

Confirmation of order

Layout: / Your order dated: / Ultimate buyer:

Production Line for max. dimensions 2,70 x 4,00 m

1. Technical Data

General specification

Input glass size	min.	190 x 350		[mm]		
	max.	2700 x 4000		[mm]		
Glass thickness	min.	3		[mm]		
	max.	15		[mm]		
Vertical glass transport height		500 +/- 20		[mm]		
Horizontal glass transport height		850 +/- 20		[mm]		
Weight of insulating glass units		max. 1000 kg resp. 250 kg/m				
Inclination of the production line		6 degrees				
Direction of travel		left to right				
Unit setting		metric				
Machine colours		Bystronic Design RAL 7035 RAL 5015				
Purchaser supplies	Power	Voltage	3 x 400 V / 50 Hz			
		Voltage variations	+6% to -10%			
		Grounding system (IEC 60364-1)	N + PE (TN-S)			
	Air pressure	Connection	G 1			
		Pressure	6.5	[bar]		
		Solids and max. oil content	Class 3			
		Water dew point	Class 2			
	Water	Raw water pressure	4.5	[bar]		
Ambient temperature	min.	15		[°C]		
	max.	35		[°C]		
Relative air humidity	max.	75		[%]		
Plant cabling	Cable		Cable ducts		Cable duct support	
	Delivery	Installation	Delivery	Installation	Delivery	Installation
	Supply line -> Cabinet	Customer	Customer	Customer	Customer	Customer
	Cabinet -> Machine	Bystronic	Bystronic	Bystronic	Bystronic	Bystronic
Machine -> Machine	Bystronic	Bystronic	Bystronic	Bystronic	Bystronic	Bystronic
Requirements for processing glass plates						
Processable glass types		Float, toughened glass, laminated glass, patterns (only partially possible; depending on glass surface and position of the structure)				

Flatness tolerance of glass plates	Deviation from ideal plane of the entire glass plate may not exceed 2 mm. Greater deviations can lead to disturbances to the job routing and require a functional intervention from case to case through the operating personnel.
Cutting tolerance of glass plates	+/- 0,5 mm A glass plate congruence of +/- 0,5 mm must be both with shapes and with rectangular formats guaranteed.
Laminated glass	preferably rectangular sawn or ground, no overhanging foils
Glass edges	cut, without bevels
The production line is suitable for the manufacture of	Double and triple insulated glass units (rectangular, congruent) according to Lenhardt's specification. Shaped i. g. units (congruent) according to Lenhardt's shape catalogue. One up to four sided stepped double insulating glass units according to Lenhardt's specification. Automatic gas filling of double insulating glass units according to Lenhardt's specification. Automatic gas filling and sealing of triples and stepped double insulating glass units – possible with additional equipment – according to the following specification.
Machine layout	Machine layout plan no. 10099288.20
Conveyor speed	Two stage, V = 24/48 m/min. The transport speed is manually pre-selectable.
Detailed information about the individual machine please see in chapter "Scope of delivery"	

Documents / Language

Labeling on the machines		
Messages on the machinery displays		
Operation manuals		CD-ROM + Print out
Spare parts catalogue	German, English, French	CD-ROM (will be supplied approx. 3 weeks after acceptance)
All other documents	German/English	Print out

Insulating glass units with metallic spacer

Processable dimensions (h x l)	min.	190 x 350	[mm]
	max.	2700 x 4000	[mm]
Thickness of insulated glass units		12 to 60	[mm]
Glass thickness		3 to 15	[mm]
Spacer frame widths		6 to 24	[mm]
Distance from glass edge to spacer outside:	2 to 20 mm stepless adjustable		
Processable spacer frame profiles	Standard Aluminium-, steel- or plastics profiles can be utilized, if the strength of these profiles is designed for a press-force of at least 50 Newton per cm.		
Shapes	In accordance with the Lenhardt shape catalogue LENEX SOLO 0707		

Special note for the glass plate washing machine

Processable dimensions (h x l)	min.	190 x 350	[mm]
	max.	2700 x 4000	[mm]
Glass plate thickness		3 to 15	[mm]
Transportation speed	4 to 12 m/min. variable; depending on glass plate thickness and properties of glass plates to be washed		

