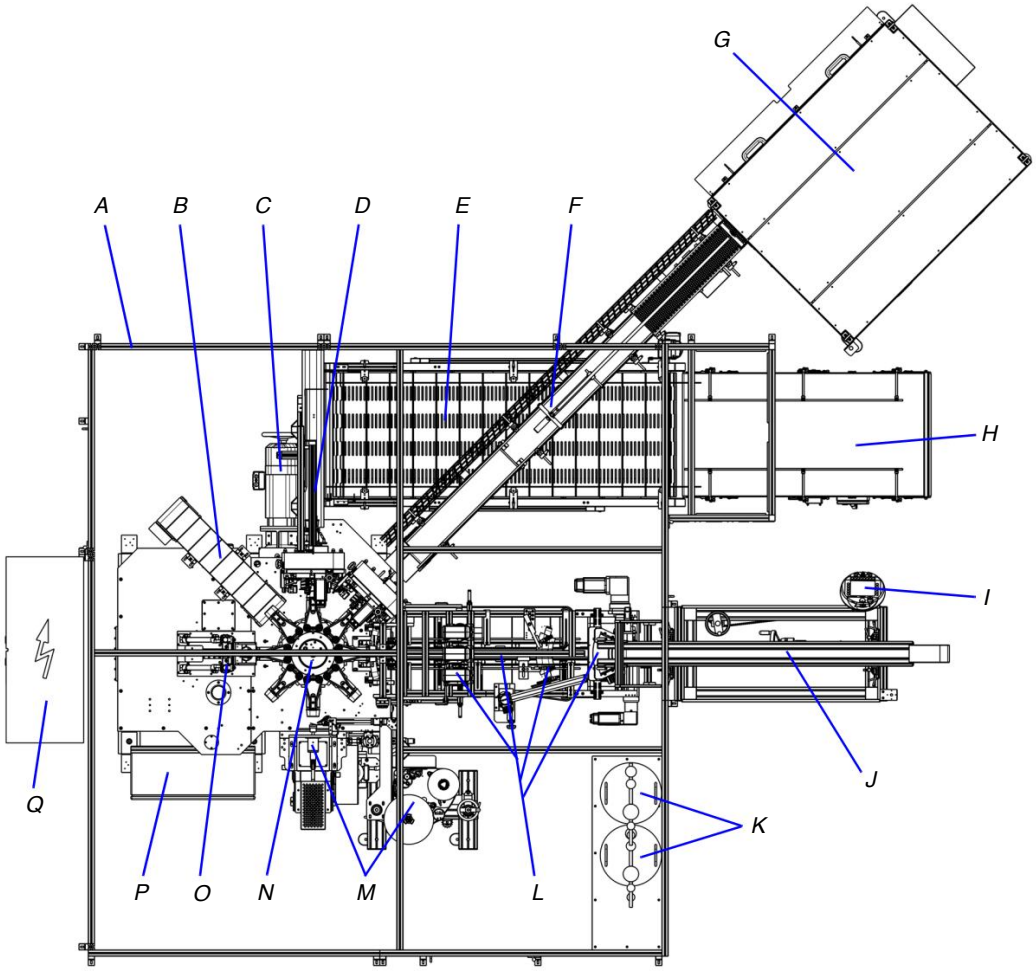


A control cabinet
B camera system
C protective housing
D conveyor belt for rejects
E counting and stacking unit
F conveyor belt stacking
G conveyor belt inlet feed
H Elevator (inlet storage)
I Removal conveyor for cup stacks
J ~~Long-term investors~~ Accumulator Infeed Conveyor for Blanks
K Vacuum pump (if equipped)
L ~~Cutting feeder with cutting magazine~~, vacuum belt, glue and hot air units
Blanks Feeder with Blanks Magazine
M cold glue pumps
N side channel vacuum pumps
O turntable / Turret
P labeling system
Q Connection cabinet ~~machine~~



A Elevator (Inlet Storage) Feeder
B Removal conveyor for cup stacks C Mobile Panel /Removeable Remote Controller
D ~~long-term investors~~ Blanks, accumulator Conveyor Feeder
E ~~cutting feeder with cutting magazine~~, vacuum belt, glue and hot air units Blancks Conveyor Feeder & Blanks Magazine Feeder
F Cold glue pumps G Turntable / Turret
H labeling system
I protective housing
J Control cabinet
K camera system
L conveyor belt for rejects
M Main drive motor with handwheel
N counting and stacking unit
O conveyor belt stacking
P conveyor belt inlet feed

3.1.2 top view



A Protective housing B Conveyor belt for rejects C Main drive motor with handwheel D Counting and stacking unit E Conveyor belt for stacking F Conveyor belt for inlet feed G Elevator (inlet storage) Feeder

H Removal conveyor for cup stacks I ~~Mobile Panel~~ Removeable Remote Control

J ~~Long-term feeder K~~ Accumulator Feeder for Blanks

~~Cold glue pumps L~~ K Cold Glue Tanks & Pumps

~~Cutting feeder with cutting magazine, vacuum belt, glue and hot air units M Labeling system N Turntable~~

