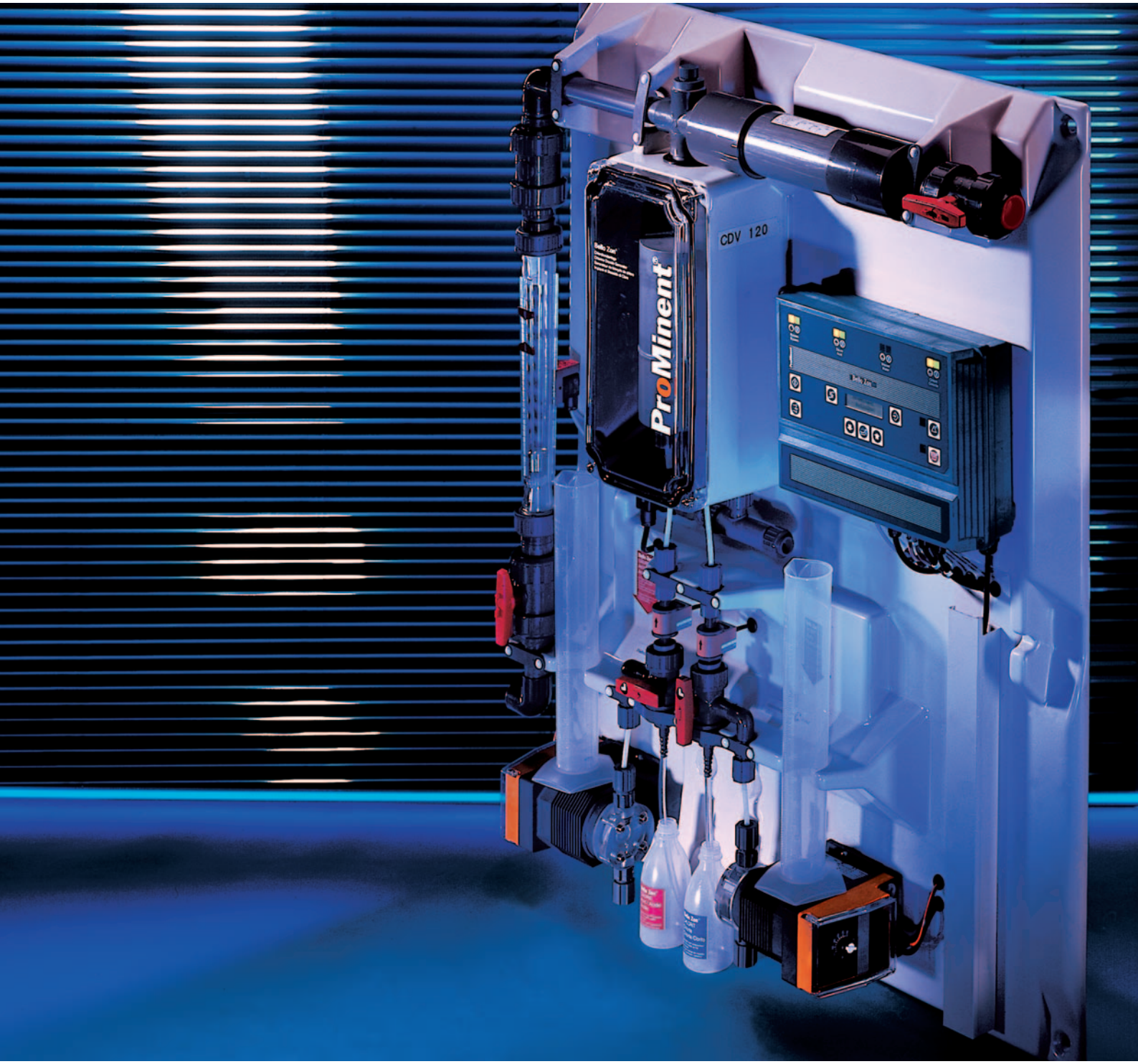
Bello Zon® CHLORINE DIOXIDE GENERATING PLANT



ProMinent®

Chlorine Dioxide:
Economical, Environmentally Friendly Disinfection

Since more attention is now being paid to the secondary reactions produced by conventional water disinfection treatments, the disinfection of drinking water and water for industrial use with chlorine dioxide (ClO_2) is gaining in significance.

