ProMinent® Aquatics Catalog

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ProMinent Contacts & Information

ProMinent Contacts

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ProMinent Websites

ProMinent Xtranet (www.prominentxtranet.com)

ProMinent Xtranet offers: Manuals, Cut sheets, Trade Show Schedule, Product Updates, Drawings and much more. Visit www.prominentxtranet.com to register.

ProMinent eNews (Newsletter)

Periodical eNews email that contains: Product Updates, Product Releases & Office Information (such as holiday closings). Visit www.prominentxtranet.com to register for the ProMinent Newsletter.

Chemical Resistance List

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

s = saturated aqueous solution
+/0 = conditional resistance
+ = good resistance
0 = limited resistance
– = no resistance
+(x%) = good resistance to x% concentration
* = With glued fittings, please check the resistance of the glue.

n = unknown resistance
=> = refer to . . .
A.C. = any concentration
S = saturated solution
Conc. = concentrated
D = weak solution

resp. to aqueous solutions

These classifications are the results of practical experience of the manufacturers of the raw materials. Since the resistance of the materials depends also on other factors (operating conditions, surface quality, etc.), this list cannot be more than a general information for which no responsibility is accepted. It should be particularly noted that, as a rule, the aggressiveness of a mixture is different from that of its individual components. In cases of doubt, suitable tests should be performed.

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Acetaldehyde	CH_3CHO	100%	–	–	+	+	0	–	+/0	+	+
Acetamide	CH_3CONH_2	S	+	+	+	+	+	0	+	+	+
Acetic Acid	CH_3COOH	100%	–	+(50%)	+	+(70%)	+	–	0	+	+
Acetic Anhydride	$(CH_3CO)_2O$	100%	–	–	+	0	0	–	+/0	–	+
Acetone	CH_3COCH_3	100%	–	–	+	+	+	–	–	0	+
Acetophenone	$C_6H_5COCH_3$	100%	–	n	+	+	+	–	+	+	+
Acetyl Chloride	CH_3COCl	100%	–	+	0	–	–	+	–	–	+
Acetylacetone	$C_5H_8O_2$	100%	–	–	+	+	+	–	+	–	+
Acetylene Dichloride=>	Dichloroethylene										
Acetylene Tetrachloride=>	Tetrachloroethane										
Acrylonitrile	CH_2=CH-CN	100%	–	–	+	+	+	–	–	+	+
Adipic Acid	$C_6H_{10}O_4$	S	+	+	+	+	+	+	+	+	+
Allyl Alcohol	CH_2CHCH_2OH	96%	–	0	+	+	+	–	+	+	+
Aluminum Acetate	$Al(CH_3COO)_3$	S	+	+	+	+	+	+	+	+	+
Aluminum Bromide	$AlBr_3$	S	+	+	n	+	+	+	+	+	+
Aluminum Chloride	$AlCl_3$	S	+	+	–	+	+	+	+	+	+
Aluminum Fluoride	AlF_3	10%	+	+	–	+	+	+	+	+	+
Aluminum Hydroxide	$Al(OH)_3$	S	+	+	+	+	+	+	+	+	+
Aluminum Nitrate	$Al(NO_3)_3$	S	+	+	+	+	+	+	+	+	+
Aluminum Phosphate	$AlPO_4$	S	+	+	+	+	+	+	+	+	+
Aluminum Sulfate	$Al(SO_4)_3$	S	+	+	+	+	+	+	+	+	+
Ammonium Acetate	CH_3COONH_4	S	+	+/0	+	+	+	+	+	+	+
Ammonium Aluminum Sulfate	$NH_4Al(SO_4)_2$	S	+	+	+	+	+	+	+	+	+
Ammonium Bicarbonate	NH_4HCO_3	S	+	+	+	+	+	+	+	+	+
Ammonium Carbonate	$(NH_4)_2CO_3$	40%	+	+	+	+	+	+	+	+	+
Ammonium Chloride	NH_4Cl	S	+	+	–	+	+	+	+	+	+
Ammonium Fluoride	NH_4F	S	+	0	0	+	+	+	+	+	+
Ammonium Hydrogen Carbonate	NH_4HCO_3	A.C.	+	+	+	+	+	+	+	+	+
Ammonium Hydroxide	NH_4OH	S	+	+	+	+	+	–	+	+	+
Ammonium Nitrate	NH_4NO_3	S	+	+	+	+	+	+	+	+	+
Ammonium Oxalate	$(NH_4)_2C_2O_4$	S	+	+	+	+	+	+	+	+	+
Ammonium Perchlorate	NH_4ClO_4	10%	+	+	+	+	+	+	+	+	+
Ammonium Peroxodisulfate	$(NH_4)_2S_2O_8$	S	+	+	+(5%)	+	+	+	+	+	+
Ammonium Persulfate	$(NH_4)_2S_2O_8$	A.C.	+	+	+	+	+	+	+	+	+
Ammonium Phosphate	$(NH_4)_3PO_4$	A.C.	+	+	+(10%)	+	+	+	+	+	+
Ammonium Sulfate	$(NH_4)_2SO_4$	A.C.	+	+	+(10%)	+	+	+	+	+	+
Ammonium Sulfide	$(NH_4)_2S$	S	+	+	n	+	+	+	+	+	+
Amyl Alcohol	$C_5H_{11}OH$	100%	+	+	+	+	+	–	+	+	+
Aniline	$C_6H_5NH_2$	100%	–	–	+	+	+	–	+/0	+	+
Aniline Hydrochloride	$C_6H_5NH_2HCl$	S	n	+	–	+	+	+/0	+/0	+	+
Antimony Trichloride	$SbCl_3$	S	+	+	–	+	+	+	+	+	+
Aqua Regia	$3HCl+HNO_3$	100%	–	+	–	–	–	–	0	+	+
Arsenic Acid	H_3AsO_4	S	+	+	+	+	+	+	+	+	+
Barium Carbonate	$BaCO_3$	S	+	+	+	+	+	+	+	+	+
Barium Chloride	$BaCl_2$	S	+	+	–	+	+	+	+	+	+
Barium Hydroxide	$Ba(OH)_2$	S	+	+	+	+	+	+	+	+	+
Barium Nitrate	$Ba(NO_3)_2$	A.C.	+	+	+	+	+	+	+	+	+
Barium Sulfate	$BaSO_4$	A.C.	+	+	+	+	+	+	+	+	+
Barium Sulfide	BaS	A.C.	+	+	+	+	+	+	+	+	+
Beer	–	100%	+	+	+	+	+	+	+	+	+

Viton® is a registered trademark of Dupont Dow Elastomers

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

s	= saturated aqueous solution	n	= unknown resistance	resp. to aqueous solutions
+/0	= conditional resistance	=>	= refer to . . .	
+	= good resistance	A.C.	= any concentration	
0	= limited resistance	S	= saturated solution	
–	= no resistance	Conc.	= concentrated	
+(x%)	= good resistance to x% concentration	D	= weak solution	
*	= With glued fittings, please check the resistance of the glue.			

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Benzaldehyde	C_6H_5CHO	100%	–	–	+	0	+	+	+	+	+
Benzene	C_6H_6	100%	–	–	+	0	0	0	–	+	+
Benzene Sulfonic Acid	$C_6H_5SO_3H$	10%	n	n	+	n	+	+	–	+	+
Benzoic Acid	C_6H_5COOH	S	+	+	+	+	+	+	+	+	+
Benzoyl Chloride	C_6H_5COCl	100%	–	n	0	0	0	+	+	n	+
Benzyl Alcohol	$C_6H_5CH_2OH$	100%	–	–	+	+	+	+	–	+	+
Benzyl Benzoate	$C_6H_5COOC_7H_7$	100%	–	–	+	0	+	+	–	0	+
Benzyl Chloride	$C_6H_5CH_2Cl$	90%	–	n	+	0	0	+	–	+	+
Bleach=>	Sodium Hypochlorite										
Bleaching Powder	$Ca(OCl)_2$	S	+	+	–	+	+	+	+	+	+
Borax	$Na_2B_4O_7$	A.C.	+	+	+	+	+	+	+	+	+
Boric Acid	H_3BO_3	S	+	+	+	+	+	+	+	+	+
Brine		S	+	+/0	+/0	+	+	+	+	+	+
Bromine	Br_2	100%	–	–	–	–	–	–	–	+	+
Bromine Liquid	Br_2	100%	–	–	–	–	–	–	–	+	+
Bromine Water	–	S	–	+	–	–	–	–	–	+	+
Bromo Benzene	C_6H_5Br	100%	n	n	+	0	0	0	–	+	+
Bromochloro Methane	CH_2BrCl	100%	–	–	+	0	–	n	+/0	+	+
Bromochlorotrifluoroethane	$HCClBrCF_3$	100%	–	–	+	0	0	+	–	+	+
Butanediol	HOC_4H_8OH	10%	n	+	+	+	+	0	+	+	+
Butanetroil	$C_4H_{10}O_3$	S	+	+	+	+	+	0	+	+	+
Butanol	C_4H_9OH	100%	–	+	+	+	+	0	+/0	+	+
Butyl Acetate	$CH_3COOC_4H_9$	100%	–	–	+	–	0	–	+/0	+	+
Butyl Acrylate	$C_7H_{13}O_2$	100%	–	–	+	+	+	–	–	+	+
Butyl Amine	$C_4H_9NH_2$	100%	n	n	+	+	n	–	–	0	+
Butyl Benzoate	$C_6H_5COOC_4H_9$	100%	–	–	+	0	0	+	+	n	+
Butyl Ether	$(C_4H_9)_2O$	100%	–	–	+	+	+	–	0	+	+
Butyl Mercaptan	C_4H_9SH	100%	n	n	n	n	n	+	–	+	+
Butyl Oleate	$C_{22}H_{42}O_2$	100%	n	n	+	n	n	+	+/0	+	+
Butyl Stearate	$C_{22}H_{44}O_2$	100%	0	n	+	n	n	+	–	+	+
Butylaldehyde	C_3H_7CHO	100%	–	n	+	+	+	–	+/0	n	+
Butyric Acid	C_3H_7COOH	100%	+(5%)	+(20%)	+	+	+	+	+	+	+
Calcium Acetate	$(CH_3COO)_2Ca$	S	+	+	+	+	+	+	+	+	+
Calcium Bisulfite	$Ca(HSO_3)_2$	S	+	+	+	+	+	+	+	+	+
Calcium Carbonate	$CaCO_3$	A.C.	+	+	+	+	+	+	+	+	+
Calcium Chloride	$CaCl_2$	S	+	+	–	+	+	+	+	+	+
Calcium Cyanide	$Ca(CN)_2$	S	+	+	n	+	+	+	+	+	+
Calcium Hydrogen Sulfite	$CaHSO_3$	S	+	+	+	+	+	+	+	+	+
*Calcium Hydroxide	$CA(OH)_2$	S	+	+	+	+	+	+	+	+	+
Calcium Hypochlorite	$Ca(OCl)_2$	S	+	+	–	+	0	0	+	+	+
Calcium Nitrate	$Ca(NO_3)_2$	S	+	+(50%)	+	+	+(50%)	+	+	+	+
Calcium Phosphate	$Ca_3(PO_4)_2$	S	+	+	+	+	+	+	+	+	+
Calcium Sulfate	$CaSO_4$	S	+	+	+	+	+	+	+	+	+
Calcium Sulfide	CaS	S	+	+	n	+	+	+	+	+	+
Calcium Sulfite	$CaSO_3$	S	+	+	+	+	+	+	+	+	+
Calcium Thiosulfate	CaS_2O_3	S	+	+	–	+	+	+	+	+	+
Camphor	$C_{10}H_{16}O$	100%	–	–	+	–	+	0	–	+	+
Carbolic Acid (see Phenol)	C_6H_5OH	100%	–	0	+	0	+	+	–	+	+
Carbon Disulfide	CS_2	100%	–	–	+	0	0	+	–	+	+
Carbon Tetrachloride	CCl_4	100%	0	–	+	0	–	+	–	+	+
Carbonic Acid	H_2CO_3	S	+	+	+	+	+	+	+	+	+

*** Requires flushing.**

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

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+/o = conditional resistance
+ = good resistance
o = limited resistance
– = no resistance
+(x%) = good resistance to x% concentration
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n = unknown resistance
=> = refer to . . .
A.C. = any concentration
S = saturated solution
Conc. = concentrated
D = weak solution

resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Caustic Soda=>	Sodium Hydroxide										
Chloric Acid	$HClO_3$	20%	+	+	–	+10%	–	0	0	+	+
Chlorine Dioxide Solution	ClO_2+H_2O	0.5%	0	+	–	0	0	0	–	+	+
Chloroacetic Acid	$CH_2ClCOOH$	A.C.	–	–	–	–	+	+	+	+	+
Chlorine Water	Cl_2+H_2O	S	+	+	–	0	0	+	+	+	+
Chlorobenzene	C_6H_5Cl	100%	–	–	+	0	+	+	–	+	+
Chloroethanol	$ClCH_2CH_2OH$	100%	–	–	+	+	+	–	0	0	+
Chloroethylbenzene	$C_6H_4ClC_2H_5$	100%	–	–	+	0	0	0	–	n	+
Chlorophenol	C_6H_4OHCl	100%	n	n	+	+	+	n	–	+	+
Chlorotoluene	C_7H_8Cl	100%	–	–	+	n	n	+	–	+	+
Chloroacetone	$ClCH_2COCH_3$	100%	–	–	+	n	n	–	+	n	+
Chlorobutadiene	C_4H_5Cl	100%	–	–	+	n	n	+	–	n	+
Chloroform	$CHCl_3$	100%	–	–	+	–	0	+	–	+	+
Chlorohydrin	$C_3H_7O_2Cl$	100%	n	n	+	+	+	+	0	–	+
Chloroprene=>	Chlorobutadiene										
Chlorosulfonic Acid	$SO_2(OH)Cl$	100%	–	–	–	–	–	–	–	–	+
Chrome Sulfate	$Cr_2(SO_4)_3$	S	+	+	+	+	+	+	+	+	+
Chromic Acid	H_2CrO_4	50%	–	+	+(10%)	+	0	+	–	+	+
Chromic Sulfuric Acid	$K_2CrO_4+H_2SO_4$	S	–	+	n	–	–	n	n	+	+
Citric Acid	$C_6H_8O_7$	S	+	+	+	+	+	+	+	+	+
Cobalt Chloride	$CoCl_2$	S	+	+	–	+	+	+	+	+	+
Copper II Acetate	$Cu(CH_3COO)_2$	S	+	+	+	+	+	+	+	+	+
Copper II Arsenite	$Cu_3(AsO_3)_2$	S	+	+	+	+	+	+	+	+	+
Copper II Carbonate	$CuCO_3$	S	+	+	+	+	+	+	+	+	+
Copper II Chloride	$CuCl_2$	S	+	+	+(1%)	+	+	+	+	+	+
Copper II Cyanide	$Cu(CN)_2$	S	+	+	+	+	+	+	+	+	+
Copper II Fluoride	CuF_2	S	+	+	+	+	+	+	+	+	+
Copper II Nitrate	$Cu(NO_3)_2$	S	+	+	+	+	+	+	+	+	+
Copper II Sulfate	$CuSO_4$	S	+	+	+	+	+	+	+	+	+
Cresole	$C_6H_4CH_3OH$	100%	0	0	+	+	+	+	–	+	+
Crotonaldehyde	$CH_3C_2H_2CHO$	100%	n	–	+	+	+	–	+	+	+
Cyclohexane	C_6H_{12}	100%	+	–	+	+	+	+	–	+	+
Cyclohexanol	$C_6H_{11}OH$	100%	0	+/0	+	+	+	+	–	+	+
Cyclohexanone	$C_6H_{10}O$	100%	–	–	+	+	+	–	+/0	+	+
Cyclohexyl Alcohol=>	Cyclohexanol										
Cyclohexylamine	$C_6H_{13}N$	100%	0	0	+	n	n	–	n	n	+
Decahydronaphthaline	$C_{10}H_{18}$	100%	–	+/0	n	0	0	0	–	+	+
Decalin=>	Decahydronaphthaline										
Diisononyl Phthalate	$C_{26}H_{42}O_4$	100%	–	–	+	+	+	n	n	+	+
Diacetone Alcohol	$C_6H_{12}O_2$	100%	–	–	+	+	+	–	+	+	+
Diamine Ethylene	$(CH_2NH_2)_2$	100%	n	0	0	+	+	–	+	+	+
Dibromoethane	$C_2H_4Br_2$	100%	–	–	+	–	n	+	–	+	+
Dibutyl Ether	$C_4H_9OC_4H_9$	100%	0	–	+	0	0	–	0	+	+
Dibutyl Phthalate	$C_{16}H_{22}O_4$	100%	–	–	+	0	+	+	+/0	+	+
Dibutylamine	$(C_4H_9)_2NH$	100%	n	n	+	+	+	–	–	+	+
Dichloro Acetic Acid	$Cl_2CHCOOH$	100%	–	+	+	+	+	–	+	+	+
Dichloro Benzene	$C_6H_4Cl_2$	100%	–	–	+	0	0	+	–	+	+
Dichloro Butane	$C_4H_8Cl_2$	100%	–	–	+	0	0	+	–	+	+
Dichloro Butene	$C_4H_6Cl_2$	100%	–	–	+	0	0	0	–	+	+
Dextrose	$C_6H_{12}O_6$	A.C.	+	+	+	+	+	+	+	+	+
Dichloroethane	$C_2H_4Cl_2$	100%	–	–	+	–	0	+	–	+	+
Dichloroethylene	$C_2H_2Cl_2$	100%	–	–	+	–	0	0	–	+	+
Dichloroisopropyl Ether	$(C_3H_6Cl)_2O$	100%	–	–	+	0	0	0	0	n	+
Dicyclohexylamine	$C_{12}H_{23}N$	100%	0	0	+	+	+	–	+	n	+

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

s	= saturated aqueous solution	n	= unknown resistance	resp. to aqueous solutions
+/o	= conditional resistance	=>	= refer to . . .	
+	= good resistance	A.C.	= any concentration	
o	= limited resistance	S	= saturated solution	
–	= no resistance	Conc.	= concentrated	
+(x%)	= good resistance to x% concentration	D	= weak solution	
*	= With glued fittings please check the resistance of the glue			

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Diethylamine	$(C_2H_5)_2NH$	100%	–	–	+	0	+	–	+	+	+
Diethylene Glycol	$C_4H_{10}O_3$	100%	+	+	+	+	+	+	+	+	+
Diethyleneglydolethyl Ether	$C_8H_{18}O_3$	100%	n	n	+	+	+	n	+/0	+	+
Diethyl Ether	$(C_2H_5)_2O$	100%	–	–	+	0	0	–	–	+	+
Diglycolic Acid	$C_4H_6O_5$	30%	+	+	+	+	+	+	n	+	+
Dihexyl Phthalate	$C_{20}H_{26}O_4$	100%	–	–	+	+	+	–	n	+	+
Diisobutylketone	$C_9H_{18}O$	100%	–	–	+	+	+	–	+	+	+
Diisopropylketone	$C_7H_{14}O$	100%	–	–	+	+	+	–	+	+	+
Dimethyl Carbonate	$(CH_3O)_2CO$	100%	n	n	+	–	+	+	–	+	+
Dimethyl Phthalate	$C_{10}H_{10}O_4$	100%	–	–	+	+	+	–	+/0	+	+
Dimethylformamide	$HCON(CH_3)_2$	100%	–	–	+	+	+	–	+	–	+
Dimethylhydrazine	$H_2NN(CH_3)_2$	100%	n	n	+	+	+	–	+	+	+
Dioctyl Phthalate	$C_6H_4(COOC_8H_{17})_2$	100%	–	–	+	+	+	–	+/0	+	+
Dioxane	$C_4H_8O_2$	100%	–	–	+	+	0	–	+/0	0	+
Dimethyl Formic Amide	$HCON(CH_3)_2$	100%	–	–	–	0	+	0	0	–	+
Disodium Hydrogen Phosphate	Na_2HPO_4	S	+	+	+	+	+	+	+	+	+
Disulfur Dichloride	S_2Cl_2	100%	+	+	+	+	+	+	–	+	+
DMF=>	Dimethylformamide										
Engine Oils		100%	n	+/0	+	+	+	+	–	+	+
Ethanol	C_2H_5OH	100%	–	+	+	+	+	–	+	+	+
Ethanol Amine	$HOC_2H_4NH_2$	100%	0	n	+	+	+	–	+/0	+	+
Ethyl Acetate	$CH_3COOC_2H_5$	100%	–	–	+	+	+35%	–	+/0	–	+
Ethyl Acrylate	$C_2H_3COOC_2H_5$	100%	–	–	+	+	+	–	+/0	0	+
Ethyl Benzene	$C_6H_5C_2H_5$	100%	–	–	+	0	0	0	–	+	+
Ethyl Benzoate	$C_6H_5COOC_2H_5$	100%	n	–	+	+	+	+	–	0	+
Ethyl Bromide	C_2H_5Br	100%	n	n	n	+	+	+	–	+	+
Ethyl Chloride	C_5H_5Cl	100%	–	–	+	–	–	+	–	+	+
Ethyl Chloroacetate	$ClCH_2COOC_2H_5$	100%	–	0	+	+	+	+	–	+	+
Ethyl Chlorocarbonate	$ClCO_2C_2H_5$	100%	n	n	n	n	n	+	–	n	+
Ethylacetylacetate	$C_6H_{10}O_3$	100%	n	–	+	+	+	+	–	+	+
Ethylacrylic Acid	C_4H_7COOH	100%	n	n	+	+	+	n	+/0	+	+
Ethylene Dibromide	$C_2H_4Br_2$	100%	–	–	+	–	0	+	–	+	+
Ethylene Dichloride	$C_2H_4Cl_2$	100%	–	–	+	–	0	+	–	+	+
Ethylene Glycol	$C_2H_4(OH)_2$	100%	+	+	+	+	+	+	+	+	+
Ethylenglycol Ethylether	$HOC_2H_4OC_2H_5$	100%	n	n	+	+	+	n	+/0	+	+
Ethylhexanol	$C_8H_{16}O$	100%	n	+/0	+	+	+	+	+	+	+
Fatty Acids	-	100%	0	0	+	+	+	+	0	+	+
Ferric Chloride	$FeCl_3$	S	+	+	–	+	+	+	+	+	+
Ferric Nitrate	$Fe(NO_3)_3$	S	+	+	+	+	+	+	+	+	+
Ferric Phosphate	$FePO_4$	S	+	+	+	+	+	+	+	+	+
Ferric Sulfate	$Fe_2(SO_4)_3$	S	+	+	0	+	+	+	+	+	+
Ferrous Chloride	$FeCl_2$	S	+	+	–	+	+	+	+	+	+
Ferrous Sulfate	$FeSO_4$	S	+	+	+	+	+	+	+	+	+
Fluoro Benzene	C_6H_5F	100%	–	–	+	0	+	0	–	+	+
Fluoroboric Acid	HBF_4	35%	+	+	0	+	+	+	+	+	+
Formaldehyde	CH_2O	40%	+	+	+	+	+	–	+/0	+	+
Formamide	$HCONH_2$	100%	+	–	+	+	+	+	+	+	+
Formic Acid	HCOOH	S	–	+/0	+	+	+	–	–	+	+
Freon 12,13,22,114,115	–	100%	–	+	–	–	–	–	–	0	+
Furan	C_4H_4O	100%	–	–	+	+	+	–	n	–	+
Furane Aldehyde	$C_5H_5O_2$	100%	n	n	n	n	n	–	+/0	0	+
Furfuryl Alcohol	$OC_4H_3CH_2OH$	100%	–	–	+	+	+	n	+/0	0	+