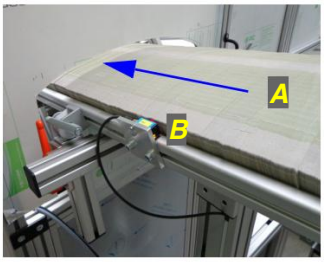
Blanks conveyor & Magazine, Vacuum Belt, Glue & Hot Air Drying Units M Labelling System N Turret

O camera system
P connection cabinet ~~machine~~
Q control cabinet

3.3 Functional description

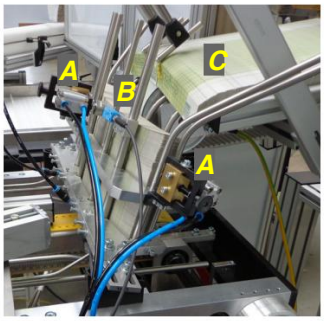
The functional description follows the material flow as far as possible.

3.3.1 production process



Blanks Accumulstor Feeder
The ' enables a continuous supply of the machine with Blanks cuts (A) by continuously refilling the cut magazine of the cutting feeder.

Accu,ulator Feeder
The fill level of the [redacted] is monitored with a light sensor **(B) .** If the level falls below the minimum level, a demand message is sent on the mobile panel and the signal light flashes yellow.

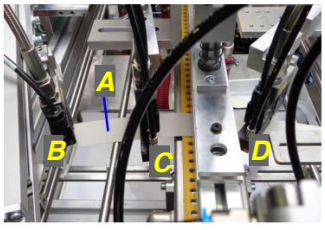


Blanks **magazine**

The blanks that are used directly are located in the blank magazine. The bottom blank is removed from the magazine by suction cups and placed on a vacuum belt. Separating air pipes support this process

To ensure that the blanks have a defined position when removed, the stack of blanks in the magazine is aligned by two Guides (A)

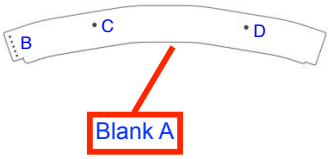
The fill level of the magazine is monitored by a light sensor **(B) .** If the minimum level is not reached, the magazine is refilled by the Accumulator Feeder (B)



glue nozzle side seam (B)

The vacuum belt transports the blank **(A)** under three glue heads **(B, C** and D).

Blank
The vacuum belt stops. The left edge of the [redacted] is under the "side seam" glue nozzle. The "side seam" glue nozzle is moved over the [redacted] A defined line of glue (glue dots) is applied to the [redacted] Blank Blank

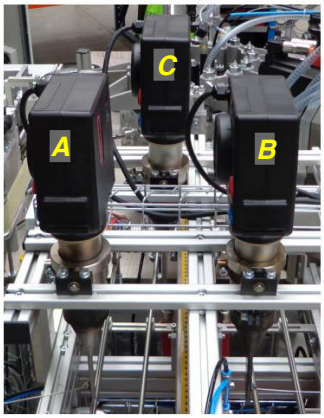


Glue nozzle securing point 1 (C)

Blank
The [redacted] is provided with a glue dot to the left of the center for attaching to the inlet.

Glue nozzle securing point 2 (D)

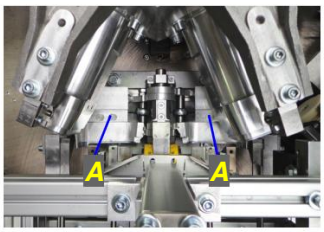
Blank
The [redacted] is provided with a glue dot to the right of the center for attaching to the inlet.



hot air nozzles

The Blank is then transported under two heaters **(A** and B). The vacuum belt stops and the glue points on the side seam and securing point 2 are pre-dried.

During the next machine cycle, the vacuum belt stops under the third heater **(C)** and the securing point 1 is pre-dried.



opened locking shells

locking shells

The vacuum belt transports the blank further for transfer to the locking trays **(A)** (machine table). A pneumatically controlled sliding mechanism (segment drive) transfers the blank from the feeder to the locking trays.

The closing shells form the blank around the inlet previously provided from the elevator and placed on the forming cone (see inlet feed). The side edges of the blank are placed on top of each other in such a way that the side seam is formed by pressing the closing strip.

The two glue securing points glue the Blank to the long sides of the inlet.

molding cone and locking strip

Immediately after the blank has been formed into the cup shell by the closing shells, the closing strip is pressed onto the forming cone and provides the necessary pressure to create the side seam.

The locking shells open again while the locking bar remains pressed to give the side seam enough time to bond. The locking bar is only raised again when the bad cup is ejected.