Special note for the assembly-, gas fill- and press robot

Processable dimensions (h x l)	min.	190 x 350	[mm]
one step pressing	max.	2700 x 3500	[mm]
two step pressing	max.	2700 x 4000	[mm]
Thickness of the front-sided glass plates with automatic gas filling	max. 15 mm (Floatglass) max. 16 mm (Laminated glass)		
Shaped units	The IG units must have a right angle between the leading edge and the bottom edge resp. between the trailing edge and the bottom edge during the positioning run-in sided within the tandem press. The height of the vertical edge must have at least 190 mm and the length of the bottom edge been at least 350 mm. The radius at the leading and/or trailing edge at the bottom edge is permissible to a maximum of 100 mm.		
Processable gases	Argon		
Gas filling rate	90 %, subject to the use of tight spacer		
Triple insulating glass units	<p>Restrictions for metallic spacer:</p> <ul style="list-style-type: none"> The total thickness of the already assembled first double unit is <u>26 mm</u> and the max. thickness of the intermediate glass plate is <u>6 mm</u>. In case of thicker intermediate glass plates, only one chamber of the triple i. g. unit can be filled with gas. 		

Special note for the sealing robot

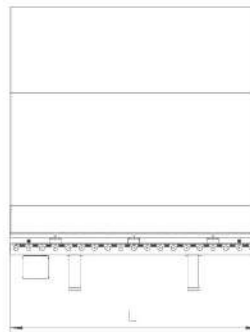
Processable dimensions (h x l)	min.	190 x 350	[mm]
	max.	2700 x 4000	[mm]
Thickness of insulated glass units		12 to 60	[mm]
Glass thickness		3 to 15	[mm]
Spacer frame widths		6 to 24	[mm]
Distance from glass edge to spacer outside:	2 to 20 mm stepless adjustable		
Sealant	Commercial 2-component sealant; proved quality for automatic sealing. For the processing of the sealant the minimum temperature of the material should be 15° C in consideration of the processing instructions given by the sealant manufacturer.		
Spacer frame profiles	Aluminium, plastic or steel profiles with flat profile back, height and form has to be uniform for all spacer widths, proved market quality suitable for the automatic sealing.		
Sealing speed	depending on the property of the used sealant and on production parameters		
Sealing depths/cross-section	2 mm up to 6 mm		
Edge displacement of glass plates of i. g. unit	+/- 1 mm		
Mixing ratio, adjustable by volume	from 100:6 till 100:14		
Sealing of stepped double i. g. units, rectangular	manually		
Dimensions of drums to be used for sealing robot			
200 l drum A-component	Container with Cover – DIN 6644 D1.3 or 1.4		
20 l drum B-component	Container with Cover – DIN 6644 D3.1		
Possible sealing depths depending on spacer widths for sealing with 2-component sealants	Spacer width		Sealing depth
	6 mm		max. 5 mm
	8 mm		max. 10 mm
	9 mm		max. 10 mm
	10 mm		max. 12 mm
	11 mm		max. 12 mm
	12 mm		max. 15 mm
14 mm		max. 15 mm	
16 mm		max. 20 mm	
These figures refer to standard 2 part sealants where we have respective experience.			

Special note for the one to four sided stepped double insulating glass units

- Only double insulating glass units (rectangular) are processable. Shaped units have to be in accordance with the Lenhardt reference book **LENEX QUATTRO 0707**. Shape geometries deviating from this cannot be processed.
- Displacement on bottom edge 0 – 50 mm.
- Displacement on leading and/or trailing and/or top edge 0 - 250 mm.
- The spacer frame has to be laid onto the smaller (rear) second glass plate. The larger glass plate has to be always the front one, otherwise automatic sealing is impossible.
- For the sealing of stepped double insulating glass the units are taken off of the line after the press robot and sealed manually.
- The maximum length of the smaller second glass plate is limited by the length of the press plates of the assembly-, gas fill- and press robot.
- Large and heavy insulating glass units have to be supported on bottom edge with suitable lifting devices when taking-off from the line. For stepped units the supporting unit has to be adapted to the bottom edge displacement and supporting blocks have to be used on the glass transport racks as well.
- Suitable lifting devices and transportation racks are not included in the supply volume. They have to be provided by the customer.
- The automatic gas filling of stepped double insulating glass units with the assembly, gas fill and press robot is possible.