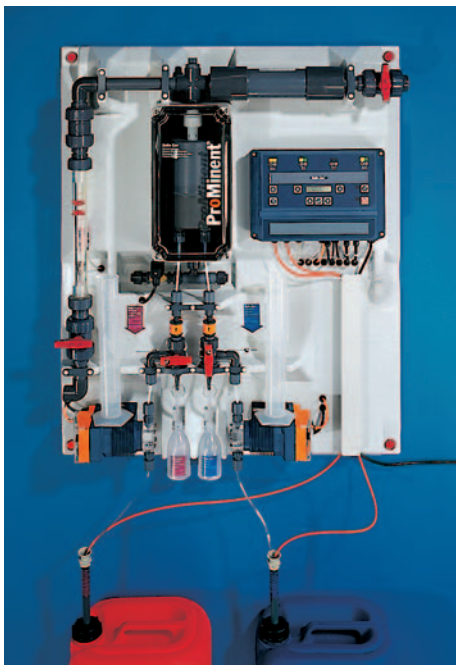
High strength disinfection with minimal environmental impact

Chlorine dioxide is an interesting alternative to chlorine because of the completely different relationship involved, between action and reaction. Chlorine dioxide produces no organic chlorine compounds with those contaminants most frequently found in water, e.g. chlorophenols or halogenated hydrocarbons (for example haloforms such as chloroform which is considered carcinogenic).

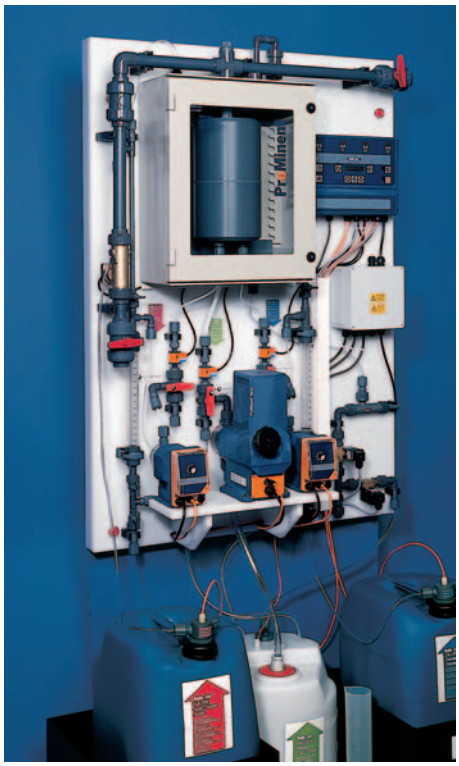
The compounds formed from the reaction of chlorine dioxide with organic water contaminants are therefore largely negligible from the point of view of quantitative, sensory or toxicity considerations. This makes chlorine dioxide the ideal disinfecting agent for the treatment of drinking water, even when used for water which contains organic contaminants, e.g. surface water, or water containing humic acid.

Minute quantities of chlorine dioxide are sufficient to disinfect drinking water. In most applications, a concentration of 0.1 mg ClO_2/l water is sufficient and the chlorine dioxide produced by the Bello Zon® process is ideal for the food and drinks industry. It is important to add that residual concentrations caused by unavoidable contact with the product cause no harm.

Chlorine dioxide can also be used to disinfect soft water with a high pH value. Its disinfecting property is greater than that of chlorine, which becomes less effective as the pH value increases.