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

s = saturated aqueous solution
+/o = conditional resistance
+ = good resistance
o = limited resistance
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+(x%) = good resistance to x% concentration
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S = saturated solution
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D = weak solution

resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Gallic Acid	$C_6H_2(OH)_3COOH$	5%	+	+	+	+	+	+	+/0	+	+
Gasoline	–	100%	–	–	+	+	+	+	–	+	+
Glucose	$C_6H_{12}O_6$	S	+	+	+	+	+	+	+	+	+
Glycerol Triacetate	$C_3H_5(CH_3COO)_3$	100%	n	n	+	+	+	–	+	+	+
Glycerol	$C_3H_5(OH)_3$	100%	+	+	+	+	+	+	+	+	+
Glycine	NH_2CH_2COOH	10%	+	+	+	+	+	+	+	+	+
Glycol	$C_2H_4(OH)_2$	100%	+	+	+	+	+	+	+	+	+
Glycolic Acid	$CH_2OH\ COOH$	70%	+	+(37%)	–	+	+	+	+	+	+
Heptane	C_7H_{16}	100%	+	+	+	+	+	+	–	+	+
Hexanal	$C_5H_{11}CHO$	100%	n	n	+	+	+	–	+/0	+	+
Hexane	C_6H_{14}	100%	+	+	+	+	+	+	–	+	+
Hexanol	$C_6H_{11}OH$	100%	–	–	+	+	+	n	+	+	+
Hexene	C_6H_{12}	100%	n	+	+	+	+	+	–	+	+
Hydrazine Hydrate	$N_2H_4*H_2O$	S	+	+	+	+	+	n	+	+	+
Hydrazine	N_2H_4	Conc.	0	0	+	+	+	+	+	+	+
Hydrobromic Acid	HBr	50%	+	+	–	+	+	–	+	+	+
Hydrochloric Acid	HCl	38%	+(32%)	+*	–	+	+	–	+	+	+
Hydrofluoric Acid	HF	80%	–	+(40%)*	–	+(40%)	+(40%)	+	0	+	+
Hydrofluosilicic Acid	H_2SiF_6	30%	+	+	0	+	+	+	+	+	+
Hydrogen Cyanide	HCN	S	+	+	+	+	+	+	+	+	+
Hydrogen Peroxide	H_2O_2	90%	+(40%)	+(40%)	+	+	+(30%)	+(30%)	+(30%)	+	+
Hydroiodic Acid	HI	S	+	+	–	+	+	–	n	+	+
Hydroquinone	$C_6H_4(OH)_2$	S	+	+	+	+	+	+	–	+	+
Hydrogen Sulfide	H_2S	S	+	+	0	+	+	+	+	+	+
Hydroxylamine Sulfate	$(NH_2OH)_2*H_2SO_4$	10%	+	+	+	+	+	+	+	+	+
Hypochlorous Acid	HOCl	S	+	+	–	0	0	+	+/0	+	+
Iodine	I_2	S	0	–	–	0	+	+	+/0	+	+
Isobutyl Alcohol	$C_2H_5CH(OH)CH_3$	100%	–	+	+	+	+	+	+	+	+
Isopropyl Chloride	$CH_3CHClCH_3$	80%	–	–	+	0	0	+	–	+	+
Isopropyl Acetate	$CH_3COOCH(CH_3)_2$	100%	–	–	+	+	+	–	+/0	+	+
Isopropyl Alcohol	$(CH_3)_2CHOH$	100%	0	+/0	+	+	+	+	+	+	+
Isopropyl Benzene	$C_6H_5CH(CH_3)_2$	100%	–	–	+	0	0	+	–	+	+
Isopropyl Ether	$C_6H_{14}O$	100%	–	–	+	0	0	–	–	+	+
Isopropanol=>	Isopropyl Alcohol										
Lactic Acid	$C_3H_6O_3$	100%	–	+	+/0	+	+	+	+(10%)	+	+
Lead II Acetate	$Pb(CH_3COO)_2$	S	+	+	+	+	+	+	+	+	+
Lead Nitrate	$Pb(NO_3)_2$	50%	+	+	+	+	+	+	+	+	+
Lead Sulfate	$PbSO_4$	S	+	+	+	+	+	+	+	+	+
Lead Tetraethyl	$Pb(C_2H_5)_4$	100%	0	+	+	+	+	+	–	+	+
Lime Milk=>	Calcium Hydroxide										
*Lime Slurry	$Ca(OH)_2$	S	+	+	+	+	+	+	+	+	+
Lithium Bromide	LiBr	S	+	+	+	+	+	+	+	+	+
Lithium Chloride	LiCl	S	+	+	+	+	+	+	+	+	+
Magnesium Carbonate	$MgCO_3$	S	+	+	+	+	+	+	+	+	+
Magnesium Chloride	$MgCl_2$	S	+	+	0	+	+	+	+	+	+
*Magnesium Hydroxide	$Mg(OH)_2$	S	+	+	+	+	+	+	+	+	+
Magnesium Nitrate	$Mg(NO_3)_2$	S	+	+	+	+	+	+	+	+	+
Magnesium Sulfate	$MgSO_4$	S	+	+	+	+	+	+	+	+	+
Maleic Acid	$C_4H_4O_4$	S	+	+	+	+	+	+	+	+	+
Malic Acid	$C_4H_6O_5$	S	+	+	+	+	+	+	+	+	+
Manganese II Chloride	$MnCl_2$	S	+	+	+	+	+	+	+	+	+

***Requires flushing.**

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

s = saturated aqueous solution
+/o = conditional resistance
+ = good resistance
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+(x%) = good resistance to x% concentration
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S = saturated solution
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resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Manganese Sulfate	$MnSO_4$	S	+	+	+	+	+	+	+	+	+
Mercuric Chloride	$HgCl_2$	S	–	+	–	+	+	+	+	+	+
Mercury	Hg	100%	+	+	+	+	+	+	+	+	+
Mercury II Chloride	$HgCl_2$	S	+	+	–	+	+	+	+	+	+
Mercury II Cyanide	$Hg(CN)_2$	S	+	+	+	+	+	+	+	+	+
Mercury II Nitrate	$Hg(NO_3)_2$	S	+	+	+	+	+	+	+	+	+
Mesityl Oxide	$C_6H_{10}O$	100%	–	–	+	n	n	–	+/0	n	+
Methacrylic Acid	C_3H_5COOH	100%	n	n	+	+	+	0	+/0	+	+
Methanol	CH_3OH	100%	–	+	+	+	+	+	+	+	+
Methoxybutanol	$CH_3O(CH_2)_4OH$	100%	–	–	+	+	+	+	0	+	+
Methyl Acetate	CH_3COOCH_3	60%	–	–	+	+	+	–	+/0	+	+
Methyl Acrylate	$C_2H_3COOCH_3$	100%	–	–	+	+	+	–	+/0	+	+
Methyl Benzoate	$C_6H_5COOCH_3$	100%	–	–	+	+	+	+	–	0	+
Methyl Catechol	$C_6H_3(OH)_2CH_3$	S	+	+	+	+	+	+	–	+	+
Methyl Cellulose		S	+	+	+	+	+	+	+	+	+
Methyl Chloroacetate	$ClCH_2COOCH_3$	100%	–	0	+	+	+	0	–	+	+
Methyl Cyclopentane	$C_5H_9CH_3$	100%	+	+	+	+	+	+	–	+	+
Methyl Dichloroacetate	$Cl_2CHCOOCH_3$	100%	–	–	+	+	+	–	n	n	+
Methyl Ethyl Ketone (MEK)	$CH_3COC_2H_5$	100%	–	–	+	+	+	–	+	–	+
Methyl Glycol	$C_3H_8O_2$	100%	+	+	+	+	+	–	+/0	+	+
Methyl Isobutyl Ketone	$CH_3COC_4H_9$	100%	–	–	+	+	+	–	0	–	+
Methyl Isopropyl Ketone	$CH_3COC_3H_7$	100%	–	–	+	+	+	–	+/0	–	+
Methyl Methacrylate	$C_3H_5COOCH_3$	100%	–	–	+	+	+	–	–	+	+
Methyl Oleate	$C_{17}H_{33}COOCH_3$	100%	n	n	+	+	+	+	+/0	+	+
Methyl Salicylate	$HOC_6H_4COOCH_3$	100%	–	–	+	+	+	n	+/0	+	+
Methylacetyl Acetate	$C_5H_8O_3$	100%	–	–	+	+	+	–	+/0	+	+
Methylamine	CH_3NH_2	32%	+	0	+	+	+	–	+	0	+
Methylene Chloride	CH_2Cl_2	100%	–	–	0	–	0	+	–	0	+
Milk	–	–	+	+	+	+	+	+	+	+	+
Morpholine	C_4H_9NO	100%	–	–	+	+	+	n	n	+	+
Naphthalene	$C_{10}H_8$	S	–	–	+	–	+	+	–	+	+
Nickel II Acetate	$(CH_3COO)_2Ni$	S	+	+	+	+	+	–	+	+	+
Nickel Chloride	$NiCl_2$	S	+	+	–	+	+	+	+	+	+
Nickel Nitrate	$Ni(NO_3)_2$	S	+	+	+	+	+	+	+	+	+
Nickel Sulfate	$NiSO_4$	S	+	+	+	+	+	+	+	+	+
Nitric Acid	HNO_3	99%	n	+(50%)	+(90%)	+(50%)	+(50%)	+(65%)	+(40%)	0	+
Nitro Benzene	$C_6H_5NO_2$	100%	–	–	+	–	+	–	–	+	+
Nitro Methane	CH_3NO_2	100%	–	–	+	+	+	–	+/0	0	+
Nitro Propane	$(CH_3)_2CHNO_2$	100%	–	–	+	+	+	–	+/0	n	+
Nitro Toluene	$C_6H_4NO_2CH_3$	100%	–	–	+	+	+	0	–	+	+
Oxalic Acid	$(COOH)_2$	S	+	+	+(10%)	+	+	+	+	+	+
Octane	C_8H_{18}	100%	+	+	+	+	+	+	–	+	+
Octanol	$C_8H_{17}OH$	100%	–	–	+	+	+	+	+	+	+
Octyl Cresole	$C_{15}H_{24}O$	100%	–	–	+	+	+	0	n	+	+
Oleum	$H_2SO_4+SO_3$	10%	n	–	+	–	–	+	–	–	+
Perchloric Acid	$HClO_4$	70%	–	+(10%)	–	+	+(10%)	+	+/0	+	+
Pentane	C_5H_{12}	100%	+	+	+	+	+	+	–	+	+
Pentanol=>	Amyl Alcohol										
Peracetic Acid	$C_2H_4O_3$	50%	–	0	+	0	0	+	0	+	+
Petroleum Ether	C_nH_{2n+2}	100%	+	+/0	+	+	+	+	–	+	+
Phenol	C_6H_5OH	100%	–	–	+	+	+	+	–	+	+
Phenyl Ethyl Ether	$C_6H_5OC_2H_5$	100%	–	–	+	+	+	–	–	n	+
Phenyl Hydrazine	$C_6H_5NHNH_2$	100%	–	–	+	0	0	0	–	+	+
Phosphoric Acid	H_3PO_4	85%	+(50%)	+	+	+	+	+	+	+	+

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

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resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
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Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Phosphorous Oxychloride	$POCl_3$	100%	–	–	n	+	+	+	+	+	+
Phosphorous Trichloride	PCl_3	100%	–	–	+	+	+	0	0	+	+
Phthalic Acid	$C_6H_4(COOH)_2$	S	+	+	+	+	+	+	+	+	+
Picric Acid	$C_6H_2(NO_3)_3OH$	S	+	+	+	+	+	+	+	+	+
Piperidine	$C_5H_{11}N$	100%	–	–	+	n	n	–	–	n	+
Polyphosphate =>	Sodium Tripolyphosphate										
Potassium Acetate	CH_3COOK	S	+	+	+	+	+	+	+	+	+
Potassium Aluminum Sulfate	$KAl(SO_4)_2$	S	+	+	+	+	+	+	+	+	+
Potassium Bicarbonate	$KHCO_3$	40%	+	+	+	+	+	+	+	+	+
Potassium Bifluoride	KHF_2	S	n	+	+	+	+	+	+	+	+
Potassium Bisulfate	$KHSO_4$	5%	+	+	+	+	+	+	+	+	+
Potassium Bitartrate	$KC_4H_5O_6$	S	+	+	+	+	+	+	+	+	+
Potassium Borate	KBO_2	S	+	+	+	+	+	+	+	+	+
Potassium Bromate	$KBrO_3$	S	+	+	+	+	+	+	+	+	+
Potassium Bromide	KBr	S	+	+	+(10%)	+	+	+	+	+	+
Potassium Carbonate	K_2CO_3	S	+	+	+	+	+	+	+	+	+
Potassium Chlorate	$KClO_3$	S	+	+	+	+	+	+	+	+	+
Potassium Chloride	KCl	S	+	+	–	+	+	+	+	+	+
Potassium Chromate	K_2CrO_4	10%	+	+	+	+	+	+	+	+	+
Potassium Chrome Sulfate	$KCr(SO_4)_2$	S	+	+	+	+	+	+	+	+	+
Potassium Cyanate	KOCN	S	+	+	+	+	+	+	+	+	+
Potassium Cyanide	KCN	S	+	+	+(5%)	+	+	+	+	+	+
Potassium Cyanoferrate II	$K_4Fe(CN)_6$	S	+	+	+	+	+	+	+	+	+
Potassium Cyanoferrate III	$K_3Fe(CN)_6$	S	+	+	+	+	+	+	+	+	+
Potassium Dichromate	$K_2Cr_2O_7$	S	+	+	+25%	+	+	+	+	+	+
Potassium Ferricyanide	$K_3Fe(CN)_6$	S	+	+	+	+	+	+	+	+	+
Potassium Ferrocyanide	$K_4Fe(CN)_6$	S	+	+	+	+	+	+	+	+	+
Potassium Fluoride	KF	S	+	+	+	+	+	+	+	+	+
Potassium Hydroxide	KOH	50%	n	+	+	+	+	–	+	+	+
Potassium Iodide	KI	S	+	+	+	+	+	+	+	+	+
Potassium Nitrate	KNO_3	S	+	+	+	+	+	+	+	+	+
Potassium Perchlorate	$KClO_4$	S	+	+	n	+	+	+	+	+	+
Potassium Permanganate	$KMnO_4$	S	+	+	+	+	+	+	+	+	+
Potassium Persulfate	K_2SO_4	S	+	+	+	+	+	+	+	+	+
Potassium Phosphate	KH_2PO_4	S	+	+	+	+	+	+	+	+	+
Potassium Sulfate	K_2SO_4	S	+	+	+	+	+	+	+	+	+
Potassium Sulfite	K_2SO_3	S	+	+	+	+	+	+	+	+	+
Propanol	C_2H_7OH	100%	–	+	+	+	+	+	+	+	+
Propionic Acid	C_2H_5COOH	100%	0	+	+	+	+	+	+	+	+
Propionitrile	CH_3CH_2CN	100%	n	n	+	+	+	+	–	+	+
Propyl Acetate	$CH_3COOC_3H_7$	100%	–	–	+	+	+	–	+/0	+	+
Propylene Glycol	$CH_3CHOHCH_2OH$	100%	+	+	+	+	+	+	+	+	+
Pyridine	C_6H_5N	100%	–	–	+	+	0	–	–	–	+
Pyrrole	C_4H_4N	100%	n	n	+	+	+	–	–	n	+
Salicylic Acid	HOC_6H_4COOH	S	+	+	+	+	+	+	+	+	+
Sea Water	–		+	+	0	+	+	+	+	+	+
Silic Acid	SiO_2+H_20	S	+	+	+	+	+	+	+	+	+
Silver Bromide	AgBr	S	+	+	+/0	+	+	+	+	+	+
Silver Chloride	AgCl	S	+	+	–	+	+	+	+	+	+
Silver Nitrate	$AgNO_3$	S	+	+	+	+	+	+	–	+	+
Soda Ash=>	Sodium Carbonate										
Sodium Acetate	CH_3COONa	S	+	+	+	+	+	+	+	+	+
Sodium Benzoate	C_6H_5COONa	S	+	+	+	+	+	+	+	+	+
Sodium Bicarbonate	$NaHCO_3$	S	+	+	+	+	+	+	+	+	+
Sodium Bisulfate	$NaHSO_4$	S	+	+	+	+	+	+	+	+	+
Sodium Bisulfite	$NaHSO_3$	S	+	+	+	+	+	+	+	+	+

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

s = saturated aqueous solution
+/o = conditional resistance
+ = good resistance
o = limited resistance
– = no resistance
+(x%) = good resistance to x% concentration
* = With glued fittings, please check the resistance of the glue.

n = unknown resistance
=> = refer to . . .
A.C. = any concentration
S = saturated solution
Conc. = concentrated
D = weak solution

resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Sodium Borate	$NaBO_2$	S	+	+	+	+	+	+	+	+	+
Sodium Bromate	$NaBrO_3$	S	+	+	+	+	+	+	+	+	+
Sodium Bromide	NaBr	S	+	+	+	+	+	+	+	+	+
Sodium Carbonate	Na_2CO_3	S	+	+	+/0	+	+	+	+	+	+
Sodium Chlorate	$NaClO_3$	S	+	+	+	+	+	+	+	+	+
Sodium Chloride	NaCl	S	+	+	–	+	+	+	+	+	+
Sodium Chlorite	$NaClO_2$	24%	+	+	+(10%)	+	+	+	+	+	+
Sodium Chromate	Na_2CrO_4	S	+	+	+	+	+	+	+	+	+
Sodium Cyanide	NaCN	S	+	+	+	+	+	+	+	+	+
Sodium Dichromate	$NaCr_2O_7$	S	+	+	+	+	+	+	+	+	+
Sodium Dithionite	$Na_2S_2O_4$	S	+	+10%	+	+10%	+10%	n	n	+	+
Sodium Fluoride	NaF	S	+	+	+(10%)	+	+	+	+	+	+
Sodium Hydrogen Sulfate	$NaHSO_4$	S	+	+	+	+	+	+	+	+	+
Sodium Hydrogen Sulfide	$NaHSO_3$	S	+	+	+	+	+	+	+	+	+
Sodium Hydroxide	NaOH	50%	+	+	+	+	+	–	+	+	+
Sodium Hypochlorite	NaOCl	12-15%	+	+	–	+	0	0	+	+	+
Sodium Iodide	NaI	S	+	+	+	+	+	+	+	+	+
Sodium Metaphosphate	$(NaPO_3)n$	S	+	+	+	+	+	+	+	+	+
Sodium Nitrate	$NaNO_3$	S	+	+	+	+	+	+	+	+	+
Sodium Nitrite	$NaNO_2$	S	+	+	+	+	+	+	+	+	+
Sodium Oxalate	$Na_2C_2O_4$	S	+	+	+	+	+	+	+	+	+
Sodium Perborate	$NaBO_2$+*H_2O_2	S	+	+/0	+	+	+	+	+	+	+
Sodium Perchlorate	$NaClO_4$	S	+	+	+(10%)	+	+	+	+	+	+
Sodium Peroxide	Na_2O_2	S	+	+	+	–	+	+	+	+	+
Sodium Persulfate	$Na_2S_2O_8$	S	n	+	+	+	+	+	+	+	+
Sodium Pyrosulfite	$Na_2S_2O_5$	S	+	+	+	+	+	n	n	+	+
Sodium Salicylate	$C_6H_4(OH)COONa$	S	+	+/0	+	+	+	+	+	+	+
Sodium Silicate	Na_2SiO_3.	S	+	+	+	+	+	+	+	+	+
Sodium Sulfate	Na_2SO_4	S	+	+	+	+	+	+	+	+	+
Sodium Sulfide	Na_2S	S	+	+	+	+	+	+	+	+	+
Sodium Sulfite	Na_2SO_3	S	+	+	+(50%)	+	+	+	+	+	+
Sodium Tetraborate	$Na_2B_4O_7$*$10H_2O$	S	+	+	+	+	+	+	+	+	+
Sodium Thiosulfate	$Na_2S_2O_3$	S	+	+	+(25%)	+	+	+	+	+	+
Sodium Tripolyphosphate	$Na_5P_3O_{10}$	S	+	+	+	+	+	+/0	+	+	+
Stannic Chloride	$SnCl_4$	100%	+	+	–	+	+	+	+	+	+
Stannous Chloride	$SnCl_2$	S	+	+	–	+	+	+	+	+	+
Starch	$(C_6H_{10}O_5)n$	S	+	+	+	+	+	+	+	+	+
Stearic Acid	$C_{17}H_{35}COOH$	100%	+	+	+	+	+	+	–	+	+
Styrene	$C_6H_5CHCH_2$	100%	–	–	+	0	0	0	–	+	+
Succinic Acid	$C_4H_6O_4$	S	+	+	+	+	+	+	+	+	+
Sugar Syrup		S	+	+	+	+	+	+	+	+	+
Sulfuric Acid	H_2SO_4	98%	+30%	+50%	+20%	+80%	+85%	+	+	+	+
Sulfurous Acid	H_2SO_3	A.C.	+	+	+(10%)	+	+	+	+	+	+
Sulfuryl Chloride	SO_2Cl_2	100%	–	–	n	–	–	+	0	n	+
Tannic Acid	$C_{76}H_{52}O_{46}$	50%	+	+	+	+	+	+	+	+	+
Tartaric Acid	$C_4H_6O_6$	S	+(50%)	+	+	+	+	+	+/0	+	+
Tetrachloroethane	$C_2H_2Cl_4$	100%	–	–	+	0	0	0	–	+	+
Tetrachloroethene	C_2Cl_4	100%	–	–	+	0	0	0	–	+	+
Tetrahydrofuran	C_4H_8O	100%	–	–	+	0	0	–	–	–	+
Tetrahydro Naphthalene	$C_6H_4C_4H_8$	100%	–	–	+	0	–	+	–	+	+
Thionyl Chloride	$SOCl_2$	100%	–	–	n	–	–	+	+	–	+
Thiophene	C_4H_4S	100%	n	–	+	0	0	–	–	n	+
Tin II Chloride	$SnCl_2$	S	+	0	–	+	+	+	+	+	+
Tin II Sulfate	$SnSO_4$	S	+	+	+	+	+	+	+	+	+
Tin IV Chloride	$SnCl_4$	S	n	+	–	+	+	+	+	+	+

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C).** (May differ at other temperatures)

s = saturated aqueous solution
+/o = conditional resistance
\+ = good resistance
o = limited resistance
– = no resistance
+(x%) = good resistance to x% concentration
* = With glued fittings, please check the resistance of the glue.

n = unknown resistance
=> = refer to . . .
A.C. = any concentration
S = saturated solution
Conc. = concentrated
D = weak solution

resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).
PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Titanium Tetrachloride	$TiCl_4$	100%	n	n	n	n	n	0	–	+	+
Toluene	$C_6H_5CH_3$	100%	–	–	+	0	0	0	–	+	+
Toluene Diisocyanate	$C_7H_6(NCO)_2$	100%	n	n	+	+	+	–	+/0	n	+
Tributyl Phosphate	$(C_4H_9)_3PO_4$	100%	n	–	+	+	+	–	+	+	+
Trichloroacetaldehyde Hydr.	$CCl_3CH(OH)_2$	S	–	–	+	+	0	0	0	–	+
Trichloroethane	CCl_3CH_3	100%	–	–	+	0	0	+	–	+	+
Trichloroethene	C_2HCl_3	100%	–	–	+/0	0	0	0	–	+	+
Trichloroethylene	C_2HCl_3	100%	–	–	+	0	0	0	–	+	+
Trichloroacetic Acid	CCl_3COOH	50%	–	+	–	+	+	–	0	+	+
Tricresyl Phosphate	$(C_7H_7O)_3PO$	90%	n	–	+	+	+	0	+	n	+
Triethanolamine	$N(C_2H_4OH)_3$	100%	–	0	+	+	+	–	+/0	+	+
Trioctyl Phosphate	$(C_8H_{17})_3PO_4$	100%	n	–	+	+	+	0	+	+	+
Trisodium Phosphate	Na_3PO_4	S	+	+	+	+	+	+	+	+	+
Urea	$CO(NH_2)_2$	S	+	+/0	+	+	+	+	+	+	+
Vinyl Acetate	$CH_2CHOOCCH_3$	100%	–	–	+	0	–	0	–	+	+
Xylene	$C_6H_4(CH_3)_2$	100%	–	–	+	0	–	0	–	0	+
Zinc Acetate	$(CH_3COO)_2Zn$	S	+	+	+	+	+	–	+	+	+
Zinc Chloride	$ZnCl_2$	S	+	+	–	+	+	+	+	+	+
Zinc Sulfate	$ZnSO_4$	S	+	+	+	+	+	+	+	+	+

Controllers

DCM 2 Series

Description

The ProMinent DCM 2 controller is the perfect partner for monitoring and controlling water chemistry parameters and processes in hotels, motels and condos. The DCM 2's precision and uncompromising quality represent a world-class solution to ensure a safe and healthy water experience for patrons.