2. Scope of delivery

Pos. 1 Conveyor station, vertical, airfloat design Type TB - LK - V - .
for transport of glass plates and insulating glass units without areal touching the support wall



- Modular system multi purposing, for integration in insulating production lines, easy adaptation to multiple functions by modular additions
- Basic design with one drive, prepared to add optional features
- Safe and reliable buffering of glass elements by separating in independent transport segments, occupancy monitoring by sensor system connected with production line control
- Non-contact transport by air-cushion support, no roller prints
- Effective air cushion, slot-shaped, air nozzle arranged at the bottom edge of support wall avoids draught
- Air cushion is created with filtered air by blower
- Smooth support wall surface without chafing points preventing accidents, easy to keep clean
- Drive of transport rollers by friction for gentle transport and less roller wearing
- Subsequent change of drive- /buffer segments and arrangement of drive units as well as drive direction is possible
- Transport level height: 500mm +/- 20 mm

1084M0501 Conveyor- and buffering station, vertical, airfloat design

1 piece H=3200 mm L=3710 mm T=700 mm Tlk=500 mm
Pel: 1,4 kW weight.: approx. 700 kg

Type	TB	LK	2,70	3,70	V				
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Pos. 1.1

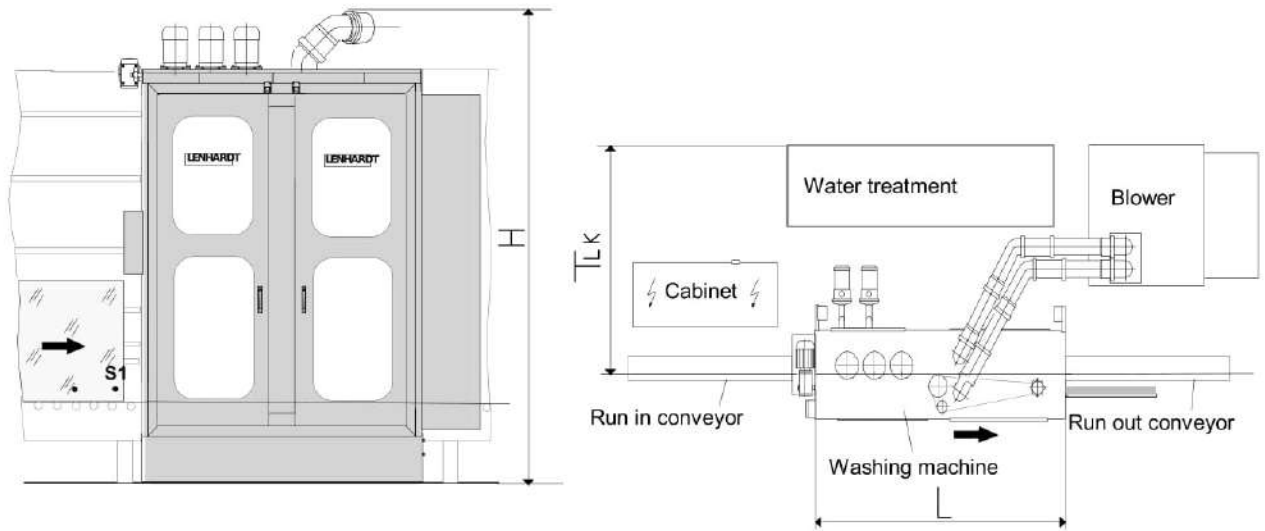
732Z0501 Special design as run-in conveyor for washing machine (PVC),
1 piece Length 3700 mm

Support wall made of PVC
All direction rollers
Air valve

Pos. 1.2

921Z0503 Foot switch, transport start ⇔ stop
1 piece

Pos. 2 Glass plate washing machine, Type GW-D
for continuous cleaning and drying of glass plates



Basic design without inspection lites

- Compact, efficient glass plate washing machine
- Chainless brush- and transport drives outside of the machine, easy accessible
- Synchronous drive of vertical transport shafts for slip- and distortion-free glass plate transport
- Stepless adjustment of transport speed
- Continuous cleaning of different glass plate thickness
- 3 separate brush drives
- Alternating brush rotation directions for optimum cleaning results
- Symmetric design of brush shafts, bilateral suitable
- Maintenance-free, waterprotected bearings
- Brush drives, waterpumps and air blower are automatically switched-off, if production is interrupted
- Air knife design blower-nozzles for optimum glass plate drying
- Machine housing completely made of stainless steel, drying zone with sound protection
- Environmentally beneficial, energy saving water-circuit system by separated washing- and rinsing-zones
- Basic design for 2-circuit water system
- Water-tank with heater integrated in machine housing
- Inspection windows in front doors -optional-