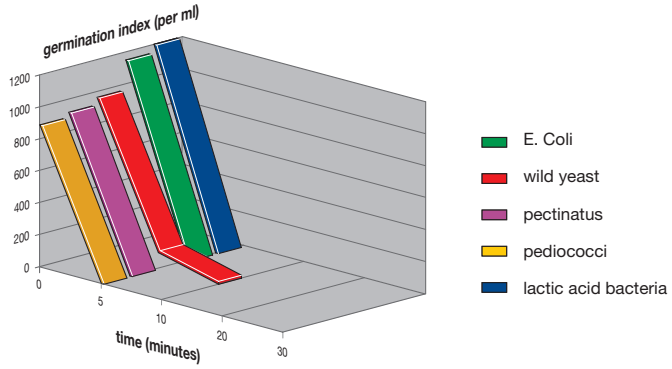


Bello Zon® CDVa –
compact and clear display



Bello Zon® CDKa –
Chlorine dioxide from concentrated chemicals

Disinfection with Chlorine dioxide (0.3 mg/l)
(approved by the independant German Authority LGA)

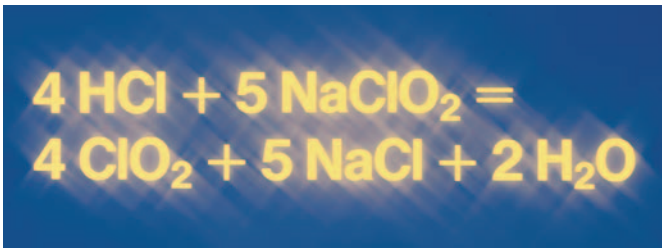


Wherever sterile water is required for washing, rinsing or disinfecting, Chlorine dioxide produced by ProMinent's Bello Zon® plants is the superior alternative to chlorine.

The Bello Zon® process is based on the use of two liquids. The resulting chlorine-free chlorine dioxide remains dissolved in water and can therefore be safely and precisely administered. The safety measures required are therefore fundamentally more simple than with chlorine gas plants.

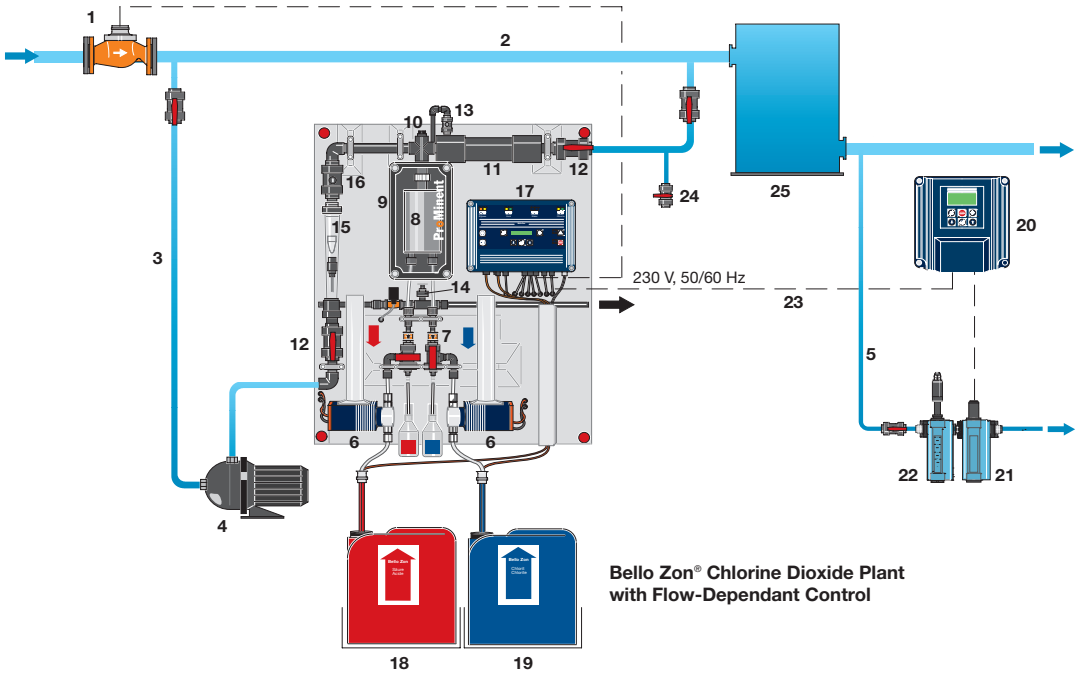
Bello Zon® plants produce chlorine dioxide on site