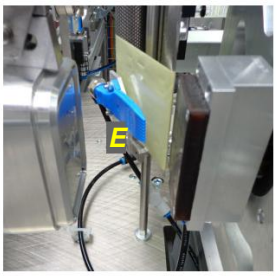
The cup is now moved station by station on the turntable. / Turret

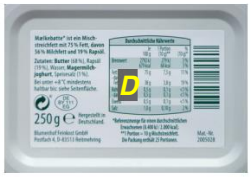
empty station

no processing

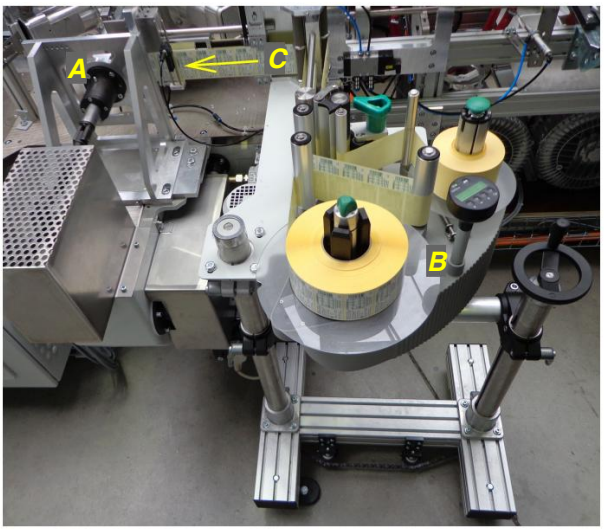
Label

After the emptying station, a label is attached to the bottom of the cup.





label example



On the labeling tool **(A),** a label is removed from the carrier tape **(C)** via the labeler/ Dispenser **(B)** and pressed onto the bottom of the cup with a forward movement of the tool (D).

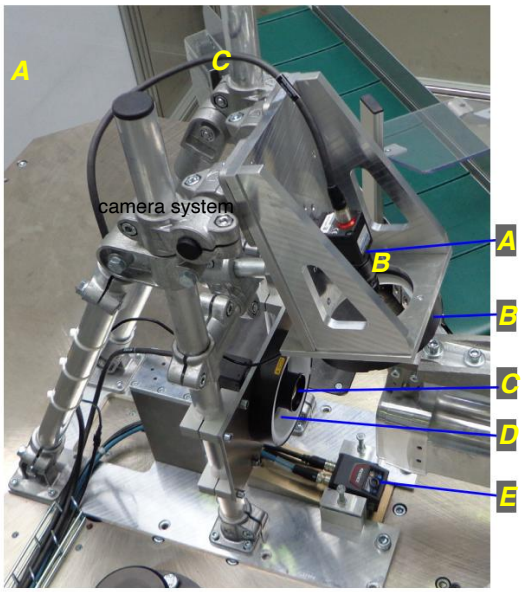
This process is supported by a vacuum to hold the label to the tool and a fan nozzle **(E)** which does not allow the peel angle of the label to become too large when separating from the carrier tape.

brush strip

In the next cycle, the label is brushed onto the bottom of the cup again using a brush bar **(A) .** This ensures that all edges of the label are in contact with the bottom of the cup.

quality control (camera image evaluation)

Two cameras and a barcode reader are used to control the labeling and gluing of the [redacted] Blanks



When the cup is in front of the camera setup, several checks are performed.

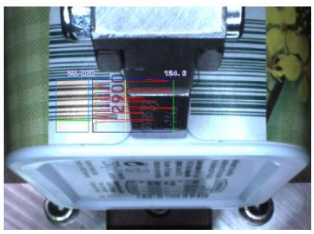
First, data collection:
- Barcode reader **(E)** reads the lower barcode.
- Camera 1 **(C)** captures the label on the cup bottom and the barcode.
- Camera 2 **(A)** records the overlap of the ~~cut (gluing~~ of the Blanks (gluing) ~~ung)~~ and the upper barcode.

Both cameras are supported by high-performance LED lamps to increase contrast when taking pictures.

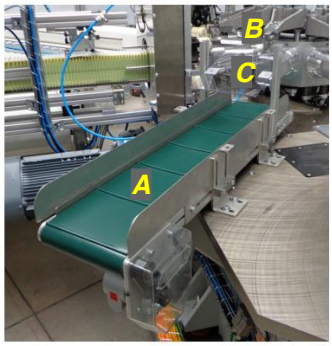
The images captured by the cameras and the barcode read by the barcode reader are evaluated and compared with references.

If this evaluation results in, for example, an unreadable barcode or a Blank that has been stuck on "crookedly", an ejection signal is generated for the next station.

Examples of image analysis



bad cup ejection

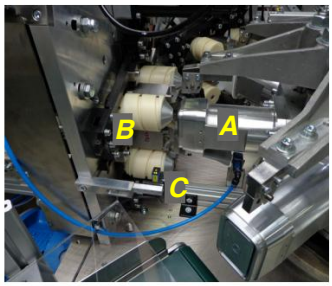


Turret
With the next machine cycle, the ~~turntable~~ brings the cup in front of the reject conveyor belt (A).
The cam disc under the turntable moves the closing bar **(B)** upwards away from the side seam, thus enabling the cup to be blown off the cone.