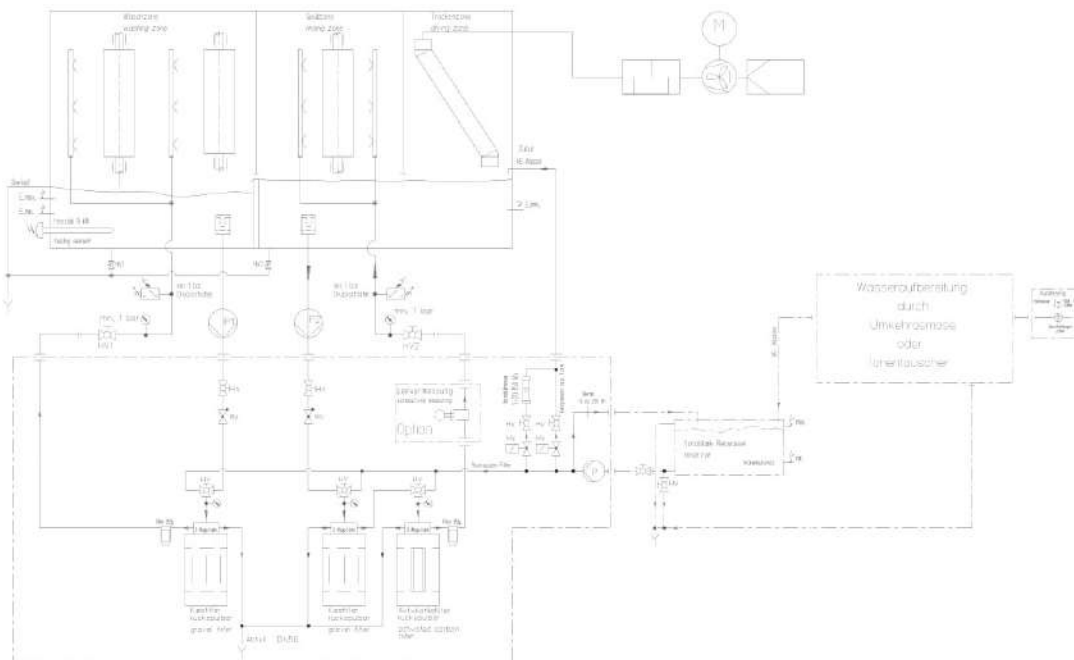
451M03 **Glass plate washing machine, 2,70m**
1 piece *Glass plate thickness: 3-15 mm*
processing dimensions: 100x300 mm up to 2700 mm operating width
H=4080 mm L=2280 mm Tlk=2600 mm
Pel:app.34 kW (with heater) pneu: 6bar, R¼
weight:2870 kg (with blower and control cabinet)

Type	GW	D	2,70	V	3B15		
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Note:

All brushes equipped with bristles diameter 0,2 mm.

Pos. 2.1 Pure water circuit plant, for glass plate washing machine Type GW D, 2-circuit cascade system



*2- circuit pure water plant, for washing machine type GW D,
conductivity meter - option-*

1325Z04 **2- circuit pure water plant, for washing machine Type GW D**
1 piece **cascade system**, layout 332974, configuration:

washing zone:

- gravel filter, backwashable

rinsing zone:

- gravel filter, backwashable
- carbon filter, backwashable
- pump for the supply of clean water