Chlorine dioxide is a gas whose physical properties prevent it either from being bottled or compressed. Its unstable nature would cause it to break down and storage is not commercially viable. Chlorine dioxide must therefore be manufactured on site in specially developed plants.



With the Bello Zon® process from ProMinent, chlorine dioxide can be simply and safely produced from hydrochloric acid and sodium chlorite. The quantity of chlorine dioxide produced can easily be adapted according to requirements by adjusting the frequency of the solenoid dosing pump. This can be controlled manually or automatically by connecting a water gauge or regulator.

The internationally renowned ProMinent® solenoid dosing pumps pump the chemicals into a reactor where they combine to form a solution of chlorine dioxide. The concentrate from the reactor (approx. 20 g ClO_2/l) is diluted when it passes through a bypass pipe. It feeds continuously into the flow of water which is to be treated. A fundamental characteristic of this process is the production of chlorine-free chlorine dioxide solution which is adjusted precisely in accordance with the application requirements.



Bello Zon® Chlorine Dioxide Plant with Flow-Dependant Control

1 water gauge (contact, analogue)
2 main water pipe
3 bypass pipe 1-2 m³/h
4 bypass pump
5 water monitoring pipe
6 solenoid dosing pump
7 flow sensor
8 reactor
9 reactor housing
10 dosing valve (pressure sensitive)
11 mixer
12 stop valve
13 ventilation valve
14 suction device
15 bypass monitor
16 non-return-valve
17 control with production level display
18 Bello Zon® acids in safety vessel
19 Bello Zon® chlorite in safety vessel
20 D1C - chlorine dioxide meter
21 chlorine dioxide probe
22 water readings monitor
23 interlocking contact
24 rinsing connector
25 holding tank

Applications

Because of their compact form, simple operation and high safety standards the Bello Zon® plants are suited to many applications, such as:

Care of public water supply, the food industry and the drinks industry

- treating drinking water and water for industrial use
- legionella prevention

Apart from highly effective disinfection, long term protection against bacteria in the distribution network is provided for. Moreover, chlorine dioxide helps to remove odour and taste from water (breaking down phenols, algal metabolic porducts etc.). As chlorine dioxide does not react with ammonia, less is needed than when chlorine is used.

Brewing and drinks industry

- bottle cleansing

Even when pH levels are high, the Bello Zon® provides protection against micro-organisms as the chlorine dioxide level is controlled by residual measurement in the cold water zone. The measurement of chlorine dioxide content takes place online with the aid of the DULCOTEST® chlorine dioxide measuring probe.

Also within the drinks industry the Bello Zon® can be used in:

- rinsers
- CIP (cleaning in place) plants
- pasteurisers
- recoolers
- autoclaves

Milk industry

- vapour treatment

Re-using condensed water helps to reduce the consumption of fresh water. Chlorine dioxide protects against micro-organisms.