If an ejection signal is present from quality control, the cup is pneumatically blown from the forming cone **(C)** onto the reject conveyor belt.

If there is no ejection signal, the cup is transferred to the counting and stacking unit during the next cycle.

cup transfer to counting and stacking unit

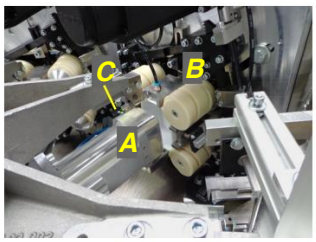


After the next machine cycle, the cup that has been deemed good is ready for cup transfer.

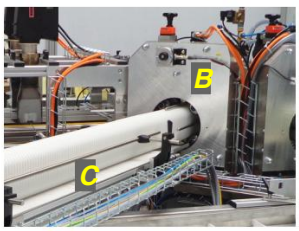
Here, the cup is pneumatically transferred from the forming cone **(A)** to a 4-fold screw ~~conveyor~~ **(B) ,** which passes the cup on to the counting and stacking unit.
Product Nester

A sensor **(C)** (light barrier) monitors the transfer. If the cup remains on the mold cone, the machine is stopped.

inlet feed



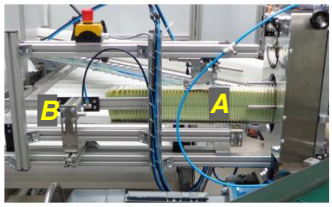
The following machine cycle brings the recently emptied mold cone **(A)** in front of the inlet feed.
Denester denested Products
Here, a 4-screw ~~conveyor~~ **(B)** brings ~~an inlet~~ to the mold cone for transfer. A vacuum holds the ~~inlet~~ on the mold cone.
Product



The correct position of the inlet on the mold cone is determined by a Sensor **(C)** detects, in case of error the machine is stopped.

Products
The ~~inlets~~ are transported to the 4-screw conveyor via a feed belt (C), which is continuously filled with ~~inlet rods~~ from the elevator. Pneumatics support the transfer of an ~~inlet~~ into the 4-screw conveyor.
Product Stacks
Product Stack

counting and stacking unit

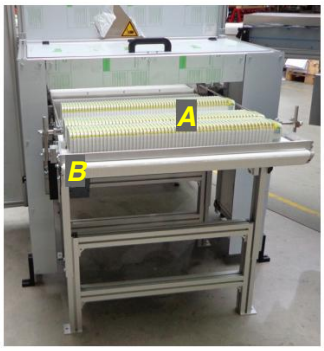


The finished cups are pushed together into a compact stack of cups **(A)** and counted.
Once a set number of cups has been reached for a stack, it is separated and ejected onto the stacking conveyor belt via an ejection cylinder **(B) .**

stacking

The finished cup stacks are transported to the removal belt by the stacking conveyor.

output of the cup stacks



The cup stacks **(A)** fall onto the cup stack removal belt (B) at the end of the destacking conveyor belt. The belt transports the cup stacks out of the area of the protective housing for removal by the machine operator.

Production monitoring with machine stop in case of malfunctions

The machine is equipped with a monitoring system that immediately switches off the machine if there are any disruptions in the production process.

Notice

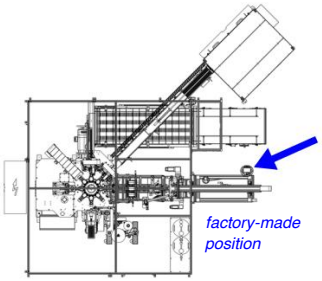
If an electrical malfunction occurs on the machine, the responsible electrical technician must be informed.
The circuit diagram of the CBU-ISO is located in a storage compartment on the inside of the left control cabinet door.

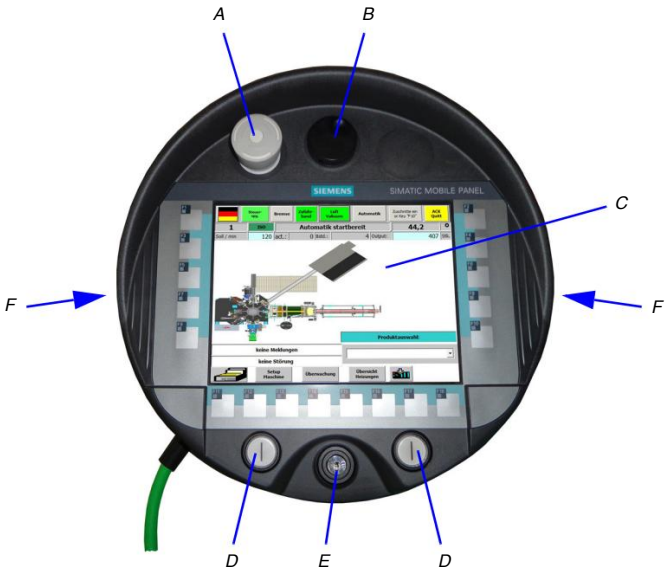
The circuit diagram is also stored in this documentation.