Application Specific Markets

- Swimming pools
- Therapy pools
- Hot tubs
- Spray pads
- Residential pools

Features & Benefits

- Proprietary sensor technology for pH & ORP
- Hydraulic compensation via true PID control
- Ethernet web-based real-time monitor and control via smart phone, iPad or tablet device
- Hydraulically advanced flowcell assembly
- Automatic discrete control and flow adjustments of chemical dosing pump
- Trackster™ auto poll, data logging, graphing and report building software
- USB host data log upload port

Specifications

Specifications	Details
Operator Interface	
Remote	Fully interactive Ethernet TCP/IP graphical interface with security access codes
Local	2 line, 12 character LCD display, 5 buttons, 2 LEDs: Steady Blue = “OK,” Flashing Blue = flow switch is in “Recovery Delay” after a flow interuption, Flashing Red = “Alarm”
Analog	
Sensors	pH, ORP and Temperature
Digital I/O	
Digital Inputs	2 (1 Configurable)
Output/Control Relays	3 (10 A, assignable)
Digital Outputs	2 (assignable)
Control	
	On/Off P/PI/PID Time Modulated Event Timer Flow Restored delay (adjustable)
Communication	
	HTML server on board, standard USB port Standard Ethernet, Wireless EVDO Cellular, Optional WiFi for use with Smartphone/iPad HTML, Micro Web Server with user definable IP address
System	
Power	120 or 230 VAC, 50/60Hz, single phase
Fusing	5 amps @ 120 VAC or 2.5 Amps @ 230 VAC
Surge Suppression	Relay 2, 10 Amp N.O.
Accessory Power	12 VDC, Regulated, Thermally Fused @ 50 mA
Enclosure	Non-metallic, NEMA 4X
Memory integrity protection	Internal Flash parameter protection, and 5 year lithium Battery for RAM stored values

DCM 2 Series Selection Guide

Model	Description	Part Number
DCM 200	Controller for pH, ORP	7761496

DCM 5 Series

Description

The ProMinent DCM 5 controller is the perfect partner for monitoring and controlling water chemistry parameters and processes. The DCM 5's precision and uncompromising quality represent a world-class solution to ensure a safe and healthy water experience for patrons.

Application Specific Markets

- Swimming pools
- Therapy pools
- Hot tubs
- Water parks
- Spray pads
- Amusement Park Attractions
- Zoos and Aquariums

Features & Benefits

- Proprietary sensor technology
- Oxidant specific sensor
- Combined chlorine control[1]
- Simultaneous Chlorine/ORP control
- Eco! Mode
- VFD control
- Real-time corrosion & calcification monitoring and alarm[2]
- Loading compensation via true proportional control
- Hydraulically advanced flowcell assembly
- Automatic discrete control and flow adjustments of chemical dosing pump[3]
- Capable of controlling two bodies of water[4]
- Trackster™ auto poll, data logging, graphing and report building software
- Standard web-based real-time monitor and control via smart phone, iPad or tablet device

Notes:
1 Requires optional total chlorine probe
2 Requires optional corrosion and scaling probes
3 When used with ProMinent dosing pumps
4 Optional

Specifications

Specifications	Details
Operator Interface	
Remote	Fully interactive Ethernet TCP/IP graphical interface with security access codes
Local	2 line, 12 character LCD display, 5 buttons, 2 LEDs: Steady Blue – “OK”, Flashing Red = “Alarm”
Sensors	
Included Sensors	pH, ORP, Temperature
Optional Sensors	Free Chlorine, total Chlorine, Calculated Combined Chlorine, Salt Generated Free Chlorine, Stabilized Chlorine, Conductivity, Bromine, Feed Verification, Corrosion, Calcification, Flow Rate, Water Level. Second body of water set of sensors: pH + ORP, Temperature
Field Upgrades	Sensors input modules are available for field upgrades
Inputs	
Digital Inputs	8, (7 fully configurable)
Analog Inputs	8 (configurable options) Example: 2 Cond, 2 Temp, 1 pH, 1 ORP, 1 FAC, 1 TRC
Outputs	
Control Relays	5 (fully assignable for: 1. Acid 2. Oxidant 3. Chlorine Boost / Caustic Feed 4. Probe Wash / Alarm 5. Filter Acid / Flow switch test & verify 6. Auto Fill 7. Heater Control 8. UV control (Interlocked with sample and recirculation flow when used for chemical feed.)
Digital Outputs	4 (fully assignable as dry contact sets for variable frequency pump) for: 1. UV 2. Pump / VFD Control 3. Chlorine / Ozone Generator 4. Alarm / Eco!Mode mode for Recirculation Pump Base feed available if sensor disconnected
Analog Outputs	2 (optional isolated, 4-20 mA)
Control	
	On/Off ORP assisting Residual P/PI/PID Eco!Mode Event Timers UV Boost / VFD Control Chlorine Boost / Ozone Control Flow Restored delay (adjustable) Emergency Off for Recirculation Pump Autofill Chem Feed Verification (optional) Pulsed Pump Speed
Communication	
	HTML server on board (standard) 10 Base T, TCP/IP Ethernet, Optional Wireless EVDO Cellular, Smartphone / iPad HTML, Micro Web Server with DHCP or user definable IP address
Security	
	Local and remote access protected by access codes
System	
Power	120 or 230 VAC, 60/50 Hz, 5A/3A, single phase only
Fusing	5 amps @ 120 VAC or 2.5 Amps @ 230 VAC
Surge Suppression	Relay 2-5 N.O. contacts snubbed @ 0.1 µF, 150 Ω
Accessory Power	15-22 VDC, Unregulated, Thermally Fused 2 50 mA
Enclosure	Non-metallic, NEMA 4X, 14” x 9” x 4.5” (WxHxD)
Convenience	Save and restore of “last known good” parameters Multiple pre-loaded configuration and browser views
Warranty	
	5 years on electronics 2 years on ORP, pH sensors 1 year on all other parts

DCM 5 Series Selection Guide

Model	Description	Part Number
DCM 500	Controller for pH, ORP and Temp	7761461
DCM 501	Controller for pH, ORP and PPM on non stabilized (CYA) water	7761462
DCM 502	Controller for pH, ORP, PPM and Combined PPM on non stabilized (CYA) water	7761463
DCM 503	Controller for pH, ORP and PPM and CYA stabilized water	7761464
DCM 520	Complete 2-Pool System, with 2 Separate Sample Modules, including pH, ORP and Temp Sensors only 1 temp sensor input on DCM500! Expansion board needed for second temp input	Configure via eQuote or Inquire
DCM 5	Custom configurations and packages	Available on inquiry or via eQuote

DCM 5 Spare Parts / Accessories

Description	Part Number
pH sensor, Industrial Grade, 38.9 mL Inorganic gel, with SN6 connector, 25 mm DGMa and 1/2" NPT	7500441
ORP Sensor, 38.9 mL Inorganic gel, with proprietary Platinum tip design, SN6 connector, 25 mm DGMa, and 1/2" NPT	7500442
ORP GOLD tip probe, SN6 13.5 mm DGMa	1003875
SN6 to BNC connector for retrofits on controllers with BNC connection, 6ft.	1033011
Conductivity Temperature Sensor Upgrade	7761452
Water level control switch. *valve provided by others*	1031590
Flow sensor for ½" to 4" pipe with direct connection to DCM5. ***Saddle ordered separately***	7500539
Flow sensor for 5" to 8" pipe with direct connection to DCM5. ***Saddle ordered separately***	7500540
Flow sensor for 10" and greater pipe with direct connection to DCM5. ***Saddle ordered separately***	7500541
PVC Saddle 2" PVC	7500542
PVC Saddle 3" PVC	7500543
PVC Saddle 4" PVC	7500544
PVC Saddle 6" PVC	7500545
PVC Saddle 8" PVC	7500546
PVC Saddle 10" PVC	7500547
PVC Saddle 12" PVC	7500548
3G Wireless Service Module. Includes 1 yr. of monthly service and Wi-Fi network.	7500504
10 ft. corded Antenna for 3G service	7500505
27 ft. corded Antenna for 3G service	7500507
BRE 1-MA-10PPM Bromine Sensor DCM500	1006895
CL CLO 1-10 ppm Free Chlorine Probe for use with Salt Pools or presence of hydrogen in water	1033870
CL CGE 1-10 ppm Free Chlorine used when Cyanuric is present	792842
CL CLE 3 10 ppm Free Chlorine probe w/o Cyanuric Acid	792919
CTE CHLORINE SENSOR 1-10 ppm Gold tip. Total / Combined PPM for Salt Pools or presence of hydrogen in water	7781550
PPM Rebuild Kit (SP SET CGE2/CTE1 w/ Membrane Caps)	740048
Corrosion Kit – Admiralty Brass	7500550
Corrosion Kit – Carbon Steel	7500551
Corrosion Kit – Copper	7500552
Corrosion Kit – Stainless Steel	7500553
Corrosion Kit – Cupro Nickel	7500554
Expansion card kit	7500567

Dulcomarin II

Description

The ProMinent Dulcomarin II Pool Controller technology is revolutionizing measuring, control and metering technology in pools, water parks and aquariums. The decentralized modular concept with one single central unit controls sensors and chemical feeders for up to 16 bodies of water.

Application Specific Markets

- Swimming pools
- Water parks
- Spray pads
- Zoos and Aquariums

Features & Benefits

- Compact and configurable for any application
- Integrated videographic recorder
- Large VGA color display
- Logbook function saves all events such as calibration data, error messages, etc.
- Embedded web server – view measurement data from any PC with standard web browser
- Maintenance/error message by SMS or e-mail
- Decentralized modular design – control up to 16 bodies of water
- Easy on-site calibration
- Access Codes to prevent unauthorized adjustment
- CANopen BUS sensor technology
- pH, ORP, Temperature, Free Chlorine and Total Chlorine control
- Calculated combined chlorine reading

Specifications

Measurement parameters (per system, up to 16 bodies of water)	pH	1 to 14
	Redox/ORP	-1200 to +1200 mV
	Free chlorine	0.01 to 100 ppm
	Total chlorine	0.01 to 10 ppm (optional)
	Combined chlorine as differential measurement	0.01 to 2 ppm (optional)
	Temperature	-4°F (-20°C) to +302°F (+150°C)
Error of measurement	pH, chlorine and ORP: max. ±0.5% of the measuring scale range (at 77°F / 25°C) Temperature: max. ±0.5% °C of the measuring range (at 77°F / 25°C)	
Measurement inputs	pH and Redox/ORP via terminal mV chlorine via CANopen bus connection of sensor modules and actuator modules via CANopen bus	
Control modes	P/PI/PID control, intelligent control and ORP	
Control	Bidirectional control for pH (acid/alkali), unidirectional control for disinfectants	
EcoMode	EcoMode-Energy saving mode for non peak hours, control parameters are optimized for non peak hours	
Digital inputs (per system)	6 x 16 potential-free inputs (sample water, pause, 3 pump fault relays, disturbance variable, change over of parameter set, contact water meter)	
Analog inputs (per system)	3 x 16 4-20 mA Inputs	2 x 16 Digital Inputs
Signal current outputs (per system)	4 x 0/4-20 mA (for each measured variable galvanically separated), max. load 600 Ω range adjustable	
	3 x 16 Digital Inputs	3 x 16 Pulse Inputs
Alarm relay	250 V~, 3A	
Interfaces	Local Area Network (LAN), SD expansion slot (for SD or MMC cards)	
Communication	Embedded web server or embedded OPC server	
Electrical connection	85 to 265 V~, 50/60 Hz	
Ambient temperature	23°F to 113°F (-5°C to 45°C)	
Storage temperature	14°F to 158°F (-10°C to 70°C)	
System of protection	IP 65 / NEMA 4x	
Dimensions of central unit	13.46” x 8.94” x 3.07” (342 x 227 x 78 mm) (WxHxD)	

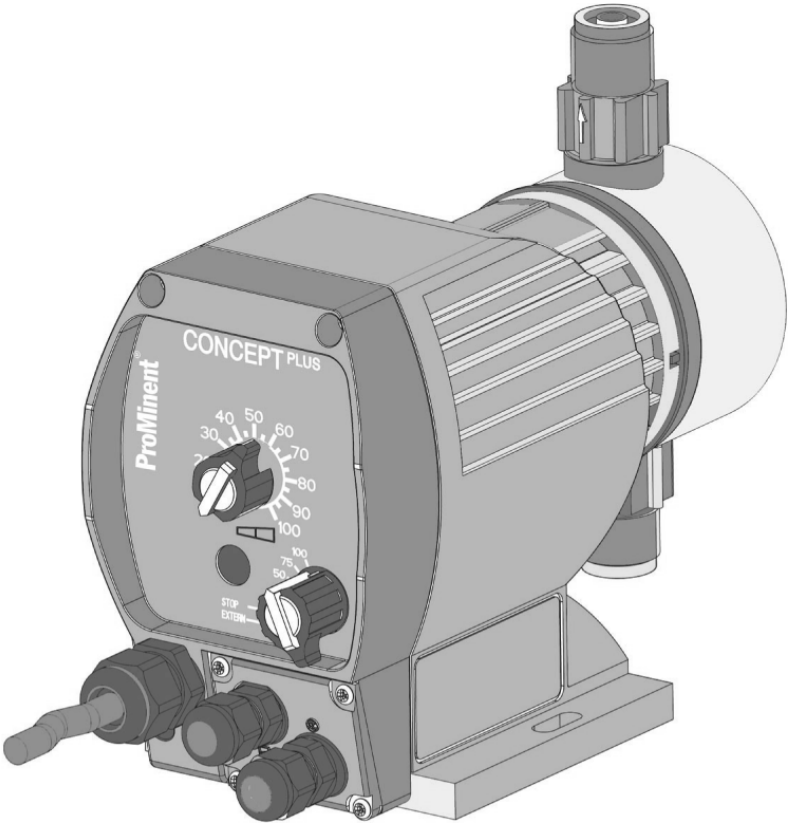
Pumps

ProMinent® Concept^{PLUS} Solenoid Diaphragm Metering Pumps

Overview: Concept^{PLUS}

Ideal for basic chemical feed applications

- Capacity range of 0.20 to 3.94 GPH (0.74 to 14.9 LPH) at pressures up to 232 psi (16 bar).
- Continuous stroke length adjustment from 0-100% (recommended 30-100%)
- Fixed frequency settings @ 0, 25, 50, 75 and 100%
- Low cost opens up opportunities in the most basic applications
- NP (acrylic) and PVDF liquid ends
- Integral bleed valve simplifies priming and prevents “loss of prime” prevents “loss of prime”
- Common applications: Cooling towers, chlorination and metal finishing
- Optional chemical tank level indicator available
- Private labeling & colors available
- Certified to NSF/ANSI 61, NSF 50 pending



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Capacity Data

Pump Version	Capacity at Maximum Back Pressure					Max. Stroking Rate	Pre-Primed Suction Lift		Tubing Connectors O.D. x I.D. (in.)	Shipping Weight (approx.)	
	psig	(bar)	U.S. GPH	(L/h)	mL / stroke	spm	ft.	(m)		lbs.	(kg)
1002	145	(10)	0.55	(2.4)	0.19	180	16	(5)	1/4” x 3/16”	3.97	(1.8)
0704	101	(7)	1.00	(3.7)	0.36	180	13	(4)	1/4” x 3/16”	3.97	(1.8)
0308	43	(3)	2.25	(9.0)	0.79	180	20	(6)	3/8” x 1/4”	3.97	(1.8)
0215	21	(2)	3.94	(14.1)	1.40	180	5	(1.5)	3/8” x 1/4”	3.97	(1.8)

External pulse contact retrofit available as an option (P/N 1022000)

Materials In Contact With Chemicals

	Pump head	Valves	O-rings	Balls
NPB	Acrylic	PVC	Viton®	ceramic

Pump diaphragm with PTFE-coating.

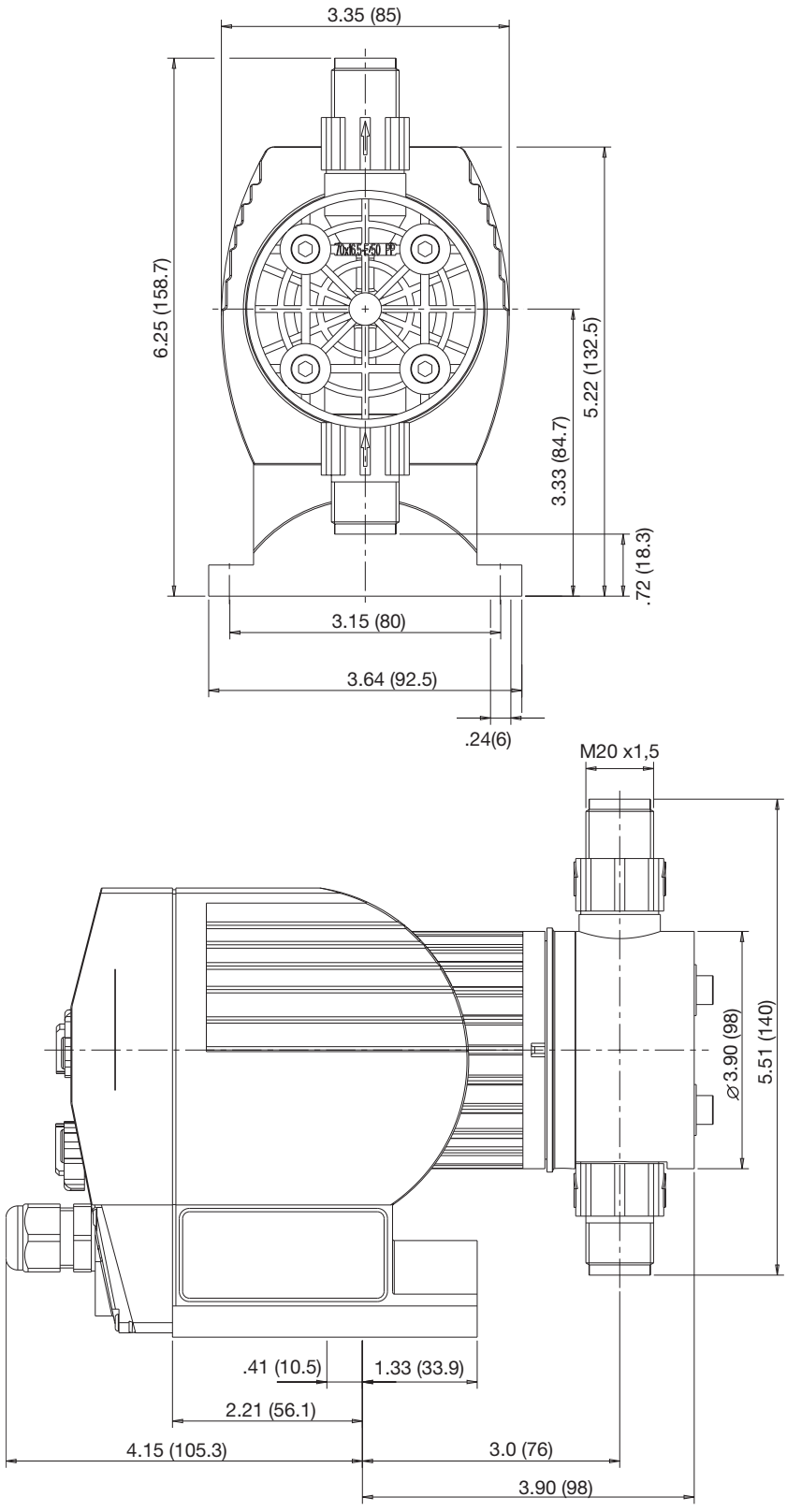
Note: Viton® is a registered trademark of DuPont Dow Elastomers.

Identcode Ordering System

CNPa	**Concept PLUS**										
	Version	**Capacity**									
	1002	0.53 gph (2.0 l/h), 145 psi (10 bar)									
	0704	1.03 gph (3.9 l/h), 102 psi (7 bar)									
	0308	2.10 gph (8.0 l/h), 43.5 psi (3 bar)									
	0215	3.17 gph (13.5 l/h), 29 psi (1.5 bar)									
		Liquid end material:									
		PP	Polypropylene								
		NP	Acryllic/PVC								
		PV	PVDF								
			O-rings:								
			E	EPDM/PTFE coated, only for PP and NP self-degassing							
			B	FPM-B/PTFE coated, only on PP and NP self-degassing							
			T	PTFE/PTFE coated							
				Liquid end version:							
				0	Non-bleed version, no valve spring						
				1	Non-bleed version, with valve spring						
				2	With deaerator, no valve spring (except 0704 models)						
				3	With deaerator, with valve spring						
					Connection:						
					0	Standard according to technical data					
					B	Special connection 3/8" x 1/4"					
						Logo:					
						0	With ProMinent® logo				
							Power Supply:				
							A	1 ph 230 V 50/60 Hz (Euro plug)			
							D	1 ph 115 V 50/60 Hz (US plug)			
							U	1 ph 230 V 50/60 Hz (US plug) (consult factory for pricing)			
								Control Option:			
								0	Standard (w/o external control)		
								B	Pulse control		
									Accessories:		
									1	With accessories (foot valve, injection valve, tubing)	
										Approval:	
										04	CSA
CNPa	**1002**	**NP**	**B**	**2**	**0**	**0**	**A**	**B**	**1**	**04**	

Dimensional Drawings

Dimensions in inches (mm).
Ranges given, actual dimension dependent on liquid end material.