water supply fittings

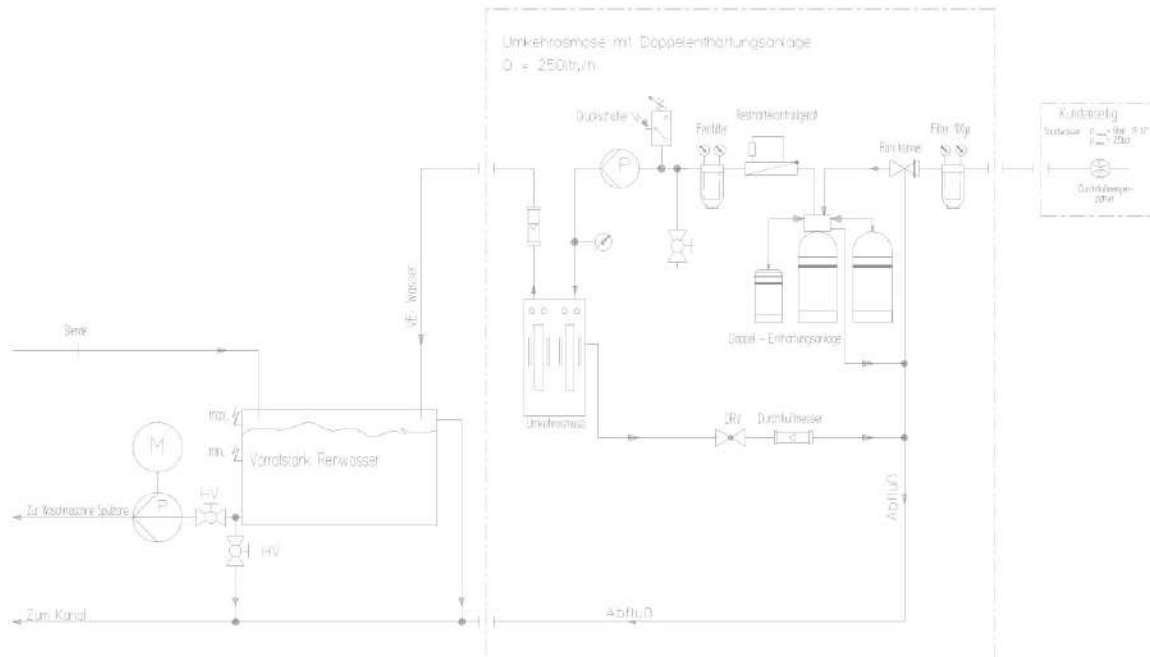
- flow meter
- hand valve
- 2 x magnet valves
- throttle for pure water reservoir

stainless rack

LxWxH approx. = 1600 x 810 x 1810 mm

Pel. ca. 0.15 kW weight.: approx. 320 kg

Pos. 2.2 Reverse osmosis plants for water circuit systems with cascade mode or for the connection to a system of other make



Reverse osmosis plant HP 250 KR for washing machine Type GW

1303Z04 Reverse osmosis plant HP 250 KR for washing machine Type GW

1 piece Layout 333230, configuration:

- reverse osmosis system HP 250 KR
 - nominal permeate output 250 l/h
 - diaphragm material PA-PS
 - desalting rate 97 - 99.5%
 - max. yield 75%
- double water softening device
- control unit for residual hardness
- pipe separator
- prefilter 100 µm
- finefilter 10", mesh width 5 µm
- control system
- stainless rack

LxBxH approx.=800 x 710 x1700 mm

Pei. approx. 0.55 kW weight approx. 160 kg

Pos. 2.2.1

840Z04 **Reservoir 2000 ltr.** for storage of full demineralized pure water
1 piece with level control device
material: PE, impervious to light, inspection hole: \varnothing 350 mm
dimensions: 2070 x 1690 (+ 150 mm *fittings*) x 720 mm

Pos. 2.3

476Z0302 **Monitoring device for coated glass plates with conductivity testing of
the coated side prior to it going to the washing machine**
1 piece
The coated glass plate is stopped automatically in the area of the monitoring device before reaching the washing machine. Conductivity testing carries out the subsequent checking of the coated glass plate, which registers exclusively metallic conducting coatings.
The monitoring device is linked via software to the control of the washing machine. Thus the right sequence is monitored during feeding of the coated glass plates to the washing machine. If an incorrect feed occurs an error message appears and the production process is interrupted.

Pos. 3

1084M0501 Conveyor- and buffering station, vertical, airfloat design
1 piece H=3200 mm L=3710 mm T=700 mm Tlk=500 mm
Pel: 1,4 kW weight.: approx. 700 kg

Type	TB	LK	2,70	3,70	V				
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Pos. 3.1

851Z0503 Conveyor subdivision for additional buffer zone,
1 piece price per additional segment incl. drive

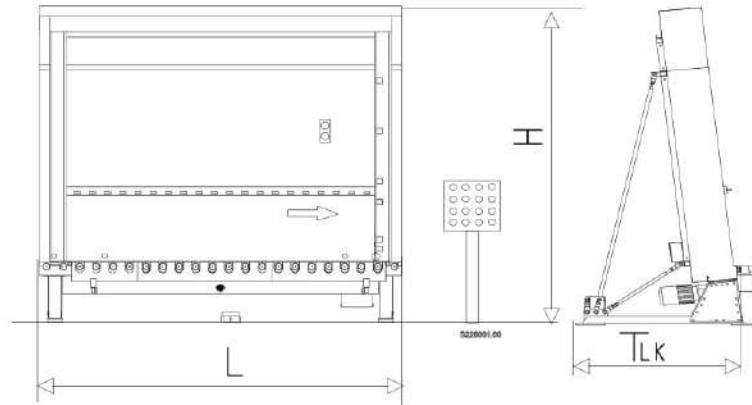
Pos. 3.2

852Z0503 Frequency converter for stepless adjustment of transport speed,
1 piece Pmax. = 1 kW

Pos. 3.3

849Z0503 Horizontal frame positioning girder with quick adjustment of
1 piece frame setback 0-25 mm

Pos. 4 Inspection and manual frame positioning station, Type VR...
 for visual inspection of glass plates and for manual positioning of butyl coated metal spacers, with integrated indirect lighting in vertical movable pedestal roller girder.