3.3.4 Mobile Panel (mobile control unit) Remote Control

The machine is operated using the mobile panel.

A holder is attached to the long-term feeder for storing the mobile panel.





*A **emergency stop** push button*

B Rotary knob (without function)

C graphical user interface (HMI)

D Two-hand control switch (x2)

E Key switch (operating modes)
left: automatic operation right:
manual operation
Middle position: no operating mode
Key can be removed here

F Two-hand control switch (x2)

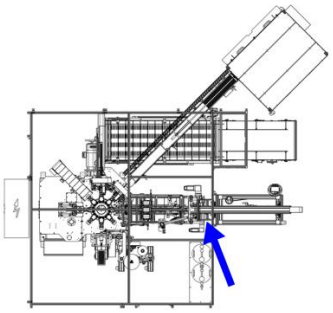
The mobile panel contains the control elements necessary to operate the machine and the graphical user interface (HMI - Human-Machine Interface).

3.3.7 Vacuum supply

when equipped

A vacuum pump **(A)** ensures sufficient vacuum supply for the ~~cutting~~ Blanks magazine (suction cup), turntable (cone) and labeling system.
Turret

vacuum pump V-VTN 41



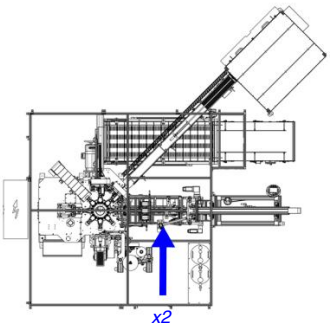
similar image

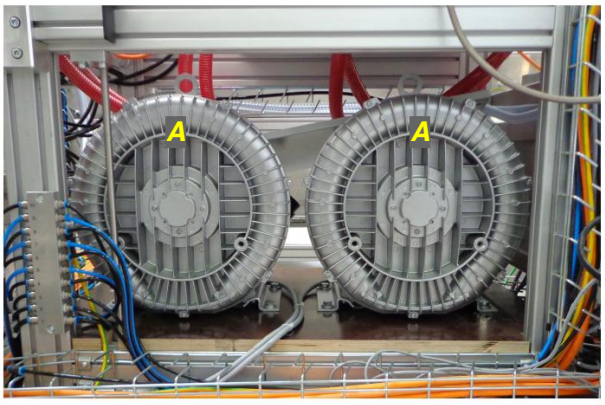
Notice

See supplier documentation for further information regarding the vacuum pump.

Two side channel vacuum pumps **(A)** supply the ~~cutting~~ Blanks conveyor belt with sufficient vacuum.

side channel vacuum pump 2BH16





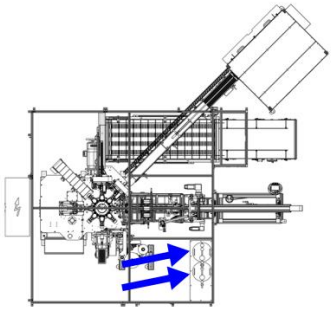
Notice

See supplier documentation for further information regarding side channel vacuum pumps.

3.3.8 cold glue pumps

Two cold glue pumps **(A)** supply the three glue application heads on the Blanks ~~cutting~~ feeder.

adhesive feed unit KFE-EKP6-MEP



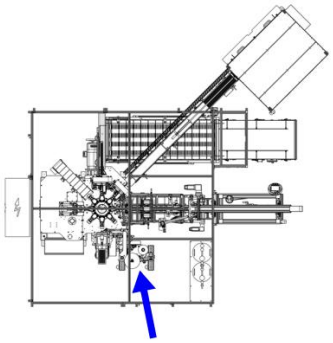
Notice

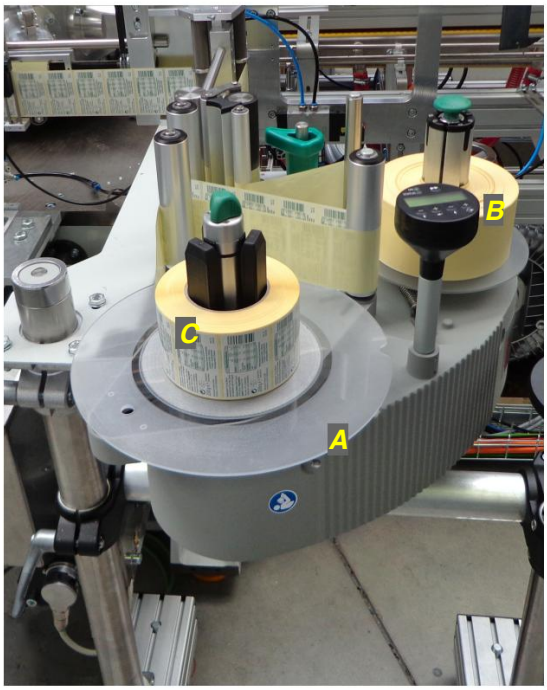
See supplier documentation for further information regarding the adhesive feed unit.