ProMinent® Beta® b Solenoid Diaphragm Metering Pumps

Overview: Beta® b

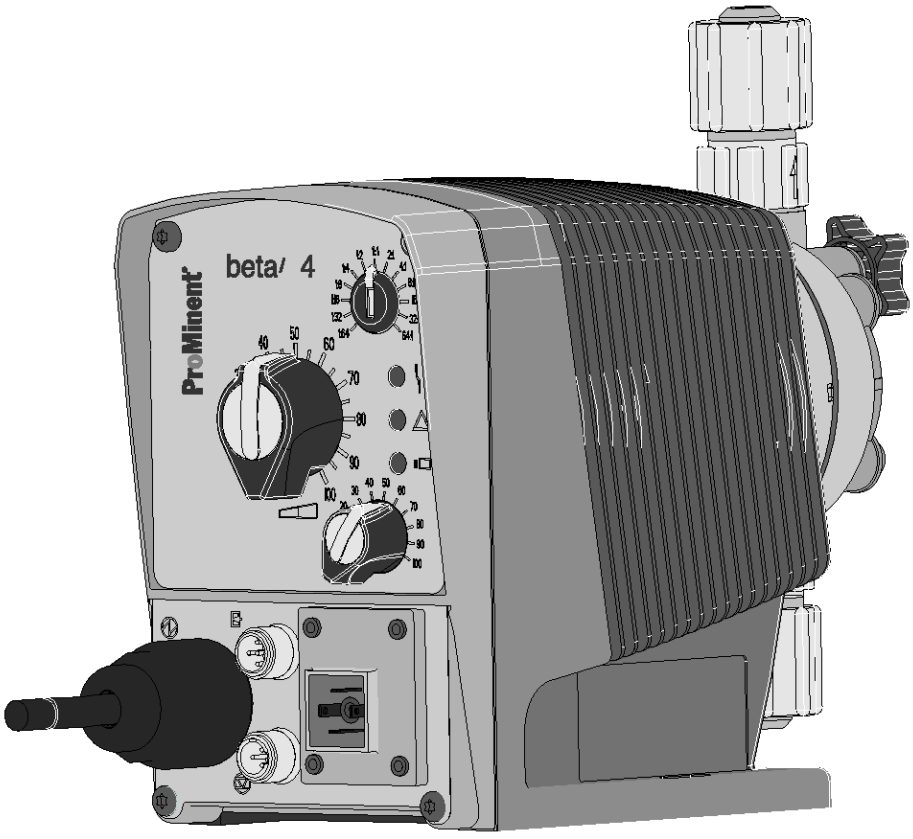
Ideal for basic chemical feed applications

- Capacity range 8.4 gph (32 l/h) max, 363 psi (25 bar) max
- External contact input for pulse control with a range of 1:64-64:1
- Continuous stroke length adjustment from 0-100% (recommended 30-100%)
- Supplied in Acrylic/PVC and PVDF
- Patented coarse/fine deaeration for PP, and Acrylic/PVC
- Auto-degassing liquid end in Acrylic/PVC
- HV liquid end for highly viscous media (Suitable for viscosities to 3000 psi)
- 10-setting stroke frequency adjustment from 10-100&
- External control via voltage-free contacts
- Connector for two stage level switch
- 12-24 V DC, 24 V AC low voltage version
- LED's for operation status
- NSF/ANSI 61 approved, NSF 50 pending

ProMinent® solenoid-driven metering pumps consist of two main components: the pump drive unit and the liquid end. The beta series offers two drive (solenoid) sizes: beta/4 (BT4b) and the beta/5 (BT5b). Operating principles and options are identical, and both units offer maximum backpressure up to 363 psig (17.5 bar). Capacity range for the beta/4 is 0.19 to 5 gph (0.74 to 19 l/h); beta/5 is 0.80 to 8.4 gph (2.9 to 32 l/h).

Feed rate is determined by stroke length and stroking rate: stroke length can be varied from 0 to 100% with an adjustment ration of 10:1. It is set manually by the adjustment knob on the front of the pump.

Stroke rate can be adjusted in 10% increments between 10 and 100% via the multifunction switch. This switch is also used to select voltage-free On/Off external pulse contact, pump stop, or test (for priming).



P_BE_0048_SW

Specifications

Drive Unit

The pump housing is constructed of fiberglass-reinforced PPE plastic to protect against corrosion, dust and water.

The solenoid drive unit houses a short-stroke solenoid with a maximum stroke length of 0.05” (1.25 mm). It is equipped with a noise suppressing mechanism for quiet operation and the armature is the only moving part.

Operating on pulse action, each pulse generates a magnetic field in the solenoid coil. This magnetic field moves the armature, which the diaphragm is on. The diaphragm pushes into the dosing head cavity forcing chemical out of the discharge valve. When the magnetic field is de-energized, a spring returns the armature and diaphragm to their original position. This return movement draws chemical into the dosing head cavity through the suction valve.

In the event of a diaphragm rupture, the liquid end has a weep hole on the bottom of the backplate to direct chemical out of the pump and away from the solenoid. An optional diaphragm failure monitor can be used to stop the pump and indicate a problem.

The stroke-length adjusting mechanism is connected directly to the solenoid. Adjustment results in an accurate self-locking stroke length setting.

Diaphragm

The diaphragm is constructed of fabric-reinforced EPDM elastomer with a plastic core and PTFE-facing. It is chemically resistant to virtually all process fluids and can be used over a wide temperature range. The beta pump is designed with a convex diaphragm. The curved shape provides more precise metering and alleviates stress placed on the diaphragm by reducing liquid end dead volume.

Liquid End

The beta metering pump liquid ends are available in five material versions: Polypropylene (PP), Kynar (PVDF), Acrylic/PVC (NP), PTFE (TT), and 316 Stainless steel (SS).

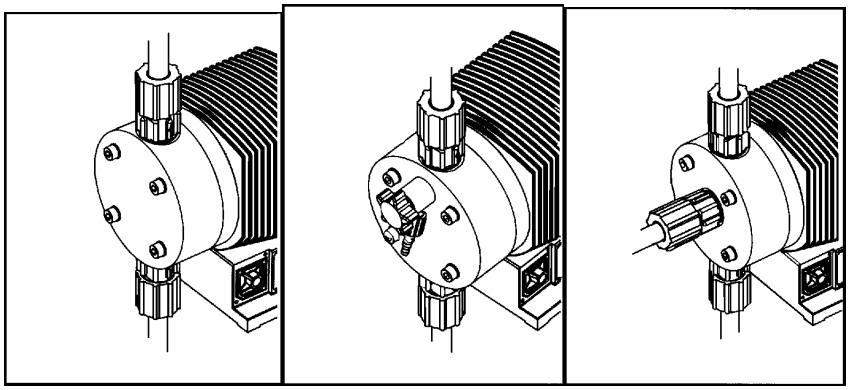
Some liquid ends are interchangeable between the BT4a and BT5a.

Options include a manual bleed valve with needle valve for easy priming, and continuous bleeding of fluids that tend to off-gas (available with versions PP, PVT and NP liquid ends).

Automatic degassing liquid ends are available for PP and NP versions (except 1000 and 0232). This style liquid end discharges from the center and degasses from the top to prevent air build-up in the chamber.

High viscosity PVDF liquid ends are available for pump versions 1005, 0708, 0413, 0220, 1008, 0713 and 0420. Their metering capacity is 10-20% less than standard pump versions and recommended viscosity is up to 3000 cPs. The HV liquid ends are not self-priming so flooded suction is recommended.

Suction and discharge parts are equipped with double ball check valves for superior repeatability.



Liquid end without bleed valve Liquid end with bleed valve Auto-degassing liquid end

Specifications (cont.)

Power Supply

The beta metering pumps accepts a universal 100-230 volt power supply +/− 10%, single phase, 50/60 Hz, with a 1.15 service factor. Performance is identical whether operated on 50 Hz or 60 Hz power. The power cord is detachable.

Fault Indicators

Three LED lights indicate operational status. A green light flashes during normal operation; a yellow light warns of low chemical; and a red light indicates lack of chemical or an operational error.

Relay Outputs

Fault annunciating relay: For low tank level (level switch), processor fault, and fuse/power supply failure.

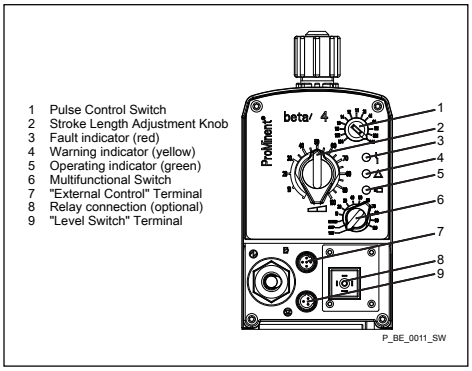
Pacing relay: A contact closure is issued with every pump stroke (contact duration 150 ms). This allows a second ProMinent metering pump to be paced synchronously, or to totalize flow with an external stroke counter

c US Recognized

CE Available

NSF

Certified to NSF/ANSI 61



Specifications (Cont.)

Maximum stroke length:	0.05” (1.25 mm)
Materials of construction Housing:	Fiberglass reinforced PPE
Diaphragm:	PTFE-faced EPDM with plastic core
Liquid end options	PVDF, Acrylic/PVC
Enclosure rating:	(IP 65)
Motor insulation class:	F
Power supply:	100-230 VAC, 1 phase, 50/60 Hz, +/- 10%; 12-24 VDC or 24 VDC +/- 10%
Check valves:	Double ball
Repeatability of the metering:	When used according to operating instructions, ± 2% under constant conditions and at minimum 30% stroke length
Power cord:	6 foot (2 m)
Relay Cable (optional):	6 foot (2 m)
Relay load	
Fault relay only (options 1 & 3):	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions
Fault and pacing relay (options 4 & 5):	Contact load: 250 VAC/DC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions Residual impedance in ON-position (R_{DSOn}): < 8 Ω Residual current in OFF-position: <1µA Maximum current: < 100 mA Maximum voltage: 24 VDC Switch functions: $15x10^9$ Contact closure: 100 ms (for pacing relay)
Ambient temperature range:	14 °F (-10 °C) to 113 °F (45 °C)

Max. fluid operating temperatures:

Material	**Constant**	**Short Term**
Acrylic/PVC	113 °F (45 °C)	140 °F (60 °C)
PVDF	149 °F (65 °C)	212 °F (100 °C)

Average power drain at maximum stroking rate (Watts) / current drain at pump stroke (Amps)	
BT4b:	17W / 0.7 A or 15 A (peak current for approx. 1 ms)
BT5b:	22 W / 1.0 A or A (peak current for approx. 1 ms)
Service factor:	1.15
Warranty:	2 years on drive, 1 year on liquid end
Industry standards:	UL recognized, CE available for USA and Canada, NSF/ANSI 61
Valve threads:	Metric thread for PP, NP, PVT and TT versions. 1/2” MNPT connections are available in all materials
Standard Production Test:	**All pumps are tested for capacity at maximum pressure prior to shipment**
Max. solids size in fluid:	Pumps with 1/4” valves: 15µ – Pumps with 1/2” valves: 50µ
Controlling contact (pulse):	With voltage free contact, or with semiconductor sink login control (NPN), not source logic (PNP). With a residual voltage of <700 mV, the contact load is approximately 0.5 mA at +5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used.) Pump ignores contacts exceeding maximum input rate, and will not remember.
Necessary contact duration:	20 ms
Recommended Viscosity:	Max. 200 cPs for standard liquid end Max. 500 cPs for valve with springs Max. 50 cPs for auto-degassing metering pumps Max. 3000 cPs for high viscosity

Capacity Data

Pump Version	Capacity at Max Backpressure psig	(bar)	U.S. GPH	(L/h)	mL/ stroke	Capacity at 1/2 Max Backpressure psig	(bar)	U.S. GPH	(L/h)	mL/ stroke	Pre-Primed Suction Lift ft.	(m)	Max. Stroking Rate spm	Tubing Connectors[2] O.D. x I.D. inches	Shipping Weight (higher weights are for SS) lbs.	(kg)
BT4b																
1000	145	(10)	0.20	(0.74)	0.07	73	(5)	0.22	(0.82)	0.08	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
2001[3]	290	(20)	0.25	(0.96)	0.10	145	(10)	0.40	(1.50)	0.13	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1601	232	(16)	0.29	(1.10)	0.10	116	(8)	0.37	(1.40)	0.13	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6
2002[3]	290	(20)	0.45	(1.70)	0.19	145	(10)	0.74	(2.80)	0.24	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1602	232	(16)	0.58	(2.20)	0.19	116	(8)	0.66	(2.50)	0.24	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1604	232	(16)	0.95	(3.60)	0.33	116	(8)	1.14	(4.30)	0.40	19.6	(6)	180	1/4 x 3/16	6.8-8.6	(3.1-3.9)
0708	101	(7)	1.88	(7.10)	0.66	50.5	(3.5)	2.22	(8.40)	0.78	19.6	(6)	180	1/2 x 3/8	6.8-8.6	(3.1-3.9)
0413	58	(4)	3.25	(12.30)	1.14	29	(2)	3.75	(14.20)	1.31	9.8	(3)	180	1/2 x 3/8	6.8-8.6	(3.1-3.9)
0220	29	(2)	5.02	(19.00)	1.76	14.5	(1)	5.52	(20.90)	1.94	6.5	(2)	180	1/2 x 3/8	7.3-9.7	(3.3-4.4)
BT5b																
2504[3]	363	(25)	0.77	(2.90)	0.27	181	(12.5)	0.98	(3.70)	0.34	19.6	(6)	180	(8 x 4mm)	9.9-11.7	(4.5-5.3)
1008	145	(10)	1.80	(6.80)	0.63	73	(5)	2.19	(8.30)	0.76	19.6	(6)	180	1/2 x 3/8	9.9-11.7	(4.5-5.3)
0713	101	(7)	2.91	(11.00)	1.02	50.5	(3.5)	3.46	(13.10)	1.21	13.1	(4)	180	1/2 x 3/8	9.9-11.7	(4.5-5.3)
0420	58	(4)	4.52	(17.10)	1.58	29	(2)	5.05	(19.10)	1.77	9.8	(3)	180	1/2 x 3/8	10.4-12.8	(4.7-5.8)
0232[1]	29	(2)	8.45	(32.00)	2.96	14.5	(1)	9.56	(36.20)	3.35	6.5	(2)	180	1/2 x 3/8	11.2-14.6	(5.1-6.6)
With auto-degassing liquid ends																
BT4b																
1601	232	(16)	0.16	(0.59)	0.06	116	(8)	0.21	(0.80)	0.07	5.9	(1.8)	180	1/4 x 3/16	6.4	(2.9)
1602	232	(16)	0.37	(1.40)	0.13	116	(8)	0.46	(1.74)	0.174	6.9	(2.1)	180	1/4 x 3/16	6.4	(2.9)
1604	232	(16)	0.71	(2.70)	0.25	116	(8)	0.95	(3.60)	0.33	8.8	(2.7)	180	1/4 x 3/16	6.8	(3.1)
0708	101	(7)	1.74	(6.60)	0.61	50.8	(3.5)	1.98	(7.50)	0.69	6.5	(2.0)	180	1/2 x 3/8	6.8	(3.1)
0413	58	(4)	2.85	(10.80)	1.00	29	(2)	3.33	(12.60)	1.17	6.5	(2.0)	180	1/2 x 3/8	6.8	(3.1)
0220	29	(2)	4.28	(16.20)	1.50	14.5	(1)	4.76	(18.00)	1.67	6.5	(2.0)	180	1/2 x 3/8	7.3	(3.3)
BT5b																
1008	145	(10)	1.66	(6.30)	0.58	73	(5)	1.98	(7.50)	0.69	9.8	(3)	180	1/2 x 3/8	9.9	(4.5)
0713	101	(7)	2.77	(10.50)	0.97	51	(3.5)	3.25	(12.30)	1.14	8.2	(2.5)	180	1/2 x 3/8	9.9	(4.5)
0420	58	(4)	4.12	(15.60)	1.44	29	(2)	4.60	(17.40)	1.61	8.2	(2.5)	180	1/2 x 3/8	10.4	(4.7)

Above capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (21°C).
Higher specific gravity fluids will reduce suction lift. Higher viscosity fluids will reduce capacity.
Liquid ends for highly viscous media have 10-20% less metering capacity and are not self-priming. Standard connectors are 1/2" MNPTor 5/8" hose barb.
Positive suction recommended.

[1] Not available with bleed valve.
[2] SS versions use 1/4" female threads except models 0220, 0420, and 0232 which use 3/8" female threads.
[3] Only available in SS and Acrylic liquid ends

Note: Universal control cable necessary for external Beta control.

Materials In Contact With Chemicals

	Pump Head	Suction/Pressure Connector	O-rings	Balls
PPE[5]	Polypropylene	Polypropylene	EPDM	ceramic
PPB[5]	Polypropylene	Polypropylene	Viton®	ceramic
NPE[4.5]	Acrylic	PVC	EPDM	ceramic
NPB[4.5]	Acrylic	PVC	Viton®	ceramic
PVT[4]	PVDF	PVDF	PTFE	ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	ceramic
SST	316 stainless steel	316 stainless steel	PTFE	ceramic
NPT[4]	Acrylic	PVDF	PTFE	ceramic
PPT	Polypropylene	Polypropylene	PTFE	ceramic

[4] NSF/ANSI 61 approved

[5] Only available in self de-gassing models

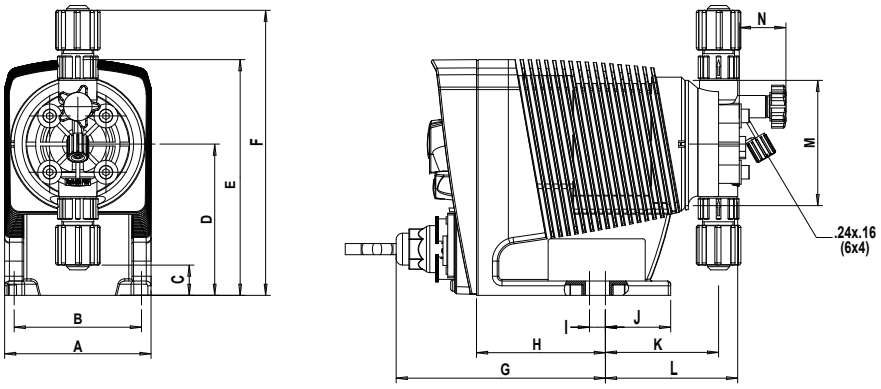
Note: Viton® is a registered trademark of DuPont Dow Elastomers.

Identcode Ordering System

BT4b	Beta 4b														Beta 5b	
	Version	**Capacity**													**Version**	**Capacity**
	1000	0.20 gph (0.74 l/h), 145 psi (10 bar)													2504	0.77 gph (2.90 l/h), 362 psi (25 bar)
	2001	0.25 gph (0.96 l/h), 290 psi, (20 bar)													1008	1.80 gph (6.80 l/h), 145 psi (10 bar)
	1601	0.29 gph (1.10 l/h), 253 psi (17.5 bar)													0713	2.91 gph (11.00 l/h), 101 psi (7 bar)
	2002	0.45 gph (1.70 l/h), 290 psi (20 bar)													0420	4.52 gph (17.10 l/h), 58 psi (4 bar)
	1602	0.58 gph (2.2 l/h), 253 psi (17.5 bar)													0232	8.45 gph (32.00 l/h), 29 psi (2 bar)
		Liquid end material:														
		PP	Polypropylene/PVDF, for self-degassing version Polypropylene/Polypropylene													
		NP	Acrylic glass/PVDF, for self-degassing version Acrylic glass/PVC													
		PV	PVDF/PVDF													
		TT	PTFE/PTFE													
		SS	Stainless steel													
			O-rings:													
			E	EPDM/PTFE coated, only for PP and NP self-degassing												
			B	FPM-B/PTFE coated, only on PP and NP self-degassing												
			T	PTFE/PTFE coated												
			S	Diaphragm additionally with FPM coating for siliceous media												
				Liquid end version:												
				0	Non-bleed version, no valve spring, for TT, SS and type 0232 only											
				1	Non-bleed version, with valve spring, for TT, SS and type 0232 only											
				2	With deaerator, no valve spring, PP, PV, NP only, not type 0232											
				3	With deaerator, with valve spring, PP, PV, NP only, not type 0232											
				4	Version for highly viscous media, only PVT, types 1005, 1605, 0708, 1008, 0413, 0713, 0220, 0420											
				9	Self-degassing for PP, NP only, not for types 1000 and 0232											
					Hydraulic connections:											
					0	Standard according to technical data										
					B	special-connection 3/8" x 1/4"										
						Version:										
						0	Standard									
							Logo:									
							0	With ProMinent® logo								
								Power supply:								
								U	Universal 100-240 V							
									Cable and plug:							
									A	6 ft European						
									B	6 ft Swiss						
									C	6 ft Austrialian						
									D	6 ft USA						
									1	6 ft open-ended						
										Relay:						
										0	No relay					
										1	Fault indicating relay, normally energized, 1 x changeover contact 230 V - 2 A					
										3	Fault indicating relay, normally de-energized, 1 x changeover contact 230 V - 2 A					
										4	As 1 + pacing relay 2 x normally open contacts 24 V - 100 mA					
										5	As 3 + pacing relay 2 x normally open contacts 24 V - 100 mA					
											Accessories:					
											0	No accessories				
											1	With foot and injection valve, 5 ft PVC suction tubing, 10 ft PE discharge tubing				
												Control type:				
												0	No lock			
												1	With lock: manual operation locked when external cable plugged in			
													Control variants:			
													0	Standard		
														Options on request:		
														00	No options	
BT4b	**1000**	**PP**	**E**	**0**	**0**	**0**	**0**	**U**	**A**	**0**	**0**	**0**	**0**	**00**		

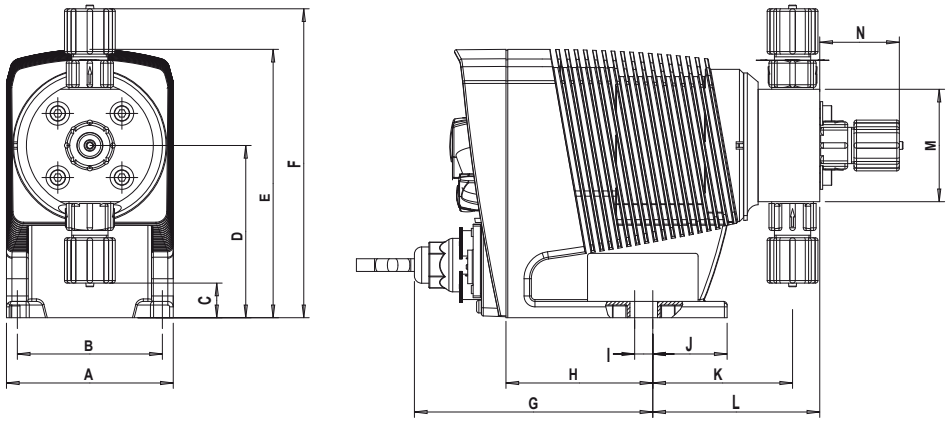
Dimensional Drawings

Dimensions in inches (mm).
Ranges given, actual dimension dependent on liquid end material.