- Total visual surface monitoring of glass plate, supported on upper and lower edge only
- Contrastive lighting of inspection area for effective and quick glass plate control
- Automatic adjustment of vertical movable roller girder
- Non-soiling glass plate transport
- Program controlled vertical- and horizontal frame positioning girder for quick and exactly application of butyl-coated metal frames
- Automatic adjustment of frame positioning girder according to present glass thickness
- Quick adjustment for frame setback
- Operation-programs for double- and triple-insulating units
- Manual adjustment of movable roller girder for shaped glass plates
- Start/stop control of transport by foot switch
- User guiding by coloured signal-lights
- Additional non glaring lamp

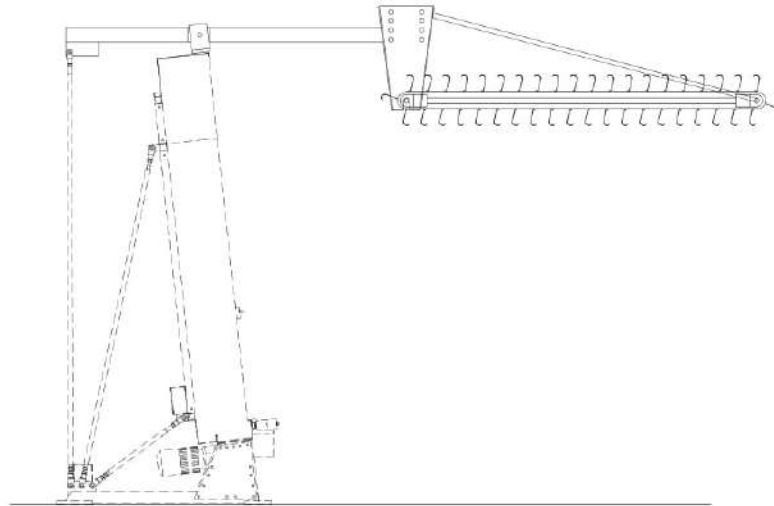
513M0701 Inspection and manual frame positioning station, 2,7m, vertical
1 piece glass plate thickness: 3 up to 45 mm
 processing dimensions.: 170x350 mm up to working height of 2700 mm
 including foot switch

H=3700 mm L=2910 mm Tlk=1140 mm
 Pel:0,75 kW pneu: 6,5 bar weight app. 720 kg

Type	VR	2,70	2,90	V				
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Note: Work on the machine, those the serving or maintenance staff can't be accomplish from the soil - in particular positioning very large frames - may only with a suitable and fixed leader system be accomplished.

Pos. 4.1 Overhead conveyor, type RQF
for uncoated and coated spacer frames



Picture shows overhead conveyor mounted on inspection and frame positioning station

- Overhead conveyor for manual or automatic transport of spacer frames
- Possibilities of mounting: on ceiling, on inspection station, free installation on stand
- Transport of coated spacer frames without touching the coating
- Light barrier switch for stopping frame transport on the end of take off side
- For transport of coated frames the hooks are provided with anti-adhesive layer
- Possibility to transport several spacer frames in one hook row
- Subsequent installation in existing production line possible

1133M0704 Overhead conveyor, 18 usable hook rows, 5 hook chains

1 piece for mounting on inspection and frame positioning station.
For safety requirements an additional fastening on ceiling is necessary!