3.3.9 labeling

The machine has a labeling unit that places a label on each cup bottom.
The labels are on a paper carrier roll. The label tape is guided past the labeling tool and dispenses one label at a time.

labeler ALS 256 RH





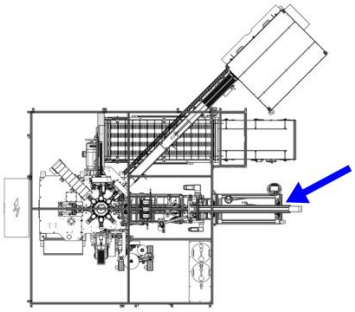
A labeler ALS 256 RH
B control unit
C Carrier roll with labels

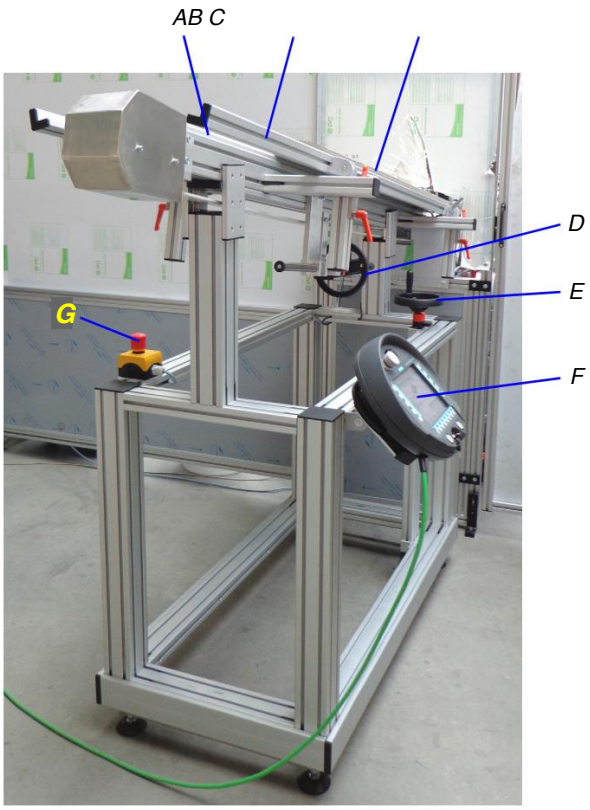
Notice

See supplier documentation for further information regarding the labeler.

3.3.10

Accumulstor feeder supplies the machine with Blanks and ensures continuous production.

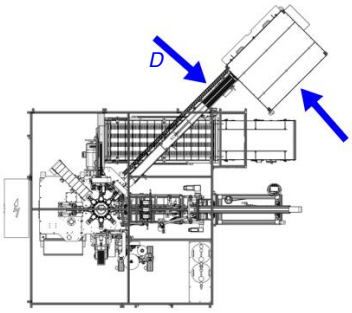




A conveyor belt
B Blank guides (adjustable)
C inserted blanks
D Longitudinal adjustment
E height adjustment
F Mobile Panel
*G **Emergency stop** switch*

3.3.11 elevator (inlet storage)

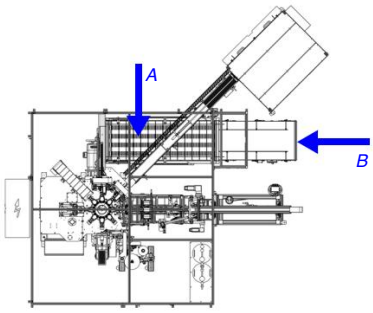
The elevator supplies the machine with the ~~inlets~~ Blanks and ensures continuous production.



A inserted inlet stack
B roller shutter
*C Elevator control panel with **emergency stop** switch*
D Intet feed belt (machine feeding)

The elevator is filled by the operator with inlet stacks **(A) .**
The inlet stacks are transported further inside the elevator via the endless transport.
If required, a complete stack is pushed onto the inlet feed belt **(D) .** This transports the inlets to the 4-screw feeder of the machine.