Pump	A	B	C	D	E	F	G	H	I	J	K	L	M	N
BT4	3.6	3.1	.13-.75	3.7	5.8	7.0-7.8	5.2	3.2	.39	1.4	2.8-3.0	3.2-3.7	2.8-4.3	1.1
	(92)	(80)	(3.2-19)	(95)	(148)	(179-199)	(131.5)	(81)	(10)	(36)	(71-76)	(83-93)	(ø 90-ø 110)	29.3
BT5	4.0	3.1	.13-.75	4.0	6.0	7.0-7.8	5.3	3.3	.59	1.6	2.8-3.0	3.2-3.7	2.8-4.3	1.1`
	(102)	(80)	(3.2-19)	(101)	(153)	(179-199)	(135.5)	(85)	(15)	(41)	(71-76)	(83-93)	(ø 90-ø 110)	29.3

With Auto-Degassing Liquid Ends



Pump	A	B	C	D	E	F	G	H	I	J	K	L	M	N
BT4	3.6	3.1	.30-.75	3.7	5.8	6.7-7.42	5.2	3.2	.39	1.4	2.9-3.0	3.5-4.2	2.8-3.5	1.73
	(92)	(80)	(7.5-19)	(95)	(148)	(170.5-188.5)	(131.5)	(81)	(10)	(36)	(74-77)	(89-105.5)	(ø 90-ø 70)	43.9
BT5	4.0	3.1	.30-.75	4.0	6.0	6.7-7.42	5.3	3.3	.59	1.6	2.9-3.0	3.5-4.2	2.8-3.5	1.73
	(102)	(80)	(7.5-19)	(101)	(153)	(170.5-188.5)	(135.5)	(85)	(15)	(41)	(74-77)	(89-105.5)	(ø 90-ø 70)	43.9

DULCO®flex DF2a Peristaltic Pump

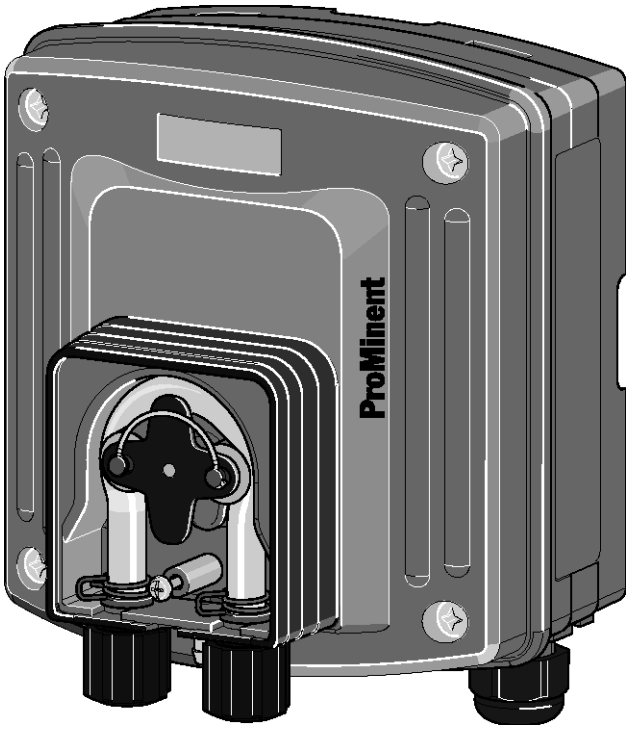
Overview: DULCO®flex DF2a

- Capacity range 0.1-0.63 gph (0.4-2.4 l/h) at max. 22 psi (1.5 bar) back pressure
- Hose material: Tygon® or PharMed®
- Control and/or quality control via mains ON/OFF
- Practically silent operation
- Self-priming against max. 22 psi (1.5 bar)
- Gentle metering
- Sprung rollers for constant rolling pressure and extended service life of hose

The DULCO®flex is a peristaltic pump. The metering chemical is displaced in the direction of flow as rotor squeezes the hose. No valves are required, which ensures that the chemical is treated gently.

Typical applications are processes in which only a limited feed pressure is required such as the metering of conditioning agents in private pools.

The robust, chemical-resistant PPE housing is protected on all sides from spray (IP 65), which guarantees its universal application capability. OEM versions are available on request.



pk_1_130

Identcode Ordering System

DF2a	Type	Capacity								
		bar	l/h							
	0204	1.5	0.4							
	0208	1.5	0.8							
	0216	1.5	1.6							
	0224	1.5	2.4							
		Hose material								
		P	PharMed®							
		T	Tygon®							
		V	Viton® for fragrances (special version)							
			Version							
			0	With ProMinent® logo						
			1	Without ProMinent® logo						
				Hydraulic connectors						
				0	Connector for hose 6/4 mm priming and discharge side					
				9	Connector for hose 10/4 mm discharge side only					
					Power supply					
					A	230 V ± 10 %, 50/60 Hz				
					B	115 V ± 10 %, 50/60 Hz				
						Cable and plug				
						0	No mains lead			
						1	With 2 m mains lead, open ended			
							Drive			
							0	Mains ON/OFF		
								Installation		
								W	Wall mounted	
									Accessories	
									0	No accessories

Tygon®, Viton® and PharMed® are registered trademarks

Technical Data

Type	psi	Capacity gpm	Frequency rpm	Connector size o dia x i. dia.	Suction Height mWC	Intake Head mWC
0204	22	0.11	5	6x4/10x4	4	3
0208	22	0.21	10	6x4/10x4	4	3
0216	22	0.42	20	6x4/10x4	4	3
0224	22	0.63	30	6x4/10x4	4	3

Admissible ambient temperature:	50°-113°F (10°-45°C)
Power consumption approx.:	5W
Switching duration:	100%
Enclosure rating:	IP 65

All data refers to water at 68°F (20°C).

	Part No.
Spare hose set, complete, PharMed®	1009480
Spare hose set Tygon®	1009481
Replacement hose complete Viton®	1023842

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Overview: Sigma/ 1

Ideal for Economical mid-range applications

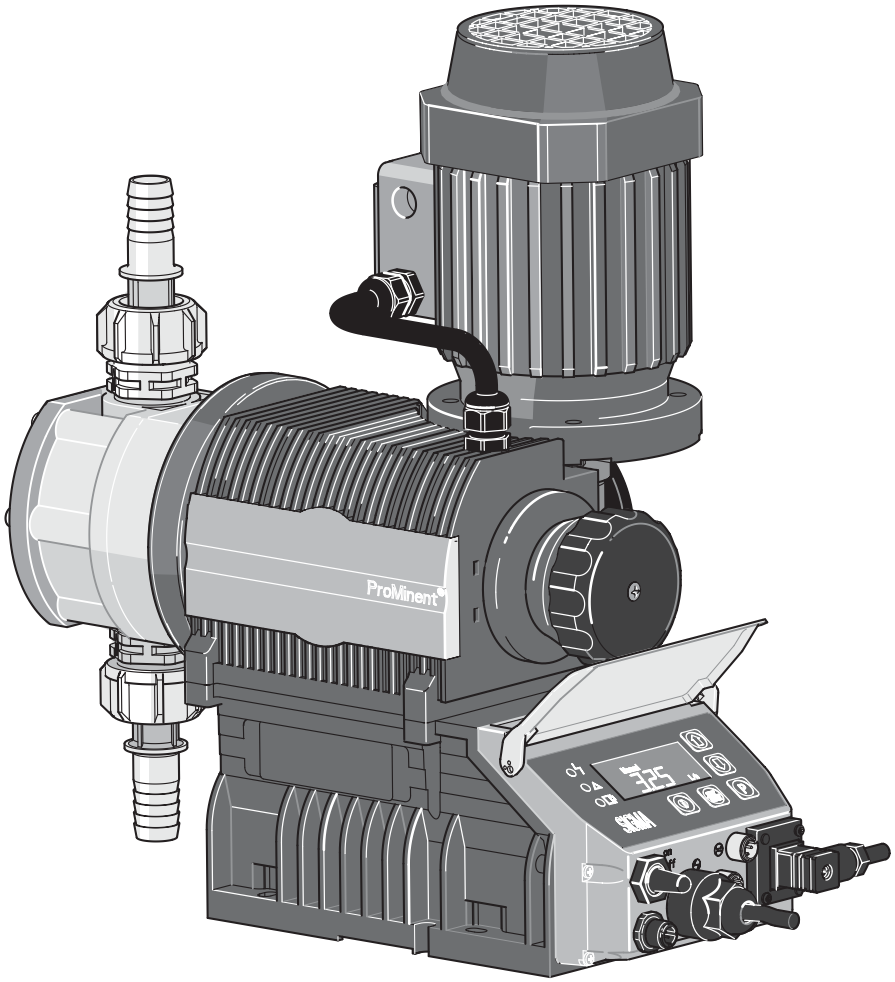
The ProMinent® Sigma/ 1 is a mechanically actuated diaphragm metering pump. It has a capacity range of 5.3-38 gph (20-144 l/h) at a max. back pressure of 174-58 psi (12-4 bar). The pump capacity is adjusted by varying the stroke length (4 mm) in 1% steps via a self locking adjusting knob.

The reproducible metering accuracy is better than ± 2$ providing installation has been correctly carried out, and in the stroke length range of 30-100%. (Instructions in the operating instructions manual must be followed.)

The stable, corrosion resistant metal and plastic housing is rated IP 65. To facilitate adaptation of the pumps to the widest possible range of processing requirements we offer a choice of three gearbox rations, three liquid end sizes, two liquid end materials and either contact or analog signal (e.g. o/4-20 mA) control options in the form of the S1Ca Sigma controller.

For safety reasons, all motor driven metering pumps must be equipped with adequate protection against electrical overload.

All PVDF versions are NSF/ANSI 61 approve.

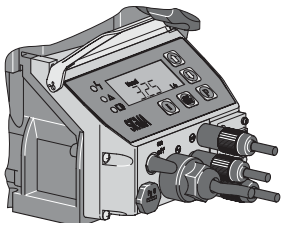


Sigma/ 1 Basic Type (S1Ba)

The ProMinent® Sigma Basic type is a motor driven metering pump with no internal electronic control system. The ProMinent® S1Ba has a number of different drive options, including the single phase AC motor or a 3ph. Motor.

Different flanges are available so that customers can use their own motor to drive the pump.

Sigma/ 1 Control Type (S1Ca)



The ProMinent® Sigma microprocessor version (standard IP 65) allows rapid and reliable adjustment to fluctuating metering requirements.

The microprocessor controller of the Sigma pumps, featuring the optimum combination of variable AC frequency combined with digital stroking frequency, ensures exact metering even in the lower minimum range due to individual stroke control.

The individual pump functions are simply adjusted using the five programming keys. A backlit LCD indicates the current operating status. LEDs function as operation or fault indicators and fault indicator or pacing relays monitor the pump function.

Local or remote control is possible with PROFIBUS® and/or an integrated process timer.

Standard Modes and Functions

Feed rate is determined by stroke length and stroke rate. Stroke length is manually adjustable from 1 to 100% in increments of 1% via the stroke length knob.

Stroke rate can be set to a maximum of 90, 170 or 200 strokes per minute (pump dependent). An illuminated LCD displays stroke length, stroke rate and an accumulative stroke counter, which can be cleared and reset.

Pump capacity output is displayed in either U.S. gph or l/h, set by the operator. Output is accumulated and totalized capacity is also displayed in either U.S. gallons or liters.

The “i” key is used to scroll information screens for stroke rate, stroke length, stroke counter, capacity and totalized capacity. Other information is available depending on control mode.

Control Modes

The control modes available with the Sigma/ 1 include manual, external contact with pulse control (multiplier/divider), batch, or analog control. The PROFIBUS® option includes all control modes, plus fieldbus connection.

In the “Manual” mode, stroke rate is controlled manually. The “Contact” external mode allows adjustments to be made externally (e.g. by means of a pulse-type water meter for proportional chemical feed). Pulse signals are fed into the contact input of the pump by an optional control cable. Each pulse from a water meter or pulse-type controller provides the pump an input to pump at the selected pulse ration, up to the pump’s maximum stroke rate. Over-stroking the pump is not possible.

Standard Functions

“Calibrate”

The pump can be directly calibrated in-line to actual flow. Calibration is maintained within the stroke frequency range of 90/170/200 spm (model dependent). A warning indicator flashes when adjustments to the stroke volume are made outside the calibrated range of ± 10%.

“Auxiliary Frequency”

An auxiliary frequency can be programmed. This default stroking rate can be enabled via the optional control cable.

“Flow”

The Sigma/ 1 series metering pumps will monitor their own output, with an optional adjustable flow monitor. Every fluid discharge is sensed and fed back to the electronic control circuit of the pump. If insufficient fluid is discharged for a predetermined number of strokes (up to 125), the pump automatically stops and the red LED lights. The optional fault relay changes state to issue an alarm or active a standby pump. Call for availability.

“Float Switch”

An optional two-stage ProMinent® float switch can be plugged into the pump to monitor chemical tank levels. An early warning is issued when the allowable minimum level is reached. The pump continues to operate while the display flashes, the yellow LED lights and an optional collective fault relay changes state to issue an alarm. If the liquid level in the supply tank drops another 3/4” (20 mm), the pump automatically shuts down, the LCD displays “Minim” and the red LED lights. The optional fault relay remains activated.

“Pause”

The Sigma/ 1 series can be remotely started and stopped via a dry contact through the optional control cable.

“Stop”

The Sigma/ 1 can be stopped by pressing the STOP/START key without disconnecting from the power supply.

“Prime”

Priming is activated by pressing both arrow keys at the same time while the frequency display is showing.

Functions and Error Indicators

Three LED lights on the pump faceplate signal operational status. The green light flashes during normal operation, and the yellow light warns of situation that could lead to a fault (e.g. low chemical). If the fault occurs “error” will appear on the LCD screen and the red LED light appears.

Optional Modes and Functions

Optional Control Modes

“Analog” Mode

With this option, the stroking rate of the Sigma/ 1 is directly proportional to the analog signal. For a custom range setting, the curve feature of the analog input can be selected. With this, the pump response to the analog input can be easily programmed.

“Contact” Mode with Pulse Control

This feature is used to “tune” the pump to contact generators of any kid (e.g. pulse-type water meter or process controller), and eliminate the need for a costly external control unit. The following functions can be selected by means of the keypad.

Pulse step-up (multiply) and step-down (divide)

By simply entering a factor in the 0.01-99.99 range, the step-up or step-down ratio is set.

For example:

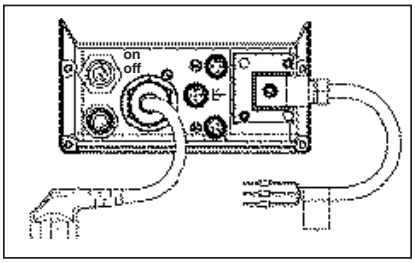
Step-up Factor:		Step-down Factor:	
99.99	1 pulse = 99.99 pump strokes	0.25	4 pulses = 1 pump stroke
10	1 pulse = 10 pump strokes	0.01	100 pulses = 1 pump stroke

“Batch” Mode

The Batch mode is a variation of the contact operating mode. A number of strokes can be predetermined up to 65,535 strokes (whole numbers) or the feed quantity can be predetermined. The batch is then initiated by either pressing the “P” key on the pump face or providing a contact to the external control cable.

Access Code

A programmable access code to prevent unauthorized changes to settings is available as an option.



An external panel enables optional relays to be installed on-site.

Relay outputs

Fault annunciating relay

For low tank level (flow switch), loss of flow (flow monitor), loss of analog signal and diaphragm failure detector, system faults and fuse/power supply failure.

Fault annunciating and Pacing relay

In addition to the fault annunciating relay, a contact closure is issued with every pump stroke (contact duration 150 ms). This allows a second ProMinent® metering pump to be paced synchronously, or to totalize flow with an external stroke counter.

4-20 mA Analog Output

A 4-20 mA analog output option is available for use with pumps that operate in the manual mode or by a remote 4-20 mA analog reference signal. The 4-20 mA analog output signal is linear to pump frequency multiplied by the percentage of stroke length. The output signal is isolated and can drive up to 300 Ohms Impedance. Analog output can be used for status feedback to higher level control systems for closed loop control or for monitoring chemical usage. This option is available in combination with either the fault annunciating or pacing relay.

Timer Relay

The optional integrated 2-week timer offers 81 programmable events. It can be set to hourly, daily work days, weekend, weekly or two-week periods with switch-on times from 1 second to two weeks. The timer can be programmed to change operation mode, frequency and the function of two relays. All the functions can be programmed independently of one another. Up to 13 delay times can be programmed into the timer function.

The range of applications exceeds that of a “standard timer”. Typical application is disinfection in cooling towers, process water, etc. with the ability to automatically program shock dosages or increase the concentration at a certain interval.

Fieldbus connection

Monitor and control remotely via a SCADA/PLC system using the profibus-DP system.

Note: Relay options not available with profibus. Profibus is not field retrofittable.

Specifications

General

Maximum stroke length:	0.16” (4.0 mm)
Power cord:	6 foot (2 m) 2 wire + ground (supplied on control versions)
Stroke frequency control:	S1Ba: Constant speed or optional DC/SCR drive or AC inverter S1Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
Stroke counting:	Standard on S1Ca
Materials of construction	
Housing:	Glass-filled Luranyl™ (PPE)

Wetted materials of construction:		
Liquid End:	PVDF	316 SS
Suct./Dis. Connectors:	PVDF	316 SS
Seals:	PTFE/Viton®	PTFE/Viton®
Check Balls:	Cermaic	SS
Pressure Relief Valves:	PVDF/Viton® O-rings	SS/Viton® O-rings

Drive:	Cam and spring-follower (lost motion)
Lubrication:	Sealed grease lubricated bearings and gearing
Warranty:	Two years on drive, one year on liquid end
Factory testing:	**Each pump is tested for rated flow at maximum pressure**
Industry Standard:	CE approved, CSA available (standard in Canada), NSF/ANSI 61
Diaphragm materials:	PTFE faced EPDM with Nylon reinforcement and steel core
Liquid end options:	Polyvinylidene Fluoride (PVDF) or 316 SS, with PTFE faced Viton® seals
Check valves:	Single ball check, PVDF and SS versions Optional springs available (Hastelloy C4)
Repeatability:	When used according to the operating instructions, better than ± 2%

Max. fluid operating temperatures:	Material	Constant (Max. Backpressure)	Short Term (15 min. @ max. 30 psi)
	PVDF	149 °F (65 °C)	212 °F (100 °C)
	316 SS	194 °F (90 °C)	248 °F (120 °C)

Diaphragm failure indication:	Optional, see accessories. Switch is N.C., opens to indicate failure. Switch rated 250 VAC, 0.3 A inductive or 0.5 A resistive; 30 VDC, 1.0 A resistive. Required minimum 21 psig (1.5 bar) backpressure on pump. N.O. switch available upon request. Includes double diaphragm leak prevention.
Max. solids size in fluid:	0.3 mm
Stroke length adjustment:	Manual, in increments of 1%. Motorized stroke length adjustment available.

Sigma/ 1 Basic Version

Motor:	See available motors in identity code

Specifications (Cont.)

Sigma/ 1 Control Version

Control Function:	At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM	
Enclosure rating:	NEMA 3 (IP 55)	
Motor data:	Totally enclosed, fan cooled (IP 55); class F insulation; IEC frame; 1/8 HP (0.09 kW) 230 V, 3 phase (0.7 A)	
Relay load		
Fault relay only (options 1 & 3):	Contact load: 250 VAC, 2A, 50/60 Hz	
	Operating life: > 200,000 switch funcations	
Fault and pacing relay	Contact load: max. 24 V, AC/DC, max. 100 mA	
(options 4 & 5):	Max. $50x10^6$ switch cycles @ 10 V, 10 mA	
Analog output signal:	Max. impedance 300 W	
	Isolated 4-20 mA output signal	
Profibus – DP field bus options:	Transfer:	RS – 485
	Wiring:	2-wired, twisted, shielded
	Length:	3637 ft. (1200 m)/328 ft. (100 m)
	Baudrate:	9600 bits/s; 12 Mbits/s
	No. of participants:	32 with 127 repeaters
	Topology:	Line
	Access procedure:	Master/master with token ring
Relay cable (optional):	6 foot (2 m) 3 wire (SPDT) 250 VAC, 2A	
Pulse contact/remote pause contact:	With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used).	
Max. pulse frequency:	25 pulses/sec	
Contact impedance:	10 kOhm	
Max. pulse memory:	65,535 pulses	
Necessary contact duration:	20ms	
Analog – current input burden:	Approximately 120 Ohm	
Max. allowable input current:	50 mA	
Power requirements:	Single phase, 115-230 VAC ± 10%, 50/60 Hz	

Capacity Data

Sigma/1 Basic Version

Technical data:	60 Hz (1750 RPM) operation *Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		*Shipping Weight w/Motor	
Pump Version S1Ba HM	psig	(bar)	U.S. GPH	(L/h)	Stroke/ min.	mL/ stroke	(water) ft.	(m)	psig	(bar)	DN	in.	(approx.) lbs.	(kg)
12017 PVT	145	(10)	5.3	(20)	88	4	23	(7)	14.5	(1)	10	1/2 MNPT	19.8	(9)
12017 SST	174	(12)	5.3	(20)	88	4	23	(7)	14.5	(1)	10	3/8 FNPT	26.5	(12)
12035 PVT	145	(10)	11.1	(42)	172	4	23	(7)	14.5	(1)	10	1/2 MNPT	19.8	(9)
12035 SST	174	(12)	11.1	(42)	172	4	23	(7)	14.5	(1)	10	3/8 FNPT	26.5	(12)
10050 PVT	145	(10)	15.8	(60)	240	4	23	(7)	14.5	(1)	10	1/2 MNPT	19.8	(9)
10050 SST	145	(10)	15.8	(60)	240	4	23	(7)	14.5	(1)	10	3/8 FNPT	26.5	(12)
10022 PVT	145	(10)	6.8	(26)	88	5.1	19.6	(6)	14.5	(1)	10	1/2 MNPT	19.8	(9)
10022 SST	145	(10)	6.8	(26)	88	5.1	19.6	(6)	14.5	(1)	10	3/8 FNPT	26.5	(12)
10044 PVT	145	(10)	14	(53)	172	5.1	19.6	(6)	14.5	(1)	10	1/2 MNPT	19.8	(9)
10044 SST	145	(10)	14	(53)	172	5.1	19.6	(6)	14.5	(1)	10	3/8 FNPT	26.5	(12)
07065 PVT	102	(7)	20.6	(78)	240	5.1	19.6	(6)	14.5	(1)	10	1/2 MNPT	19.8	(9)
07065 SST	102	(7)	20.6	(78)	240	5.1	19.6	(6)	14.5	(1)	10	3/8 FNPT	26.5	(12)
07042 PVT	102	(7)	13.2	(50)	88	9.7	9.8	(3)	14.5	(1)	15	3/4 MNPT	21	(9.5)
07042 SST	102	(7)	13.2	(50)	88	9.7	9.8	(3)	14.5	(1)	15	1/2 FNPT	29.8	(13.5)
04084 PVT	58	(4)	26.7	(101)	172	9.7	9.8	(3)	14.5	(1)	15	3/4 MNPT	21	(9.5)
04084 SST	58	(4)	26.7	(101)	172	9.7	9.8	(3)	14.5	(1)	15	1/2 FNPT	29.8	(13.5)
04120 PVT	58	(4)	38	(144)	240	9.7	9.8	(3)	14.5	(1)	15	3/4 MNPT	21	(9.5)
04120 SST	58	(4)	38	(144)	240	9.7	9.8	(3)	14.5	(1)	15	1/2 FNPT	29.8	(13.5)

* Flow rates and shipping weights are for 1/8 HP standard motors. Addition of 1/3 HP or 1/2 HP motors may increase output (consult factory for de-