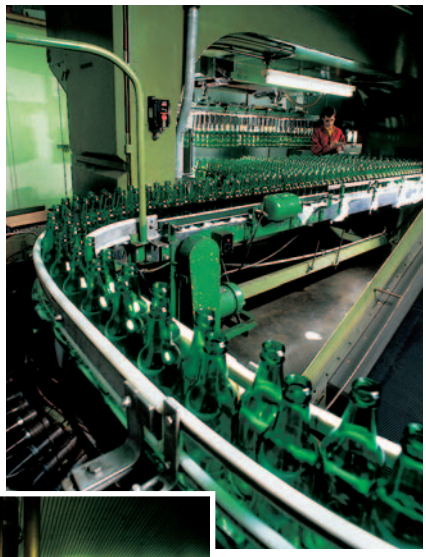
Food Industry

- treatment of water in which fruit and vegetables are washed
- treatment of water which is to be used in the preparation of fish and seafood
- preparation of poultry

Chlorine dioxide prolongs shelf life and provides effective protection from salmonella.

Paper Industry

- by tackling myxobacteria in the water circulating around the paper plant, operating costs can be considerably reduced.



Bello Zon® Chlorine Dioxide Plants: Modern Technology with Great Advantages

Simple to operate

With the aid of the microprocessor control system the dosage quantities are set directly. When the plant is operating in automatic mode

(proportional to flow) the required dose per litre can be pre-determined, e.g. 0.15 mg/l. The LCD control display also provides information on the plant production levels and the flow through the main water pipe.

Additionally the plant can administer chlorine dioxide in accordance with the requirements indicated by the readings to cyclical water systems using controller.

Remote display of chlorine dioxide production levels

The plant production levels can be transmitted to a remote measuring unit via an analogue gauge, as can the volume of flow through the main water pipe when the plant is operating under flow-proportional control.

Optimum safety technology

Bello Zon® chlorine dioxide plants from ProMinent are equipped with a flow sensor for chemicals which guarantees a consistently optimum flow through the system. It also monitors the flow of bypass water. The levels in the chemical containers are equipped with a relay switch which enables the triggering of warning sign: “chemical levels low”. The reactor vessel is automatically ventilated via an injector and a solenoid valve.

High chlorine dioxide yield

The optimal current reactor guarantees a high yield of more than 90 %. It is contained in an anti corrosive housing, separate from the dosing pump and the dosage monitor.

Quick to install

The hydraulic and electrical components of the Bello Zon® chlorine dioxide plant arrive pre-wired and ready for operation, housed in a plastic console. If a bypass pump is required, it can be connected directly.

Chlorine dioxide needs for different applications

Plants from the CDVa range which operate using diluted chemicals (9 % hydrochloric acid and 7.5 % sodium chlorite) are suitable for small to medium production capacity requirements.

Plants from the CDKa range have a medium to large production capacity. They use 30-33 % hydrochloric acid and 25 % sodium chlorite. A third pump adds the additional water required for diluting the chemicals in the reactor.

The models in this range already comply with the new DVGW[1] -Document W624 “Dosing plants for disinfecting and oxidising agents; dosing plants for chlorine dioxide”.

Chlorine dioxide can be measured online using amperometric sensor technology

The DULCOMETER® measuring and regulating technology makes it possible to measure precisely the quantity of chlorine dioxide in water.

The chlorine dioxide measuring cell DULCOTEST® from ProMinent uses an amperometric measuring system which is both the most accurate, and easily reproduced, method of measurement. The calibration results from the DPD method (colorometric chlorine dioxide measurement). Chlorine dioxide concentrations of between 0 - 10 mg/l may be measured. The measuring cells are constructed from PVC and Acrylicglass. They may be supplemented with a pH and/or Redox probes and are supplied in three value ranges. They may be used equally effectively in fresh water and salt water.

DULCOMETER® D1C controllers correspond to real set values and set the production levels in accordance with the varying values.