3.3.12 cup stack dispenser

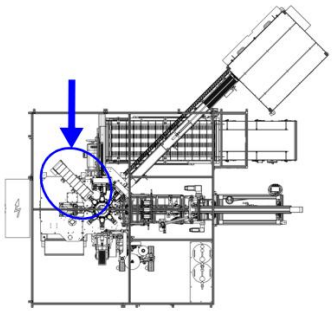


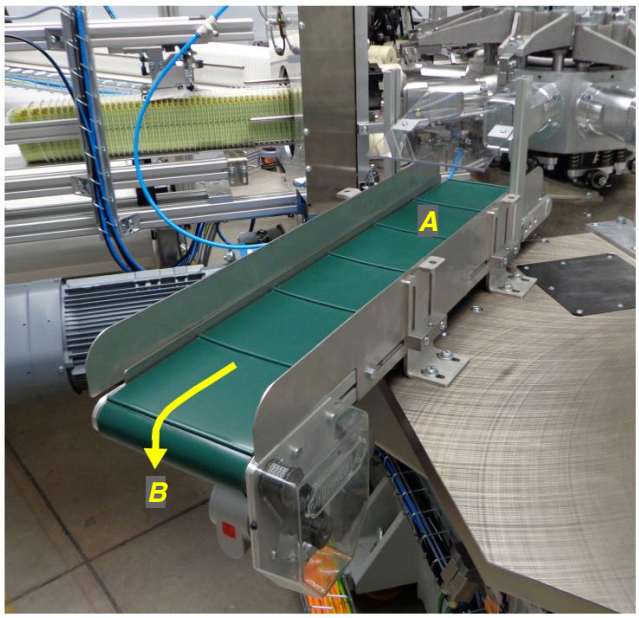
The finished cups are transported to the counting and stacking station via a 4-screw conveyor. Here the cups are assembled into a continuous stack.

A counter records the required number of cups for a finished stack. The finished stack is separated and ejected onto the destacking conveyor belt **(A) .**

The ~~de~~stacking conveyor belt transports the cup stacks to the discharge conveyor (B). The cup stacks fall onto
the removal belt and are transported to the front for removal.
ported.

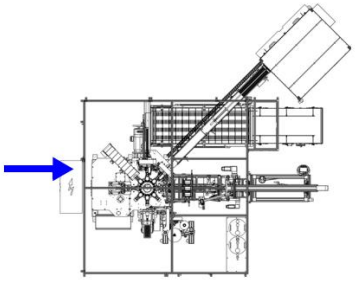
3.3.13 (reject) ejection

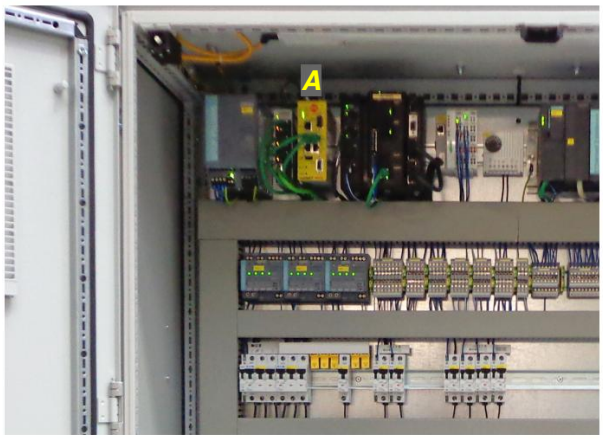




The cups identified for sorting via camera evaluation are blown out onto the reject conveyor belt **(A)** and transported to a collection container (provided by the operator) inside the protective housing (B).