Sigma/1 Control Version

Technical data:	60 Hz operation Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		*Shipping Weight w/Motor	
Pump Version S1Ca HM	psig	(bar)	U.S. GPH	(L/h)	Stroke/ min.	mL/ stroke	(water) ft.	(m)	psig	(bar)	DN	in.	(approx.) lbs.	(kg)
12017 PVT	145	(10)	5.3	(20)	90	4	23	(7)	14.5	(1)	10	1/2 MNPT	19.8	(9)
12017 SST	174	(12)	5.3	(20)	90	4	23	(7)	14.5	(1)	10	3/8 FNPT	26.5	(12)
12035 PVT	145	(10)	11.1	(42)	170	4	23	(7)	14.5	(1)	10	1/2 MNPT	19.8	(9)
12035 SST	174	(12)	11.1	(42)	170	4	23	(7)	14.5	(1)	10	3/8 FNPT	26.5	(12)
10050 PVT	145	(10)	13.2	(50)	200	4	23	(7)	14.5	(1)	10	1/2 MNPT	19.8	(9)
10050 SST	145	(10)	13.2	(50)	200	4	23	(7)	14.5	(1)	10	3/8 FNPT	26.5	(12)
10022 PVT	145	(10)	6.8	(26)	90	5.1	19.6	(6)	14.5	(1)	10	1/2 MNPT	19.8	(9)
10022 SST	145	(10)	6.8	(26)	90	5.1	19.6	(6)	14.5	(1)	10	3/8 FNPT	26.5	(12)
10044 PVT	145	(10)	14	(53)	170	5.1	19.6	(6)	14.5	(1)	10	1/2 MNPT	19.8	(9)
10044 SST	145	(10)	14	(53)	170	5.1	19.6	(6)	14.5	(1)	10	3/8 FNPT	26.5	(12)
07065 PVT	102	(7)	17.2	(65)	200	5.1	19.6	(6)	14.5	(1)	10	1/2 MNPT	19.8	(9)
07065 SST	102	(7)	17.2	(65)	200	5.1	19.6	(6)	14.5	(1)	10	3/8 FNPT	26.5	(12)
07042 PVT	102	(7)	13.2	(50)	90	9.7	9.8	(3)	14.5	(1)	15	3/4 MNPT	21	(9.5)
07042 SST	102	(7)	13.2	(50)	90	9.7	9.8	(3)	14.5	(1)	15	1/2 FNPT	29.8	(13.5)
04084 PVT	58	(4)	26.7	(101)	172	9.7	9.8	(3)	14.5	(1)	15	3/4 MNPT	21	(9.5)
04084 SST	58	(4)	26.7	(101)	172	9.7	9.8	(3)	14.5	(1)	15	1/2 FNPT	29.8	(13.5)
04120 PVT	58	(4)	31.7	(120)	200	9.7	9.8	(3)	14.5	(1)	15	3/4 MNPT	21	(9.5)
04120 SST	58	(4)	31.7	(120)	200	9.7	9.8	(3)	14.5	(1)	15	1/2 FNPT	29.8	(13.5)

* Flow rates and shipping weights are for 1/8 HP standard motors. Addition of 1/3 HP or 1/2 HP motors may increase output (consult factory for details)
Note: Universal control cable necessary for external Sigma control. (see ***page138***)

Materials In Contact with Chemicals

Liquid End	Suction/Discharge Connector	Valve	Seals/ ball seat	Balls
PVT	PVDF (Polyvinylidenefluoride)	PVDF (Polyvinylidenefluoride)	PTFE/PTFE	Ceramic
SST	Stainless steel	Stainless steel	PTFE/PTFE	Stainless Steel

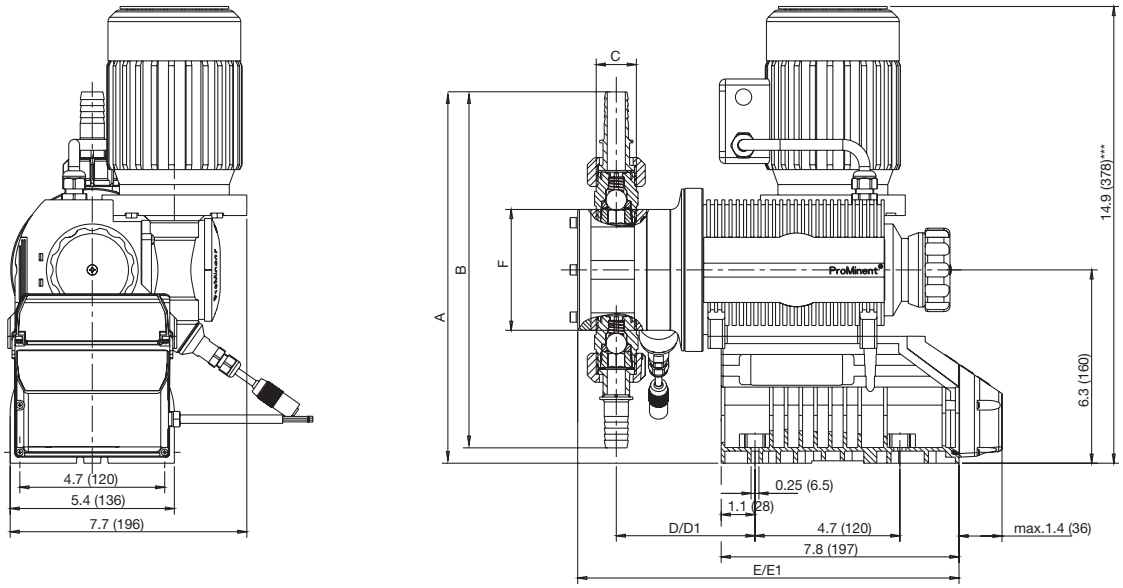
Ordering System (S1Ba)

S1Ba	Drive Type:												
	H	Main Drive, Diaphragm											
		Verison: Capacity:											
		12017*	5.2 gph (20 l/h), 174 psi (10 bar)				07065	20.6 gph (78 l/h), 102 psi (7 bar)					
		12035*	11.1 gph (42 l/h), 174 psi (10 bar)				07042	13.2 gph (50 l/h), 102 psi (7 bar)					
		10050	15.8 gph (60 l/h), 145 psi (10 bar)				04084	26.7 gph (101 l/h), 58 psi (4 bar)					* For PVDF versions. Max. 145 psig
		10022	6.8 gph (26 l/h), 145 psi (10 bar)				04120	38 gph (144 l/h), 58 psi (4 bar)					**NOTE:** Refer to technical data for capacities and stroke rates
		10044	14 gph (53 l/h), 145 psi (10 bar)										
			Liquid end material:										
			PV	PVDF									
			SS	316 Stainless Steel									
				Seal material:									
				T	PTFE								
					Diaphragm type:								
					A	Safety diaphragm w/ pump stop fuction							
					S	Safety diaphragm w/ visual indicator							
						Liquid end version:							
						0	Without valve springs						
						1	With 2 valve springs (Hastelloy C4, 1 psig)						
							Connectors:						
							7	PVDF clamping nut & insert					
							8	SS clamping nut & insert					
								Labeling:					
								0	Standard with logo				
									Voltage supply:				
									S	3 ph, 230 V/400 V, 50/60 Hz			
									M	1 ph, AC, 230 V, 50/60 Hz			
									N	1 ph, AC, 115 V 60 Hz			
									K	90 VDC Permanent magnet			
									3	Explosion Proof**			
										Enclosure rating:			
										0	Standard		
											Stroke sensor:		
											0	Without stroke sensor (Standard)	
											2	With Pacing relay (Consult Factory)	
												Stroke length adjustment:	
												0	Manual (Standard)
												1	with 3P stroke positioning motor, 230 V 50/60 Hz
												2	with 3P stroke positioning motor, 115 V 50/60 Hz
												4	W/ stroke positioning moto 4-20 mA, 230 V 50/60 Hz
												6	W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz
													**** EXPLOSION PROOF MOTOR (INCLUDING MOUNTING FLANGE):**
													1) pn. 7500344 1/3 HP, single ph, AC, 115 V, 60 Hz, EPFC (class 1 Group C & D or class 2 Group F & G T3B)
													2) pn 7746261 1/2 HP, 3 ph, 1D, 208-230/460 VAC EPFC (class 1 Group C & D or class 2 Group F & G T3B)
S1Ba	**H**	**12017**	**PV**	**T**	**0**	**0**	**7**	**0**	**S**	**0**	**0**	**0**	

Identcode Ordering System (S1Ca)

S1Ca	Drive Type														
	H	Main Drive, Diaphragm													
		Version: Capacity:													
		12017*	5.2 gph (20 l/h), 145 psi (10 bar)				07065	17.2 gph (65 l/h), 102 psi (7 bar)							
		12035*	11.1 gph (42 l/h), 145 psi (10 bar)				07042	13.2 gph (50 l/h), 102 psi (7 bar)							
		10050	13.2 gph (50 l/h), 145 psi (10 bar)				04084	26.7 gph (101 l/h), 58 psi (4 bar)							* For PVDF versions. Max. 145 psig
		10022	6.8 gph (26 l/h), 145 psi (10 bar)				04120	31.7 gph (120 l/h), 58 psi (4 bar)							**NOTE:** Refer to technical data for capacities and stroke rates
		10044	14 gph (53 l/h), 145 psi (10 bar)												
			Liquid end material:												
			PVT	PVDF with PTFE gasket											
			SST	316 Stainless Steel with PTFE gasket											
				Diaphragm type:											
				A	Safety diaphragm w/ pump stop fuction										
				B	Safety diaphragm w/alarm indication										
				S	Safety diaphragm w/ visual indicator										
					Liquid end version:										
					0	Without valve springs									
					1	With 2 valve springs (Hastelloy C4, 1 psig)									
						Connectors:									
						7	PVDF clamping nut & insert								
						8	SS clamping nut & insert								
							Labeling:								
							0	Standard with logo							
								Voltage supply:							
								U	1 ph, 115-230 V ± 10%, 50/60 Hz						
									Cable and plug with 6 ft (2 m) power cord, single phase:						
									A	European plug, 230 V					
									D	N. American plug, 115 V					
									U	N. American plug, 230 V					
										Relay:					
										0	Without relay				
										1	Fault annunciating relay, drops out				
										3	Fault annunciating relay, pulls in				
										4	Option 1 + pacing relay				
										5	Option 3 + pacing relay				
										C	4-20 mA output, drops out				
										D	4-20 mA output, pulls in				
										E	4-20 mA output, pacing relay				
											Control variant:				
											0	Manual + External with pulse control (multiplier/divider)			
											1	Manual + External with pulse controls & analog control			
											4	Option 0 + Timer			
											5	Option 1 + Timer			
											P	Option 1 + Profibus (Relay must be 0)			
												Access Code:			
												0	No access code		
												1	Access code		
													Flow monitor:		
													0	Input for metering monitor signal (pulse)	
													1	Input for maintained flow switch signal	
														Stroke length adjustment:	
														C	Manual + Calibration
S1Ca	**H**	**12017**	**PVT**	**A**	**0**	**7**	**0**	**U**	**A**	**0**	**0**	**0**	**0**	**C**	

Dimensional Drawing: (S1Ba)



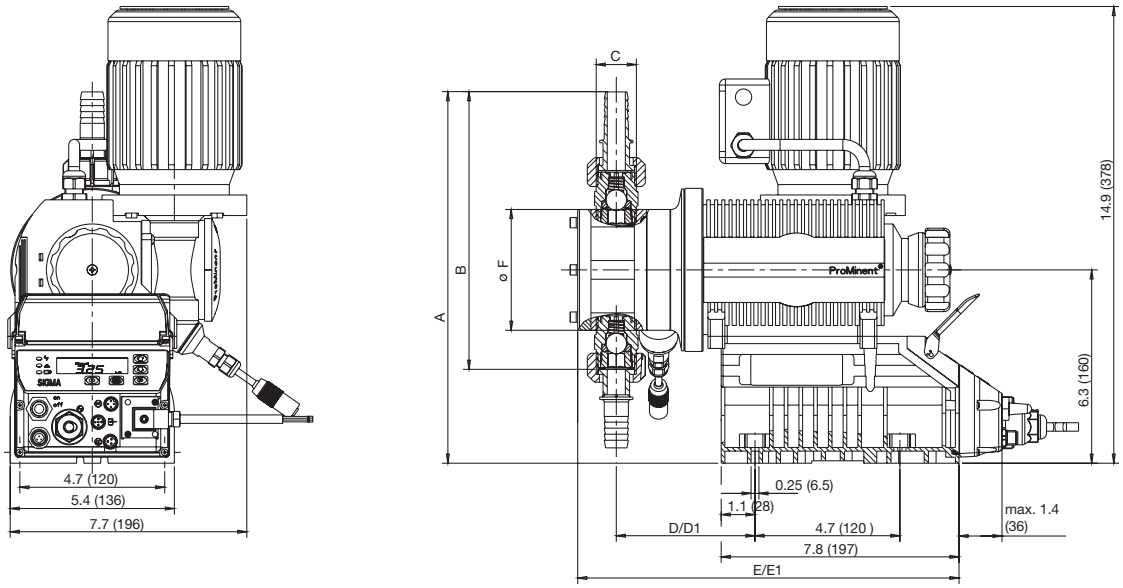
Type Sigma/ 1	A	B	Suction / Discharge Valve Thread C*	D	D1**	E	E1**	F
12017, 12035, 10050, 10022, 10044, 07065 PVT	11 (279)	9.38 (238)	1/2” MNPT	3.54 (90)	4.33 (110)	10.8 (275)	11.6 (295)	3.8 (96)
SST	9.75 (24*)	7.13 (181)	3/8” FNPT	3.5 (89)	4.29 (109)	10.8 (275)	11.6 (295)	3.8 (96)
07042, 04084, 04120 PVT	11.38 (289)	10 (254)	3/4” MNPT	3.74 (95)	4.52 (115)	11.2 (285)	12 (305)	4.8 (122)
SST	10.25 (260)	8.13 (206)	1/2” FNPT	3.7 (94)	4.48 (114)	11.2 (285)	12 (305)	4.8 (122)

* Piping adapters provided according to technical data

** Dimensions with diaphragm failure detector

*** Dimensions may vary depending on motor installed.

Dimensional Drawing: (S1Ca)



Dimensions in inches (mm)

Type Sigma/ 1	A	B	Suction / Discharge Valve Thread C*	D	D1**	E	E1**	F
12017, 12035, 10050, 10022, 10044, 07065 PVT	11 (279)	9.38 (238)	1/2” MNPT	3.54 (90)	4.33 (110)	10.8 (275)	11.6 (295)	3.8 (96)
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07042, 04084, 04120 PVT	11.38 (289)	10 (254)	3/4” MNPT	3.74 (95)	4.52 (115)	11.2 (285)	12 (305)	4.8 (122)
SST	10.25 (260)	8.13 (206)	1/2” FNPT	3.7 (94)	4.48 (114)	11.2 (285)	12 (305)	4.8 (122)

* Piping adapters provided according to technical data

** Dimensions with diaphragm failure detector

Accessories

Test Kits

Orbeco Test Kits

Description	Part Number
AquaPRO3 Pool Photometer (CL-PH-CYA)	7500560
AquaPRO6 Pool Photometer (CL-BR-PH-CYS-TA-CAL)	7500561
MC500 Multi-Parameter Colorimeter	7500593
Pool Control 9 Photometer	7500594
Pool Photometer Accessories	
IRIM – Data Transfer Device (for MC500, AquaPRO3, AquaPRO6 & PC9)	7500595
Sample Cells – Round glass 24mm diameter w/ lid (12 pack)	7500596
Cloth for cleaning cells (EA)	7500597
16mm Tube Adapter (EA)	7500598
Serial connection to computer (used for new method updates on MC500)	7500599
Verification Standard Kit (for use with MC500)	7500600
Reference Standard Kit (for use with AquaPRO3 & 6	7500601
EZ Mix Primary Chlorine Standard Kit (1.5 ppm NIST traceable primary standard)	7500602
Plastic Crushing Rod (EA)	7500603
Dilution Tube (Dilutions two, three, five & ten)	7500604
12 mL Syringe (EA)	7500605
Test Tube Rack (holds six sample cells)	7500606
Pool Photometer Reagents	
DPD #1 Tablets (0.01-6ppm) – 100ct	7500610
DPD #1 Tablets (0.01-6ppm) – 250ct	7500611
DPD #1 Tablets (0.01-6ppm) – 100ct	7500640
DPD #1 Tablets (0.01-6ppm) – 250ct	7500641
DPD #1 Tablets (0.01-6ppm) – 500ct	7500642
DPD #3 Tablets (0.01-6ppm) – 100ct	7500643
DPD #3 Tablets (0.01-6ppm) – 250ct	7500644
DPD #3 Tablets (0.01-6ppm) – 500ct	7500645
DPD #4 Tablets (0.01-6ppm) – 100ct	7500646
Cyanuric Acid Tablets – 100ct	7500647
Cyanuric Acid Tablets – 250ct	7500648
CyA Test Tablets (Cyanuric Acid) – 100ct	7500649
CyA Test Tablets (Cyanuric Acid) – 250ct	7500650
DPD #1 Tablets HR (0.01-10ppm) – 100ct	7500651
DPD #1 Tablets HR (0.01-10ppm) – 250ct	7500652
DPD #1 Tablets HR (0.01-10ppm) – 500ct	7500653
DPD #3 Tablets HR (0.01-10ppm) – 100ct	7500654
DPD #3 Tablets HR (0.01-10ppm) – 250ct	7500655
DPD #3 Tablets HR (0.01-10ppm) – 500ct	7500656
Phenol Red Tablets – 100ct	7500657
Phenol Red Tablets – 250ct	7500658
Phenol Red Tablets – 500ct	7500659
Glycine Tablets – 100ct	7500660
Dechlor Tablets – 100ct	7500661
Hydrogen Peroxide LR Tablets – 100ct	7500662
ALKA-M Tablets (5-200ppm) – 100ct	7500663
ALKA-M Tablets (5-200ppm) – 250ct	7500664
ALKA-M HR Tablets (For AquaPRO photometers) (5-500ppm) – 100ct	7500665
ALKA-M HR Tablets (For AquaPRO photometers) (5-200ppm) – 250ct	7500666
Copper #1 Tablets – 100ct	7500667
Copper #1 Tablets – 250ct	7500668
Copper #2 Tablets – 100ct	7500669
Iron LR Tablets – 100ct	7500670
Iron LR Tablets – 250ct	7500671
Iron HR – 100ct	7500672
Iron II LR Tablets – 250ct	7500673
Sulfate Tablets – 100ct	7500674

Hardcheck P/Total Hardness Tablets – 100ct	7500675
Bromocresol Purple pH (5.2-6.8) – 100ct	7500676
Thymol Blue pH (8-9.6) – 100ct	7500677
DPD #1 High Calcium Tablets (1000ppm or greater) – 100ct	7500678
PHMB Tablets – 100ct	7500679
PHMB Tablets – 250ct	7500680
Sulfite Tablets – 100ct	7500681
Copper Powder Pack Reagent Set (Free) – 100ct	7500682
Iron TPTZ Powder Pack Reagent Set (Total Iron) – 100ct	7500683
Iron Ferro (II, III Soluble) Powder Pack Reagent Set – 100ct	7500684
Sulfate 4 Powder Pack Reagent Set – 100ct	7500685
Zinc Tablets Reagent Set – 100ct	7500686
Phosphate LR Tablets Reagent Set (50-4000ppb) – 100ct	7500687
Copper Tablet Reagent Set (Free & Total) – 100ct	7500688
Aluminum Powder Pack Reagent Set – 100ct	7500689
Boron Tablet Reagent Set – 100ct	7500690
Managanese LR Powder Pack/Liquid Reagent Set – 50ct	7500691
Iron (II, III Coluble) Tablet Reagent Set) – 100ct	7500692
Aluminum Tablet Reagent Set – 100ct	7500693
Chlorine HR Tablet Reagent Set (5-200ppm) – 100ct	7500694
Chlorine UHR (0.2-16%) Sodium Hypochlorite – 100ct	7500695
Ammonia Powder Pack Reagent Set – 100ct	7500696
Ammonia Tablet Reagent Set – 100ct	7500697
Ozone Tablet Reagent Set – 100ct	7500698
Nitrate Tube Test Reagent Set – 50ct	7500699
Chloride Tablet Reagent Set – 100ct	7500700
Calcio Hardness Tablet Reagent Set – 100ct	7500701
Calcio Hardness Tablet Reagent Set – 250ct	7500702
Urea Reagent Set (0.1-3ppm) – 100ct	7500703

Test Kit for Trichloramine

Application:

- Covered Public swimming pools
- Field house
- Lobby
- Technical room
- Clean process

Features & Benefits:

- Portable equipment to measure trichlorimines in the air
- 1 malet with photometer, air pump, reagents and accessories
- 1 malet with test kits (Consumables)
- Fast response (40mn for pumping air and 3mn to do the measure)
- Average measurement per day

Description	Part Number
Malet with air pump, photometer, etc.	VAT0000
Set of 20 Kits of measurement of the trichloramine	VAT0001

CO_2 Controller

The ProMinent CO_2 controller is designed to use bottled CO_2 in the control of pH levels for Swimming Pool water.

Features & Benefits

- CO_2 dosing control panel containing rotameter and solenoid valve
- Injection assembly (contains injection lance, check valve and ball valve) is withdrawable for servicing without the need to drain the pipe work of water
- Gas bottle kit containing wall mounting, auto changeover and all accessories for either 2, 4 or 6 bottle installations
- No mineral acid solution will be present on site, which solves the problems associated with handling hydrochloric acid
- Adding CO_2 will not contribute to a TDS increase of pool water, thus reducing the amount of make-up water required to maintain the pool water quality within acceptable levels
- By maintaining the correct pH levels in your Swimming Pool the consumption of Disinfecting chemicals will be reduced by up to 50% and the overall treatment cost will be reduced by up to 40%

Ordering Information

Description	Part Number
CO2-20 Feed Unit, 2-20 SCFH	7746927
CO2-200 Feed Unit, 20-200 SCFH	7746928
CO2-20E Feed Unit, 2-20 SCFH w/ Eductor	7746929
CO2-20D Feed Unit, 2-20 SCFH w/ Diffuser	7746930
CO2-200E Feed Unit, 20-200 SCFH w/ Eductor	7746931
CO2 Heater 120V 60Hz (Only)	7746943
GP402 Brass Regulator Dual Stage	7746934
Series 200 Regulator Manifold (Dual Cylinder 24” Leads) [Manual Switchover]	7746935
SG 900 BR Switchover System (Dual Cylinder 24” Leads) [Semi-Auto Switchover]	7746936
CO2-D-L Diffuser Low 2-20 (Only)	7746926
CO2-E Eductor (Mazzei) (Includes 7746937 & Fitting for 3/8” tube connection)	7746942

Metering Monitors

LogR Corrosion Monitor

The ProMinent LogR is a real-time corrosion monitor that can save you thousands of dollars in repair bills and lost revenue due to maintenance closures of your swimming pool. Using Linear Polarization Resistance (LPR) to measure the corrosion rate of metals in your swimming pool equipment, you will be notified instantly when corrosion is beginning to occur to your impellers, heat exchangers, light assemblies, rails and ladders!