H=1260 mm L=2260 mm T=2250 mm

Type	RQF	VR	2,0	2,6					
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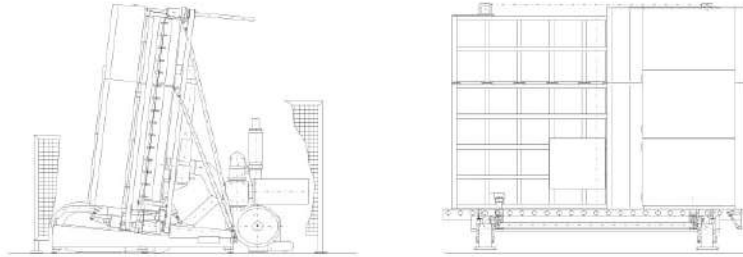
Pos. 5

1082M0501 Conveyor- and buffering station, vertical, airfloat design

1 piece H=3200 mm L=2510 mm T=700 mm Tlk=500 mm
Pel: 1,4 kW weight.: approx. 540 kg

Type	TB	LK	2,70	2,50	V				
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Pos. 6 Assembly-, gas fill- and press robot, Type ZPG, for assembling, gas filling and pressing of insulating glass units.



- Automatic assembling, gas filling and pressing of insulating glass units
- Formats: rectangular as well as nearly all kind of shapes.
Gas filling requires that the shaped unit has rectangular segments of minimum 350 mm (l) x 190 mm (h) on the leading lower corner
- Standard filling gas is Argon
- Prepared for using **optional** gases like SF6, Krypton and Xenon as well as mixtures of Argon and aforementioned gases
- Fast reacting sensor for permanent control of gas filling process
- Automatic filling of excessive glass plate length for metallic spacers
- Program controlled optimizing of filling parameters
- No holes in spacer frame necessary
- Processing of different glass plate dimensions, glass- and spacer widths in any sequence
- 2-step pressing for oversized insulating glass units with metallic spacers
- Electronic pressing power control for insulating glass units with metallic spacers
- Constant pressing with plane-parallel guided and distortion-free press-plates
- Adjustable precise press plate guiding

- Fault indicator by diagnosis-program
- Press plates can be wide opened for convenient maintenance
- Combined measuring and sequence monitoring device

193M1001 Assembly-, gas fill- and press robot, 2,70m

1 piece

thickness of unit: max. 60 mm, glass plate thickness: max. 15 mm
processing dimensions: 170x350 mm up to 2700x3500 mm
using two step pressing up to 5000 mm
H= 3415 mm L= 3700 mm T= 2315 mm
P el: 7,7 kW pneu: 6 bar weight: app. 3400 Kg

Type

ZPG		2,70	3,50	V	SP			
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Pos. 6.1

1273Z1001 Adjustment device for 1 to 4 sided stepped insulating glass units

1 piece

Glass plate displacement on leading edge adjustable from 0 up to 250 mm, on lower edge adjustable from 0 up to 100 mm. Step adjustment of specified position on display is initiated by keyboard and driven by motor (press robot will be extended to about 660 mm length).

With glass plate displacement on lower or leading edge in standard version, no gas filling will be possible.

Pos. 6.2

182Z1001 Automatic gas filling of stepped double insulating glass units - 1 to 4 steps

1 piece

Glass plate displacement at the lower edge up to max. 100 mm and at the leading edge up to max. 250 mm.

For automatic gas filling of insulating glass units with 1 to 4 steps and following automatic sealing the larger glass plate must always be arranged at the front.

The spacer thickness has to be min. 8 mm. The sum out of air space and glass plate 2 must not exceed 39 mm.

Pos. 7

939M1201 Electronic control system for production line consisting of:

1 piece

- manual spacer frame application
- assembly and press robot
- sealing robot

Pos. 8

1084M0501 Conveyor- and buffering station, vertical, airfloat design

1 piece

*H=3200 mm L=3710 mm T=700 mm Tik=500 mm
Pel: 1,4 kW weight.: approx. 700 kg*

Type

TB	LK	2,70	3,70	V					
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Pos. 9