Online measuring technology with the DULCOMETER® D1C controller and chlorine dioxide probe

1) German monitoring organisation

Technical Data

Bello Zon®	Dosage chlorine dioxide*	Max. operating pressure	Operating tempera-ture	Max. stroke frequency	Dosage per com-ponent*	Dosing pump type	Max. suc-tion level, dosing pump**	Volume (H x W x D)	Weight	Current uptake (max.)		
Type	**g/h**	**bar**	**°C**	**str./h**	**l/h**	**Bello Zon®-design**	**m. wg**	**mm**	**kg**	**230 V**	**115 V**	**24 V**
CDVb 15	15	8	10 - 40	10800	0.38	BT4a 1000	1.8	1160 x 900	18.0	2.7 A	8.4 A	6.4 A
CDVb 35	46	8	10 - 40	10800	1.15	BT4a 1001	2.0	x 210	18.0	2.7 A	8.4 A	6.4 A
CDVb 60	66	8	10 - 40	10800	1.65	BT4a 1002	2.5		18.0	2.7 A	8.4 A	6.4 A
CDVb 120	130	8	15 - 40	10800	3.25	BT4a 1005	3.0		19.2	4.2 A	13.4 A	10.0 A
CDVb 220	225	8	10 - 40	10800	5.63	BT5a 1008	3.0	1350 x 950	55.0	4.2 A	13.4 A	–
CDVa 400	400	10	10 - 40	6000	10.0	G/5 - 1310	1.9	x 380	55.0	6.9 A	12.2 A	–
CDVa 600	600	8	15 - 40	4620	15.0	Vario 12017	7.0	(without pre mixer)	57.0	1.7 A	3.4 A	–
CDVa 2000	2000	7	15 - 40	4380	50.0	Sica 12050	7.0	1850 x 1300 x 430	135.0	3.4 A	6.8 A	–

Bello Zon®	Dosage chlorine dioxide*	Max. operating pressure	Operating tempera-ture	Dosing pump C, S, W	Max. stroke frequency	Dosage per com-ponent*	Dosing pump model	Max suc-tion level, dosing pump**	Volume (H x W x D)	Weight	Current uptake (max.)	
Type	**g/h**	**bar**	**°C**		**str./h**	**l/h**	**Bello Zon®-design**	**m. wg**	**mm**	**kg**	**230 V**	**115 V**
CDKa 150	150	10	10 - 40	S, C	7200	1.0	G/4 - 1601	1.7	1350 x 950	55	5.2 A	9.5 A
				W	6000	5.5	G/5 - 1605	1.3	x 380			
CDKa 420	428	8	15 - 40	S, C	7200	2.9	G/4 - 1002	0.9	1350 x 950	57	2.7 A	5.1 A
				W	4620	15.7	Vario 12017	7.0	x 380			
CDKa 750	750	8	15 - 40	S, C	6000	5.0	G/5 - 1605	1.3	1610 x 1100	82	7.7 A	13.8 A
				W	7320	28.0	Vario 12026	7.0	x 400			
CDKa 1500	1500	8	15 - 40	S, C	6000	10.0	G/5 - 1310	1.9	1850 x 1300	135	6.8 A	12.8 A
				W	4380	55.0	SIC 12090	7.0	x 430			
CDKa 6000	6000	5	15 - 40	S, C	7320	39.0	Vario 09039	4.0	3060 x 1500	320	3.4 A	6.7 A
				W	7720	215.0	SIC 07220	5.0	x 470			
CDKa 10000	9800	2	15 - 40	S, C	6390	66.0	Vario 05075	3.0	3060 x 1500	320	3.5 A	6.7 A
				W	11880	360.0	SIC 04350	5.0	x 470			

* Metering specifications are made with respect to 5 bar back pressure (CDVa 7 = 3 bar) and 20 °C ambient temperature.
** Suction levels at 100 % stroke length

Premixer	Part number	Volume (net)	Length	Weight
		liter	**mm**	**kg**
CDKa 150/CDVa 220	740649	1.5	572	2.4
CDKa 420/CDVa 400	740650	4.5	954	5.5
CDKa 750/CDVa 600	740832	7.0	1054	7.0
CDKa 1500	1001000	13.4	1400	15.0

Subject to technical alterations.
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