Features & Benefits:

- No lengthy corrosion coupon delays – instant measurement
- Corrosion rate updates every 2.5 minutes
- Data logs every 5 minutes
- Stores up to one year of log data
- Pre-configured for your metallurgy
- Integrates with the DCM 500 Series Controller
- LPR technology
- CE Approved
- Alarm relay

Package includes:

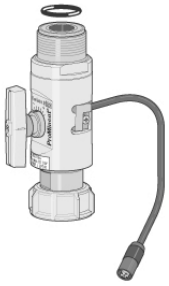
- Monitor, sensor, 24 VDC / 120 VAC power supply
- Universal power adapter
- 3/4” sensor entry “T” fitting
- 4-20 mA output
- Backplate mounting hardware
- USB flash drive with startup and O&M manuals

Choose one of the following packages:

- 90:10 Cupro – Nickel sensor package (P/N: 7761467)
- Copper sensor package (P/N: 7760789)
- Admiralty sensor package (P/N: 7760790)
- Carbon Steel sensor package (P/N: 7760788)

Adjustable metering monitor “Flow Control”

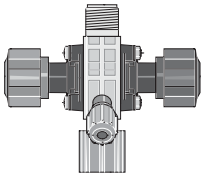
Supplied with connection cable for assembly directly to liquid end. Monitors individual strokes according to the float and orifice principles. The partial quantity of chemical flowing past the float is adjusted from the total stroke volume via the adjusting screw so that an alarm is actuated if the flow falls below 20%. The user can select the number of incomplete strokes permitted (between 1 and 125) in accordance with the actual process requirements



For Sigma HM with connection cable for assembly to liquid end.

Flow Control	Material	Pump type	Part No.
Flow Control type II (Sigma/ 1)	PVDF, EPDM	12017, 10022, 12035, 10044 10050, 07065	1021168
	PVDF, Viton® B	12017, 10022, 12035, 10044 10050, 07065	1021169
Flow Control type III (Sigma/ 1)	PVDF, EPDM	07042, 04084, 04120, 12050 12090, 12130	1021170
	PVDF, Viton® B	07042, 04084, 04120, 12050 12090, 12130	1021171

Multifunction valve



ProMinent's multifunction valve is operated by means of smooth-action rotary knobs which automatically return to their initial position when released. Made of PVDF, it can be used in feed systems for virtually all chemicals. The multifunction valve is mounted directly on the liquid end of the pump for backpressure, antisiphon, pressure relief, priming and draining the discharge line. The inlet thread is female M20 x 1.5 and the discharge is male M20 x 1.5.

ProMinent's multifunction valve has the following functions:

- Backpressure valve, opening pressure approximately 22 psi (1.5 bar)
- Relief valve, opening pressure approximately 87, 145 or 232 psi (6, 10 or 16 bar)
- Admission aid in exiting backpressure, no need to de-pressurize pipes
- Pressure relief, e.g. prior to servicing

Warning: Backpressure valves are not intended as completely sealed units!

Materials in contact with chemicals:

Valve body	PVDF
Diaphragm	PTFE-coated
O-rings	Viton or EPDM
DN 10 adapter	PVC

Technical data:

Type	Relief opening pressure	Application range by size	Part No.
Size I	145 psi (10 bar)	Beta b type 100, 1601,	791715
Size I	87 psi (6 bar)	1602, 1605, 1005, 1008, 0708, 0413, 0220	1005745
Size II (M20 x 1.5)	145 psi (10 bar)	Beta b type 1605, 1008,	792203
Size II	87 psi (6 bar)	0713, 0420, 0232	740427
Size III (DN 10)	145 psi (10 bar)		792215

Note: Multifunction valves mounted to stainless steel liquid ends require below adapters.

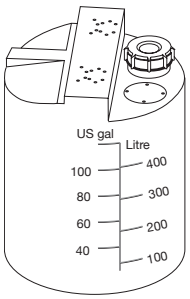
** Cannot adjust pressure; fixed factory setting.*

Connector Set for SS version pumps

Adapter with o-rings, for use with SS2 liquid ends: 1/4" MNPT x Male M20 x 1.5 adapter, PVDF	7358651
Adapter with o-rings, for use with SS2 liquid ends: 3/8" MNPT x Male M20 x 1.5 adapter, PVDF	7358659

Tanks

Chemical Tanks



15, 26, 66, 132 gallon capacity

Made of translucent UV-stabilized polyethylene, with gallon/liter scale, screw cap. Mounting platforms for ProMinent metering pumps and mixers. All tanks are specifically developed to maximize toughness. These tanks are impact, stress, and chemical resistant. Maximum allowable temperature 180 °F (82 °C).

Tank opening (screw cap) diameter for 15 – 132 gal.: 6.5"

Tank opening (screw cap) diameter for 220 and 300 gal.: 5 1/4"

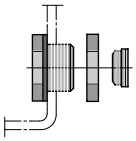
Capacity		O.D.		Height		Empty Weight		Part No.
gallon	(liter)	in.	(mm)	in.	(mm)	lb.	(kg)	
15	(60)	18	(445)	22	(559)	11	(5.0)	791994
26	(100)	20	(500)	30	(760)	17	(7.7)	1001490
78	(296)	26	(661)	43	(1100)	37	(17)	1023175
132	(500)	32	(820)	47	(1190)	54	(24.5)	791997
220	(830)	42	(1067)	41	(1041)	55	(25.0)	7809688
300	(1100)	43	(1092)	59	(1499)	70	(31.7)	7809687

Note: Pump mounting kit needed for all tanks (Part No. 7500124)

Accessories

Lock and key for screw on cap	200683

PVC tank drain fitting with plug



1077/4

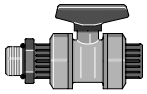
1/2” FNPT as an additional connection for chemical tanks. To be used as an open drain with plug or for addition of optional 1/2” ball valve fitting. Fits 1” opening.

	Part No.
PVC with Viton® seal	7809755
PVC with EPDM seal	7744374

3/4” FNPT as an additional connection for chemical tanks. To be used as an open drain with plug or for addition of optional 3/4” ball valve fitting. Fits 1-3/8” opening.

PVC with Viton® seal	7000300
PVC with EPDM seal	7744375

PVC ball valve



2424/4

1/2” PVC ball valve with 1/2” FNPT connections for all chemical tanks with 1/2” PVC tank drain fittings.

PVC with Viton® seal	7000309
PVC with EPDM seal	7000311

3/4” PVC ball valve with 3/4” FNPT connections for all chemical tanks with 3/4” PVC tank drain fittings.

PVC with Viton® seal	7741668
PVC with EPDM seal	7741485

Acid fume separator

Acid fume separator SDA-90 filled with 0.7 l of acid-absorbing granules for absorption of hydrochloric acid fumes.
Connection: DN 25 PP coupling with G 1/2” union nut.

	Part No.
Acid fume separator	1009987
Replacement pack of absorbent material 0.7 L	1010500

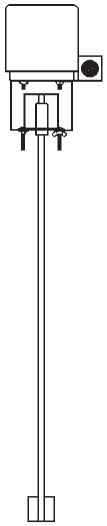
Reactor chamber vent valve

Vent valve for reactor space, adjustable, instead of vent line, which is led to open air (already included in standard delivery package on CDVb).

	Part No.
Reactor chamber vent valve	791801

Mixers

Fig. 1



Electric mixers

Note: with any tank-mounted mixer, the inertia of fluid rotating in polyethylene tank may cause the tank to move when the fluid level is low. Provision should be made to anchor the tank or to automatically shut the mixer off when the fluid level is low.

For U.S. only.
High speed mixer for water-like fluids in 15, 26 or 66 U.S. gallon tanks (Fig. 1):

Motor: 1/20 HP, 1550/1725 PFM, 115 VAC, 60 Hz, 1ph., TEFC, with 8' Type SJ power cord, no on/off switch.
Shaft: 316 SS shaft/impeller (epoxy coated)
Mount: Four hole mounting flange with bolt holes, set at 5° angle for mounting directly on tank top.
Accessories: 1" diameter PVC metering pump suction pipe with bulkhead fitting for mounting to tank top.
Shipping weight: 9 lbs. (4 kg)

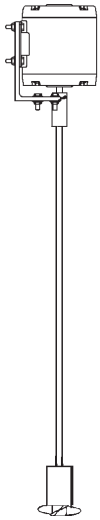
	Part No.
For 26 gallon tank (19" shaft)	7818588
For 66 gallon tank (34" shaft)	7818589
Shaft only (19" replacement)	7818590
Shaft only (34" replacement)	7818591

High speed mixer for water-like fluids in 132 to 300 gallon tanks (Fig. 2):

Motor: 1/4 HP, 1725 RPM, 115/230 VAC, 60 Hz, TEFC. Power cord not included.
Shaft: 316 SS shaft/propeller. Shaft length: 36" (may be cut down for smaller tanks)
Mount: Bracket with bolt holes, for mounting directly on tank top.

Shipping weight: 27 lbs. (12 kg)	7818592
Shaft only (36" replacement)	7744506

Fig. 2



Slow speed mixer for water-like fluids in 15, 26 or 66 gallon tanks:
Motor: 1/3 HP, 60 PRM, 115 VAC, 50/60 Hz, 1ph., TEFC. Power cord not included
Shaft: 316 SS shaft w/ 1 set of impellers. Shaft length is 44" (may be cut).
Mount: Bracket w/ 4 bolt holes for mounting directly on tank top.

Shipping weight: 32 lbs.	7818594

Note: Motor not thermally protected.

Mixer mounting kit for 15 gallon tanks:
Polyethylene flange adapter for mounting mixers to metric flange.

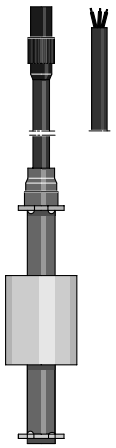
Includes all necessary hardware.	7744385

Mixer mounting kit for 26, 66 and 132 gallon tanks:
Polyethylene flange adapter for mounting mixer to metric flange.

Includes all necessary hardware.	7744319

*(Other mixers available upon request)

Float Switches



2380/4

Float switches, two stage Float switch, two-stage: for beta

(Includes ceramic weight – do not use ceramic weight for fluoride service)

To monitor the fluid level in the chemical tank. Two-stage function, first stage is early warning annunciation, second stage will shut down pump after an additional drop in the fluid level of approximately 1.2” (30mm).

Technical data:

Max. contact load 60 V, 0.3 A, 5 w/5 VA, temperature range -13 °F to 167 °F (-25 °C to 75 °C).

Materials:			**Part No.**
PP body, foamed PP float 7/8” (21 mm) dia., PE cable			
PP with 3-pole round connector	cable length	6 ft. (2 m)	7142093
		15 ft. (5 m)	7142095
PVC body, foamed PP float 7/8” (21 mm) dia., PE cable			
PVC with 3-pole round connector	cable length	6 ft. (2 m)	7142043
		15 ft. (5 m)	7142038
PVDF body, foamed PVDF float 1” (25 mm) dia., PE cable			
PVDF with 3-pole round connector	cable length	6 ft. (2 m)	7792639
		15 ft. (5 m)	7792640

1086/4

Ceramic weight for float switch

1.53” dia. x 1.26” with oval opening .51” x 1.06” (39 mm x 32 mm) (13 mm x 27 mm)

404004

With two-stage float switches with round connector, the weight is slid into position from below after the float has been removed.

Note: Not for use in fluoride applications (e.g. hydrofluosilicic acid).

2820/4

Float switches, single stage Float switch, single-stage: for Concept PLUS

(Includes ceramic weight – do not use ceramic weight for fluoride service)

For minimum level indication with simultaneous shutdown of the metering pump.

Technical data:

Max. contact load 60 V, 0.3 A, 5 W/5 VA, temperature range -13 °F to 167 °F (-25 °C to 75 °C).

Materials:			**Part No.**
PP body, foamed PP float 7/8” (21 mm) dia., PE cable			
PP with flat connector	cable length	6 ft. (2 m)	790412
		15 ft. (5 m)	790470
PVC body, foamed PP float 7/8” (21 mm) dia., PE cable			
PVC with flat connector	cable length	6 ft. (2 m)	790414
		15 ft. (5 m)	790468
PVDF body, foamed PVDF float 1” (25 mm) dia., PE cable			
PVDF with flat connector	cable length	6 ft. (2 m)	790416
		15 ft. (5 m)	790472

1086/4

Ceramic weight for float switch

1.53” dia. x 1.26” with oval opening .51” x 1.06” (39 mm x 32 mm) (13 mm x 27 mm)

404003

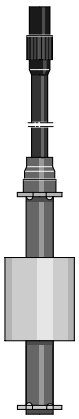
Note: Not for use in fluoride applications (e.g. hydrofluosilicic acid).

PVC weight

For bottom of foot valve for fluoride applications 7404007

For fluoride, (hydrofluosilicic acid) or when plastic is required to replace standard ceramic weight.

Float Switches (cont.)



2820/4

Float switches, two stage for Sigma Control pumps

(Includes ceramic weight – do not use ceramic weight for fluoride service)

To monitor the fluid level in the chemical tank. Two-stage function, first stage is early warning annunciation, second stage will shut down pump after an additional drop in the fluid level of approximately 1.2” (30 mm).

Technical data:

Max. contact load 60 V, 0.3 A, 5 W/5 VA, temperature range -13 °F to 167 °F (-25 °C to 75 °C).

Materials:			**Part No.**
PP body, foamed PP float 7/8” (21 mm) dia., PE cable			
PP with 3-pole round connector	cable length	6 ft. (2 m)	7142093
	15 ft. (5 m)		7142095
PVC body, foamed PP float 7/8” (21 mm) dia., PE cable			
PVC with 3-pole round connector	cable length	6 ft. (2 m)	7142043
	15 ft. (5 m)		7142038
PVDF body, foamed PVDF float 1” (25 mm) dia., PE cable			
PVDF with 3-pole round connector	cable length	6 ft. (2 m)	7142006
	15 ft. (5 m)		7142007

2820/4

Float switches, two stage for Sigma basic pumps

(Includes ceramic weight – do not use ceramic weight for fluoride service)

For minimum level indication in source tank. May be used to stop pump at motor starter or variable spped drive, or trigger alarm. May be used with relay combination.

Technical data:

Max. contact load 60 V, 0.3 A, 5 W/5 VA, temperature range -13 °F to 167 °F (-25 °C to 75 °C).

Materials:			**Part No.**
PP body, foamed PP float 7/8” (21 mm) dia., PE cable			
PP with 2 loose cable ends	cable length	15 ft. (5 m)	790412
PVC body, foamed PP float 7/8” (21 mm) dia., PE cable			
PVC with 2 loose cable ends	cable length	15 ft. (5 m)	790468
PVDF body, foamed PVDF float 1” (25 mm) dia., PE cable			
PVDF with 2 loose cable ends	cable length	15 ft. (5 m)	790472

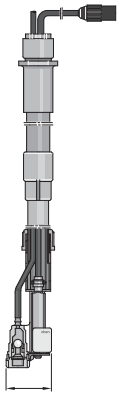
Float switch weights

PVC weight

For bottom of foot valve for fluoride applications. 7404007

For fluoride, (hydrofluosilicic acid) or when plastic is required to replace standard ceramic weight.

Suction Assemblies



2798/R

Suction assemblies, two-stage: for Beta b

Including foot valve, rigid supporting pipe, suction line and float switch with 6 ft. (2 m) cable. For use in drums or tanks with mixers, which could tangle flexible suction tubing or float switch cables.

PP version: EPDM o-rings, PE suction line

PVC version: Viton® o-rings, PVC suction line

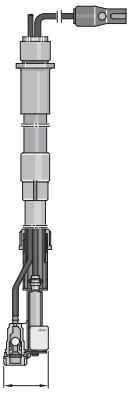
Adjustable PP suction assembly, with bulkhead fitting for 1” opening and 2 stage float switch

For ProMinent pumps with PP foot valve, PE suction hose, PP supporting pipe and union. PP two-stage float switch with 3-pole round connector. **Adjustable length (foot valve to bulkhead)**

26” to 41” (660 mm to 1040 mm) for 26 – 220 gallon (140 – 830 L) tanks

Requires 1.0” hole in top of tank for bulkhead fitting PP version.

Suction line	Part No.
1/4” x 3/16”	790368
1/2” x 3/8”	790370



2798/F

Suction assemblies, two-stage: for Concept PLUS

Including foot valve, rigid supporting pipe, suction line and float switch with 6 ft. (2 m) cable. For use in drums or tanks with mixers, which could tangle flexible suction tubing or float switch cables.

PP version: EPDM o-rings, PE suction line

PVC version: Viton® o-rings, PVC suction line

Adjustable PP suction assembly, with bulkhead fitting for 1” opening and single-stage float switch for tank.

With PP foot valve, PE suction hose, PP supporting pipe and union. PP single-stage float switch with flat connector. **Adjustable length**

Size II 26” to 41” (660 mm to 1040 mm) for 26 – 220 gal. (140 – 830 L) tank

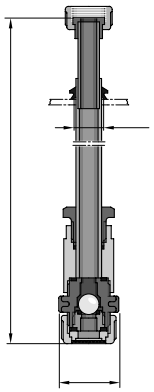
Requires 1.0” hole in top of tank for bulkhead fitting

PP Version

Suction line	Part No.
1/4” x 3/16”	790368
1/2” x 3/8”	790370

PVC Version

1/4” x 3/16”	790350
1/2” x 3/8”	790352



Note: This fitting is a compression fitting, pipe can be cut to desired length.

2801/3

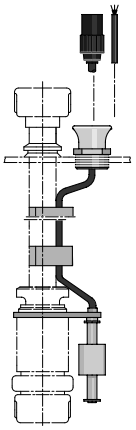
Suction assemblies: for Sigma Basic

PP without float switch

Size of connection		Max. tank size gallons (liters)	Max. length inches (mm)	Part No.
PP-DN 10 – 1/2”	Sigma	220 (830)	Up to 52” (1320)	790389
PP-DN 15 – 3/4”	Sigma	220 (830)	Up to 52” (1320)	790394
PP-DN 32 – 1-1/2”	Sigma	-	-	1005524

PVC without float switch

Size of connection		Max. tank size gallons (liters)	Max. length inches (mm)	Part No.
PVC-DN 10 – ½”	Sigma	220 (830)	Up to 52” (1320)	790387
PVC-DN 15 – ¾”	Sigma	220 (830)	Up to 52” (1320)	790391
PVC-DN 32 – 1-1/2”	Sigma	-	-	1005525



Float switch for rigid suction assemblies

PP, two-stage with round connector for S1Ca pumps

The float switch set can be ordered together with the suction assemblies 1/2” and 3/4”.

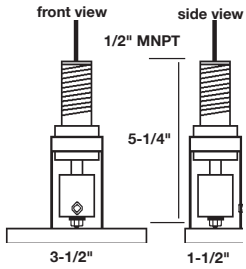
3-pole round connector 10 ft. (3 m) cable 790321

PVC, two-stage with round connector for S1Ca pumps

The float switch set can be ordered together with the suction assemblies 1/2” and 3/4”.

3-pole round connector 10 ft. (3 m) cable 790318

Diaphragm-failure Detector



Diaphragm-failure detector — Part No.

To trip an alarm and/or switch the metering pump off in case of a failure, fluid drains out a weep hole in the back plate, through a tube to the detector column. The float switch in the columns trips with 10 mL of fluid. Comprising of a float switch PVC/PE, clear PVC column, tube connectors and connecting tube. Switch closure, max. contact rating 60 VAC, 300 mA, 5 W. 1/2” MNPT conduit connection. Shipped with loose ends on cable.

N/O	7803640
N/C	7803650

For processing the alarm signal from the level switch we recommend the relay combination Part No. 914769.5 with wall-mounted plastic housing and 2 change-over relays.

Signal horn

115 V, 60 Hz, 95 dB, NEMA 4X (e.g. in conjunction with fault annunciating relay or relay combination) 7705004

Amber signal strobe light

115 V, 60 Hz, NEMA 4X (e.g. for use in conjunction with fault annunciating relay or relay combination) 7914785

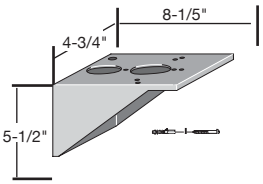
Universal Switchover Box

Two Pump Universal Switchover Box — Part No.

Automatically backup protection for ProMinent microprocessor based electronic metering pumps. Accepts Manual, 4-20 mA Analog, or External contact modes of operation, and can switch operation back and forth between two metering pumps based on an external dry contact opening and closure. Pumps must be equipped with an alarm relay output. The unit is equipped with a 120 VAC power cord and a weatherproof duplex receptacle for metering pumps power. Specify controls mode of metering pumps when ordering (e.g. Remote 4-20 mA analog pacing or water meter contact pacing).

7951130

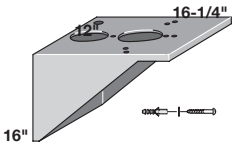
Pump Stands



pk_1_092

Wall mounting bracket for solenoid pumps

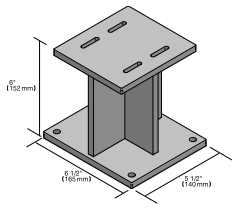
	Part No.
Made of fiberglass-reinforced PPE, with wall-plugs and screws, accepting a beta metering pump. Pumps can be mounted either parallel or perpendicular to the wall.	
PPE wall mounting bracket	810164



pk_1_092

Wall mounting bracket for Sigma

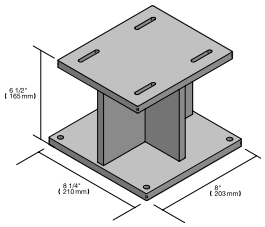
Polypro wall bracket mounts pumps so that diaphragm Is parallel to the wall	7803799



Floor mounting bracket for solenoid pumps

Polypropylene floor mounting bracket accepts pumps parallel to the floor.

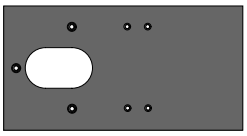
6” PP floor mounting bracket	1028758



Floor mount bracket for Motor pumps

Polypropylene floor mounting bracket accepts pumps parallel to the floor.

6-1/2” PP floor mounting bracket	7028759
10” PP floor mounting bracket	1028760



pk_1_121

Adapter plate

With fixtures, for vertical wall-mounting of beta pumps with auto-degassing liquid ends. Used with PPE wall console.

PP adapter plate	1003030

Dulcodes UV Systems

General Notes On UV Treatment

Disinfection is a fundamental step in modern water treatment. UV disinfection is being used to an ever-increasing extent here, as a safe, chemical-free and reliable disinfection process. Extensive research projects and numerous trouble-free operational systems prove the safety and reliability of UV disinfection.

With UV disinfection, the water to be disinfected is irradiated with ultraviolet light, which involves a purely physical, chemical-free process for water disinfection.

UV-C radiation in particular, with a wavelength in the 240 - 280 nm range, attacks the vital DNA of the bacteria directly. The radiation initiates a photochemical reaction and destroys the genetic information contained in the DNA. The bacteria lose their reproduction capability and are destroyed. Even parasites such as Cryptosporidia or Giardia, which are extremely resistant to chemical disinfectants, are efficiently reduced.

The initiation of photochemical reactions is utilized in other applications too. The undesirable combined chlorine in swimming pool water is reduced by UV radiation, as a result of which enormous fresh water savings are achieved. Oxidants such as ozone, chlorine or chlorine dioxide are reliably reduced in the production water used in the food and beverages industry, avoiding the need for costly activated charcoal filters.