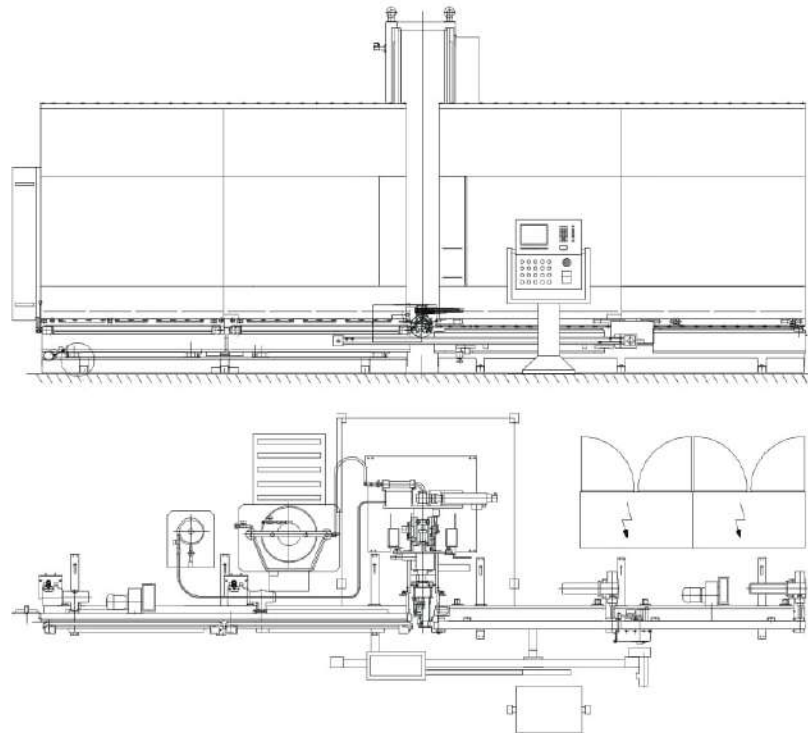
1124Z0502 Lifiable supporting girder

1 piece

Lifiable supporting girder with non-driven supporting rollers or glass plate displacement of 0 - 100 mm on bottom edge

For the automatic height-adjustment of the supporting girder the data transfer in the line is necessary.

Pos. 10 Sealing robot, single head design, shapes, Type VA 1K V MOD ZD,
for shaped and rectangular formats, 2-component-sealant, single nozzle system



- Single nozzle system for automatic sealing of shapes and rectangular formats in any sequence, with constant quality
- Fast reacting and volume controlled dosing system
- All around and clean sealing due to fast reacting and volume controlled dosing system even when frame set back is not steady
- Processing of double- and triple insulating glass units
- Data input for shapes according to stored shape catalogue
 - manual by keyboard
 - by disc
 - on line -option-
- Processing of rectangulars automatically by sensor system, without data input
- Optimum mixing quality for all field proven 2-component sealants for insulating glass
- Mixing ratio electronically adjustable
- Electronic registration of air-space width, centre of air-space and total thickness of insulating glass unit for optimum adjustment of volume flow and transport system
- Auto centering of nozzle to air-space centre

- Homogeneously sealed corners ensured by sealant injection with nozzle/spatula system
- Stepless and independent rotation of nozzle head and spatula
- Sealing of wide spacer width range without changing nozzle when processing double units
- Safe sealing of narrow air-space and precise guiding of the i.g. unit by following glass plate support systems in vertical and horizontal direction
- Short length of mixer line, only 0.16 litres mixed material
- Rinsing program for cleaning of the mixing unit with A-component
- Rinsing cabinet for cleaning of the mixing unit and the nozzles with environmental flushing agent
- Quick-action lock system for fast nozzle and mixing line change
- Basic equipment with one multirange swivel nozzle for double IG units, joint width 8-20 mm
- Additional program for alternate sealing of insulating glass units with different spacer frame systems
- Material supply by Lenhardt drum pumps,
basic design: A-component 200 litres, B component 20 litres
- V-shaped run out conveyor system for sealed units
 - no soil of lower glass edge
 - smooth transport, no glass breakage
 - safe and convenient take-off of insulating glass unit
 - self cleaning
 - long service life
- Air cushion support wall assists take-off of insulating glass unit by suction lifting device
- Free access to operation side
- Fault indicator by diagnosis-program
- Easy user guide by touch screen

1384M1102 Sealing robot, single head design, shapes, 2,7 m,

1 piece

Basic design:

run-out conveyor: 4000 mm long

processing dimensions: 190x350 mm up to 2700x4000 mm

joint width: 6-24 mm insulating glass thickness: 12-60 mm

glass plate thickness max.: 15 mm

l x w x h: approx. 8450 x 2470 x 3800 mm

depths from glass transportation line approx. 1900 mm

Pel:22 kW pneu:6 bar, R½ weight.: approx. 5760kg

Type

VA	1K	2,70		V	MOD		ZD
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1180M1101 Sealing robot / Mixing and dosing system

1 piece

executed for the processing of two-component polyurethane with liquid B-component

Pos. 10.1

1583Z1116 Hard- und Software-Equipment for sealing twice on a triple unit with
1 Stück standard nozzle

The run-in transport conveyor belt is in split mode. The two belts are adjustable in horizontal level accordingly the triple unit to support all three glass plates during second sealing process. (Maximum Unit length ≤ 4 m)..