3.3.14 Modem connection

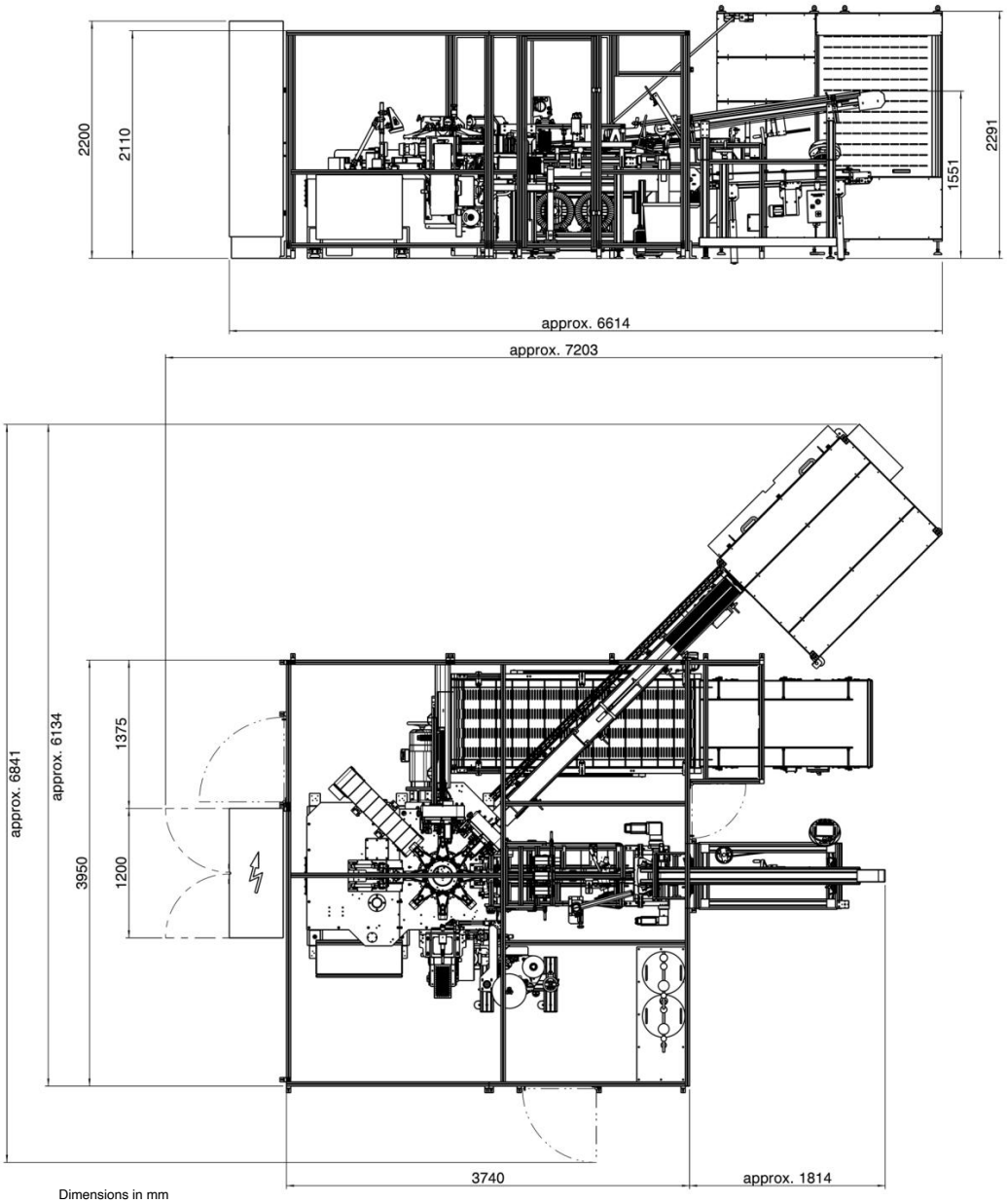




To establish a secure and reliable Internet connection for "remote maintenance" of the machine, an MBNet system **(A)** is located in the control cabinet.

3.7 Technical data

3.7.1 Dimensions



Dimensions in mm

approx. = ca.

3.7.2 Intended place of operation

Operating site conditions:

- ÿ 1000 m above sea level, otherwise larger vacuum pumps or blowers may be required.
  If the machine is to be installed at an altitude of more than 1000 m above sea level, please contact Weyhmüller Verpackungs-technik GmbH.
- relative humidity during operation from 30% to 70%
- Operation in dry environments
- Temperature range: +10 °C to +40 °C

3.7.3 Weights

machine	approx. 3200 kg
Additional components:	
- protective housing	approx. 350 kg
- control cabinet	approx. 290 kg
- Elevator with conveyor belt inlet feed	approx. 750 kg
- conveyor belt stacking	approx. 150 kg
- Cup stack removal belt	approx. 80 kg
- long-term investors	approx. 270 kg
- [redacted] Blanks Feeder	approx. 250 kg
- labeling system	approx. 90 kg

3.7.4 Floor load (machine)

surface pressure	2 N/mm²
floor load	20500 N/m²

3.7.5 Connection values

Electrical connection

Notice

Check the connection values **before** connecting the machine.

For voltage, frequency and current, see type plates on the control cabinet or on the machine

Tension	400 VAC, 50/60 Hz
rated current	60 A
backup fuse	3 x 63 AT
power consumption	approx. 30 kVA
control voltage	24 VDC

compressed air connection

compressed air	min. 6.5 bar
air consumption at 6.5 bar	approx. 1300 l/min
hose diameter	1/2"

3.7.6 Capacity

Accumulator Feeder for Blanks

- Recording length for [redacted] Blanks	approx. 190 cm
elevator	
- Length of ~~inlets per compartment~~ the Stacks per Elevator Tray	approx. 145 cm
removal conveyor for cup stacks	
- Length of the finished cup stacks	max. approx. 73 cm

3.7.7 production output

Up to 120 cups/min, depending on the quality of the materials.

3.7.8 emission value and protection class

noise measurement

Noise measurement carried out according to:

DIN EN ISO 3745 and 11202

emission value

The workplace-related emission value is **85** dB (A).

Measurement and installation conditions:
in mechanical workshop

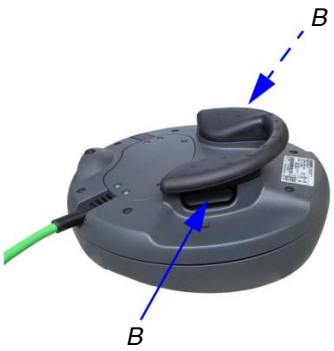
Operating conditions:
120 cycles/min

Measuring

location: 1 m from the jetty, height 1.6 m

protection class

The machine is built according to protection class IP54.



Example -Handling-

6 Press one of the switches **(B)** on the back of the Mobile Panel **and** one of the switches **(C)** together.
(A beep will sound 3 times before the machine starts after a short delay.)

The machine runs as long as the "two-hand activation" is held!

Notice

Frequent machine starts in a short period of time can lead to heating and subsequent shutdown of the main drive motor.