Special version systems with special lamps and special composition of the radiation chamber can be used for reduction of TOC (Total Organic Carbon) in the treatment of ultrapure water.
UV disinfection has many advantages:

- Immediate and safe destruction of the bacteria without addition of chemicals
- Photochemical reduction of undesirable substances
- No THM or AOX formation, no formation of other undesirable substances
- No impairment of odor or taste of the water
- No storage and handling of chemicals required
- Effect is independent of pH
- No reaction vessel or reaction tank required
- Low space requirement
- Low investment and operating costs with high reliability and efficiency

Applications Of Dulcodes UV Systems

A large number of UV disinfection systems have been supplied worldwide, for the most diverse applications:

- **Own source water suppliers and municipal water works**
  for disinfection of drinking water
- **Food and beverages industry**
  to destroy the bacteria in the water needed for food and beverages production and for disinfection of service water
  to reduce the chlorine dioxide in the production water
- **Pharmaceuticals and cosmetics industry**
  to maintain the high microbiological requirements of the production water
  to destroy residual ozone in the production water without use of activated charcoal filters
- **Reverse osmosis plants**
  for permeate disinfection
- **Municipal sewage plants**
  for reduction of the bacterial count in the sewage plant outflow
  for reduction of the bacterial count in the industrial water extracted from the sewage plant outflow
- **Horticulture**
  for disinfection of the irrigation water
- **Spa pools and swimming pools**

for disinfection of the pool water
for chloramine reduction in the pool water

- **Semiconductor industry**
  for reduction of TOC and to maintain the high microbiological requirements of the production water

Description Of Dulcodes UV System

Basically, Dulcodes UV disinfection systems consist of:

- High-quality radiation chambers made from stainless steel (DIN 1.4404 or 1.4571) or UV-resistant plastic
- Lamp protection tubes made from high-quality quartz, easily removable for cleaning purposes
- Lamps with a particularly high UV output in the 254 nm range, ensuring an outstanding disinfection characteristic
- Highly selective UV sensors with good long-term and temperature stability
- UV system controllers and modern electronic ballasts fitted in a control cabinet

The special features of our Dulcodes UV disinfection systems are:

- Even irradiation of the entire water flow through optimized system hydraulics, so ensuring outstanding disinfection results
- Flow-optimized inlet zone
- Longitudinal flow against UV lamps with high turbulence
- Use of UV lamps with long lamp life time and high UV-C output
- Automatic cleaning system for the sleeve of medium-pressure lamps
- Manual cleaning system for the sleeve of system type Dulcodes R or Dulcodes S
- System controller with comprehensive monitoring and reporting functions
- Display of all important operating parameters and reporting of faults in plain text
- Trend display of the variation of the UV sensor signal with time
- Analogue output sensor signal and alarm relay
- Use of modern electronic ballasts with bus technology for lamp-friendly ignition and operation
- Individual lamp monitoring
- Direct control of automatic isolation and flushing valves

Dulcodes UV Lamps

Standard low pressure lamp
Robust low pressure mercury lamp with a life expectancy of approx. 14,000 operating hours. The operating temperature of the lamp is 86 – 122 °F. This is why its use is limited to water temperatures between 41 and 104 °F. The output is approx. 100 W per meter arc length.

Low pressure lamp High-Flux
Low pressure amalgam lamp with a life expectancy of approx. 10,000 operating hours. The operating temperature of the lamp is 212 - 226 °F. This is why its use is limited to water temperatures of up to 158 °F. The output is independent of the water temperature and is approx. 200 W per meter arc length.

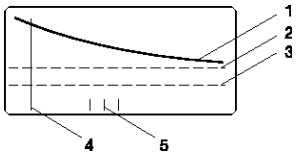
Low pressure lamp Opti-Flux
Doped, high-performance low pressure amalgam lamp with a life expectancy of approx. 14,000 operating hours. The operating temperature of the lamp is 212 - 226 °F. This is why its use is limited to water temperatures of up to 158 °F. The output is independent of the water temperature and is approx. 300 W per meter arc length.

Medium pressure lamp Powerline
Medium pressure mercury lamp with a life expectancy of approx. 6,000 to 10,000 operating hours, depending on lamp size. The high output of these lamps (up 10,000 W per meter arc length) permits the treatment of very large flows. Thanks to their broad range spectrum, these lamps are specifically suitable for photo- chemical processes. The operating temperature of the lamp is 1202 - 1562 °F. Powerline medium pressure lamps are typically operated with a mechanical wiper system. This is why their use is limited to water temperatures of up to 104°F.

Dulcodes UV Controllers

Compact controller

Compact unit for control of all basic functions of the UV system. The large graphical display shows the cur- rent UV-C output, the operating hours and the number of lamp switch-ons. With the fixed-setting warning and safety threshold levels, a warning signal is generated and a relay output (230 V / 0.2 A) for operation of a shut-off valve is actuated if the UV output is too low. Alternatively, this output can also be used as a common alarm relay (230 V / 2.5 A).



1 UV sensor signal
2 Warning threshold
3 Safety threshold
4 Calibration
5 On/Off contacts

Comfort control

The Dulcodes comfort control includes a large, graphical display for viewing the UVC sensor signal. Shown as a trend display, the lamp ageing, any possible deposit formation on the lamp protection tube or a change in water quality can be seen in a time window. The freely programmable safety and alarm thresholds are also shown as well as the number and times of the lamp activations. All operating and error messages are shown in full text. Setting the operating parameters is facilitated by the clear menu navigation. The control offers a selection of 9 different languages.

The control is connected to the ballasts via a bus system, which permits monitoring of each individual lamp. This also facilitates a spatial separation of the control over long distances from the radiation chamber including lamps and ballasts.

Various additional functions such as the automatic flushing of the system in a freely programmable flushing time, the control of a shut-off valve as well as of a circulating pump are integrated as standard. For this purpose, 2 voltage outputs 230 V / 0.2 A and a switching output 230 V / 2.5 A are integrated.

The UVC sensor signal can be monitored online via a standard signal output 0/4-20 mA. If the alarm and safety thresholds are undershot, two relay outputs (230 V / 2.5A) send a corresponding signal. All other faults are signaled via a combined alarm relay (230 V / 2.5 A).

3 potential-free control inputs facilitate linking of the control with external information: The error input can e.g. be used for an external temperature monitoring, the operation of the system can be normally interrupted using the pause input, the flow monitoring can be of help in connection with flushing processes.

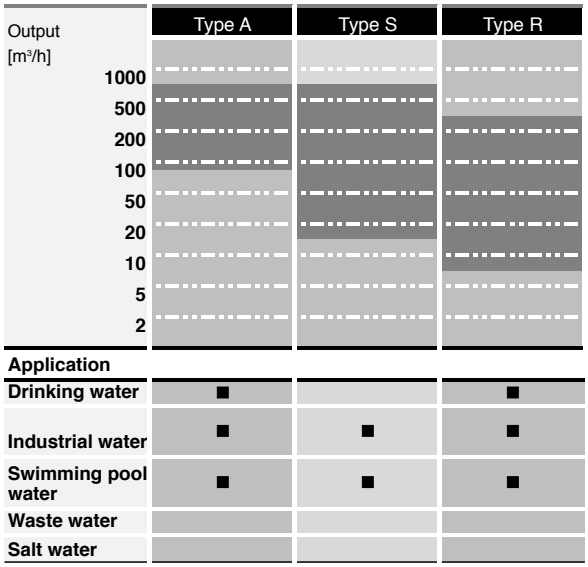
Comfort control Powerline

This control type in addition includes the option for an external power control via a standard signal 0/4-20 mA (not for Dulcodes M 2 kW, 3 kW, and Dulcodes S). The systems can thus e.g. be controlled independent of the flow or the lamp output can be automatically adapted to a defined UVC sensor signal. This saves energy costs and extends the lamp lifetime of the lamps.

The control also is equipped with a display and monitoring of the temperature of the radiation chamber as well as with a freely programmable control of the mechanical wiper system for an automatic cleaning of the lamp protection tube.

Performance Overview Of Dulcodes UV Systems

ProMinent® offers a wide range of UV systems for the most diverse applications. The following overview shows the output and main applications of our standard systems:



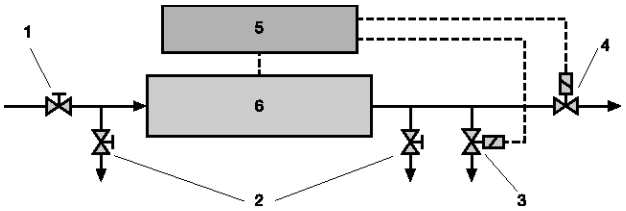
Application	Type A	Type S	Type R
Drinking water	■		■
Industrial water	■	■	■
Swimming pool water	■	■	■
Waste water			
Salt water			

We offer a full advisory service covering everything required for safe use of a Dulcodes UV system:

- Assessment of the situation on site by trained, factory certified field technicians.
- All water parameters needed for an optimum system design can be measured in our water laboratory.
- Design and planning of the system.
- Commissioning and system maintenance by our trained service technicians.

Notes On Planning And Designing A UV System

- The system must always be designed for the greatest water flow.
- The system must always be designed for the worst anticipated UV transmission.
- Fireproof sampling cocks for microbiological tests must be provided before and after UV disinfection systems.
- A manual shut-off valve must be provided before the UV system to isolate the system for maintenance work. For this reason a by-pass line installation is recommended.
- With drinking water disinfection and similar applications, an electrically controlled shut-off valve must be provided after the UV disinfection system, which also closes automatically on mains failure (solenoid valve, automatic closing flap valve or similar).
- With service water disinfection, it is normally sufficient to provide a manual valve to isolate the system for maintenance work, instead of the electrically controlled valve.
- With drinking water disinfection and similar applications, a flushing valve must be provided after the UV disinfection.
- It must be ensured that there is sufficient space available for removing the lamp protection tube and lamp replacement.
- Modern electronic ballasts only allow a limited cable length between ballast and lamp, so that the control box with the ballasts must be positioned close to the lamp. On the other hand, the controller can be fitted in a control area, for example. However, the maximum cable lengths specified by us must not be exceeded in this case.



1 Shut-off valve
2 Sampling cock
3 Flushing valve
4 Shut-off valve
5 Controller/Ballast
6 Radiation chamber

The following details are required for design of a UV system:

- Application of the system
- Maximum water flow
- Minimum UV transmission of the water

The UV transmission must be determined by means of a laboratory measurement of the absorption at 254 nm.

A full water analysis gives important conclusions on the operating conditions of the system. The following questionnaire provides our project engineers with the information needed to design an appropriate system.

Note: Dulcodes A UV System to be released in 2012.

Dulcodes A inline UV systems with medium pressure lamps

Dulcodes A UV treatment systems are ideal for the photochemical decomposition of combined chlorine (chloramines) in the treatment of swimming pool water. Chlorine-resistant germs, especially cryptosporidia are reliably killed. Special medium pressure UV lamps generate intense polychromatic UV radiation to reduce the strong odor producing and irritating substances. The result is an improved quality of water for healthy and pleasant swimming.

Features

- Flow: up to 3300 gpm (depending on transmission rate and radiation intensity).
- Extremely compact inline system with minimum space requirement.
- Simple installation thanks to minimal installation and fast retrofitting.
- Ultra-flexible installation thanks to free choice of installation location.
- Powerline S type medium-pressure lamp with a high-connected load of up to 3 kW per meter of arc length.
- High gas pressure and relatively high lamp operating temperature of 1112 to 1472 °F, hence broad emission spectrum.
- Lamp lifetime: approx. 8,000 h depending on lamp size.
- Long-time stable UVC sensor for monitoring the lamp output, the lamp protection tube contamination as well as changes in the water quality.
- Integral temperature sensor for monitoring the water temperature in the radiation chamber.
- Large graphical display to show the sensor signal with trend line of the variation of the UV sensor signal over time.
- Manual power control via manual step switch to perfectly adapt the system to the relevant capacity needed (not suitable for use with Dulcodes 1 x 0.65 and 1S).
- Automatic chloramine value-dependent on/off control, for instance when used in conjunction with the DCM 500 Controller.
- Automatic wiper system for efficient removal of deposits on the lamp protection tube. All units, except 1x0.65S, sold standardly with automatic wiper system in USA.
- Radiation chambers made from high-grade stainless steel 1.4571 or 1.4404.
- Control cabinet made of coated steel.
- Optimum energy use thanks to large radiation chamber and even radiation of the entire water flow due to improved system hydraulics.

Main applications

Drinking water	Industrial water	Swimming pool water	Wastewater	Salt water
✔	✔	✔	–	–

Technical Data

Type	Max. flow (GPM)	Lamp Power (kW)	Connected Load (kW)	Radiation Chamber Length (in)	Minimum clearance for maintenance work (in)	Min. distance from wall (in)	Empty weight / Operating weight (Lbs)	Connection nominal diameter (in)
1x1A	10.64*/16.14**	1.00	1.10	27.56	15.75	17.72	68/104	4
1x2A	18.71*/28.07**	2.00	2.10	27.56	19.69	21.65	84/143	6
1x3A	37.61*/56.32**	3.00	3.20	31.50	23.62	25.59	115/260	8
2x2A	50.99*/76.50**	4.00	4.20	35.43	39.37	26.38	172/366	8
2x3A	69.53*/104.38**	6.00	6.20	35.43	39.37	26.38	172/366	10
3x3A	104.38*/156.48**	9.00	9.20	35.43	39.37	26.38	172/366	12

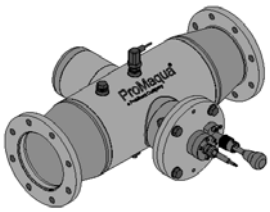
Lamp type Powerline S medium pressure lamp
Controller type Powerline S comfort control
Permissible operating pressure 87 psi
Permissible ambient temperature 41 – 104 °F
Permissible water temperature 41 – 104 °F

* 95 %/cm transmission; 600 J/m^2 UV dose

Spare Parts For Dulcodes A UV Systems

Name of the item	Part No.
UV lamp Powerline 1 kW	on request
UV lamp Powerline 2 kW	on request
UV lamp Powerline 3 kW	on request
Lamp protection tube for Dulcodes 1 A	on request
Lamp protection tube for Dulcodes 2 A	on request
Lamp protection tube for Dulcodes 3 A	on request
Wiper element (2 required per UV lamp)	on request
Spare part set UV A 1-3 kW motor wiper	on request
Spare part set UV A 2x2 kW and 2x3 kW motor wiper	on request
Spare part set UV A 3x3 kW motor wiper	on request
O-ring lamp protection tube/lamp cover	on request
UVC-U sensor M 1.4539	on request
O-ring UVC sensor	on request
Sensor cable, 16.5 ft (5m) long	on request
Replacement filter mat for control cabinet ventilation (2 mats required per control cabinet)	on request

Dulcodes S UV Systems For Chloramine Control In Pool Water



P_PMA_DS_0018_SW1

Dulcodes S UV treatment systems are suitable for a photochemical degradation of combined chlorine (chloramine) in swimming pool water treatment. Special medium pressure UV lamps generate the intensive polychromatic UV radiation to reduce the odor-intensive and eye-irritating substances. The result is an improved water quality for healthy and pleasant bathing.

Features

- Flow: up to 3302 gpm (depending on transmission rate and radiation intensity).
- Extremely compact inline system with minimum space requirement.
- Simple installation thanks to minimal installation and fast retrofitting.
- Ultra-flexible installation thanks to free choice of installation location.
- Powerline S type medium-pressure lamp with a high-connected load of up to 3 kW per meter of arc length.
- High gas pressure and relatively high lamp operating temperature of 1112 to 1472 °F, hence broad emission spectrum.
- Lamp lifetime: approx. 8,000 h depending on lamp size.
- Long-time stable UVC sensor for monitoring the lamp output, the lamp protection tube contamination as well as changes in the water quality.
- Integral temperature sensor for monitoring the water temperature in the radiation chamber.
- Large graphical display to show the sensor signal with trend line of the variation of the UV sensor signal over time.
- Manual power control via manual step switch to perfectly adapt the system to the relevant capacity needed (not suitable for use with Dulcodes 1 x 0.65 and 1S).
- Automatic chloramine value-dependent on/off control, for instance when used in conjunction with the DCM 500 or DULCOMARIN® II Chemical Controller.
- Automatic wiper system for efficient removal of deposits on the lamp protection tube. All units, except 1x0.65S, sold standardly with automatic wiper system in USA.
- Radiation chambers made from high-grade stainless steel 1.4571 or 1.4404.
- Control cabinet made of coated steel.
- Optimum energy use thanks to large radiation chamber and even radiation of the entire water flow due to improved system hydraulics.

Main applications

Drinking water	Industrial water	Swimming pool water	Wastewater	Salt water
–	✔	✔	–	–

Technical Data

Type	Max. flow (GPM)	Lamp Power (kW)	Connected Load (kW)	Radiation Chamber Length (in)	Minimum clearance for maintenance work (in)	Min. distance from wall (in)	Empty weight / Operating weight (Lbs)	Connection nominal diameter (in)
1x0.65S	75.0*	0.65	0.75	19.7	13.2	6.3	47/69	2.5
1x1S	225.0*	1.00	1.10	27.6	15.8	17.7	69/104	4
1x2S	392.0*	2.00	2.10	27.6	19.7	21.6	84/144	6
1x3S	779.0*	3.00	3.20	31.5	23.6	25.6	115/261	8
2x2S	1507.0*	4.00	4.20	35.5	39.4	26.4	172/366	8
2x3S	1453.0*	6.00	6.20	35.5	39.4	26.4	172/366	10
3x3S	2202.0*	9.00	9.20	35.5	39.4	26.4	172/366	12

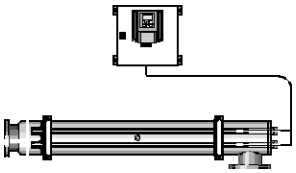
Lamp type Powerline S medium pressure lamp
Controller type Powerline S comfort control
Permissible operating pressure 87 psi
Permissible ambient temperature 41 – 104 °F
Permissible water temperature 41 – 104 °F

* 95 %/cm transmission; 600 J/m^2 UV dose

Spare Parts For Dulcodes S UV Systems

Name of the item	Part No.
UV lamp Powerline 0.6/1 kW	1035179
UV lamp Powerline 2 kW	1035057
UV lamp Powerline 3 kW	1009385
Lamp protection tube for Dulcodes 0.6 S	1035218
Lamp protection tube for Dulcodes 1 S	1035166
Lamp protection tube for Dulcodes 2 S	1035041
Lamp protection tube for Dulcodes 3 S	1035193
Wiper element (2 required per UV lamp)	1027879
Spare part set UV S 1-3 kW motor wiper	1037735
Spare part set UV S 2x2 kW and 2x3 kW motor wiper	1037756
Spare part set UV S 3x3 kW motor wiper	1037757
O-ring lamp protection tube/lamp cover	790410
UVC-U sensor M 1.4539	1034147
O-ring UVC sensor	1002175
Sensor cable, 16.5 ft (5m) long	1009398

Dulcodes Z UV Systems With Certified Performance



Dulcodes Z UV disinfection systems serve the disinfection of drinking and industrial water and can be used - depending on transmission - for flows between 2 and 230 m^3/h.

All Dulcodes Z systems are DVGW-certified and meet the requirements of the DVGW Test Regulation W 294. This test regulation requires comprehensive biodosimetric measurements as a proof of the required effectiveness of the disinfection.

The list of the treatment substances and disinfection processes according to section 11 German Drinking Water Ordinance 2001 specifies that in Germany only UV systems may be used for drinking water disinfection which meet the requirements according to the DVGW Test Regulation W 294.

Features

- Flow: up to 230 m^3/h (depending on transmission)
- High efficiency low pressure Opti-Flux lamp with special amalgam technology, increased UV output, largely independent of temperature
- Lamp service life: 14,000 h
- Low maintenance costs as a result of higher output per lamp and longer lamp service life
- Electronic ballasts with BUS interface for ignition and monitoring of each individual lamp
- Variable lamp current, hence lamp-friendly ignition process and precise adjustment of the optimal lamp operating current
- DVGW (German Gas and Water Association) certified UVC sensor for monitoring the disinfection capacity and transmission (UV transmission factor) of water
- Sensor calibration function according to DVGW guideline
- Large graphical display for output of the sensor signal and operating messages in plain text
- Monitoring of lamp ageing, lamp protection tube fouling and changes in water quality
- Freely programmable control, e.g. for different flushing, warning and shutdown procedures
- Radiation chambers made from high-grade stainless steel 1.4404
- Radiation chamber hydraulics optimized by computer simulation
- Control cabinets of painted steel

Main applications

Drinking water	Industrial water	Swimming pool water	Wastewater	Salt water
✔	✔	–	–	–

Technical Data

Type	Max. flow (GPM)	Lamp Power (W)	Connected Load (W)	Radiation Chamber Length (mm)	Minimum clearance for maintenance work (mm)	Min. distance from wall (mm)	Empty weight / Operating weight (kg)	Connection nominal diameter
75Z* **	19.8*	1x75	90	1115	910	140	12/27	G 1 1/4
200Z	44.0*	1x200	220	1040	785	140	16/30	DN 50
300Z	88.0*	1x300	320	1540	1285	140	25/47	DN 80
2x300Z	264*	2x300	650	1590	1560	219	39/97	DN 100
3x300Z	484*	3x300	1000	1625	1695	219	39/97	DN 150
4x300Z	726*	4x300	1300	1630	1563	273	56/143	DN 150
5x300Z	1012*	5x300	1600	1630	1590	273	56/144	DN 200
7x300Z	1012**	7x300	2200	1630	1590	324	73/201	DN 200

* 98 %/cm transmission; 400 J/m^2 UV dose

** 94 %/cm transmission; 400 J/m^2 UV dose

Lamp type Standard low-pressure lamp with Type 75 Z
Opti-Flux low-pressure lamp with Types 200 Z to 7x300 Z

Controller type Deluxe controller
UVC sensor signal in W/m^2, which can be calibrated with the help of a reference radiometer

Permissible operating pressure 10 bar

Permissible ambient temperature 5–40 °C

Permissible water temperature 5 - 70 °C ***5-30 °C

Spare Parts For Dulcodes Z UV Systems

Name of the item	Part No.
Opti-Flux UV lamp 75 W	1020911
Opti-Flux UV lamp 200 W	1021008
Opti-Flux UV lamp 300 W	1020929
Lamp protection tube for Dulcodes 75 Z	1020845
Lamp protection tube for Dulcodes 200 Z	1021010
Lamp protection tube for Dulcodes 1-7x300Z	1020846
O-ring lamp protection tube/lamp cover	1023569
UVC sensor Z 1.4404 DVGW	1022347
Sensor window G 1x20 for Dulcodes 75, 200, 2x300Z	1021113
Sensor window G 1x30 for Dulcodes 300, 3x300Z	1022377
Sensor window G 1x47.5 for Dulcodes 4-7x300Z	1023884
O-ring sensor window	1023570
Lamp cable, 3.5 m long	1017867
Lamp cable, 7.5 m long	1024826
Sensor connection cable, 5 m long for systems supplied since September 2006	1021041
Extension for sensor cable, 5 m long	1024825
Screwed plug G 1/4”	1002752
O-ring for G 1/4” screwed plug	741256
Replacement filter mats control cabinet ventilation (2 mats required per control cabinet)	1004212

Dulcodes R Low Pressure UV systems with wiper

Dulcodes R UV systems are used for the purpose of disinfecting drinking water and process water as well as for photochemical decomposition of chloramines in swimming pool water. They are particularly suitable for water, which tends to form deposits on the protection tube. These deposits can be easily removed with the wiper mechanism even at full operating pressure without the need to interrupt operation. The wiping process can be carried out manually or at adjustable intervals using a motorized automatic wiper.

Thanks to the OptiFlux high performance UV lamps with a power output of 300 W, maximum flow rates are achieved with a minimum number of lamps. Due to the long service life of the UV lamps of up to 14,000 operating hours, the lamps need to be replaced less frequently when compared to conventional systems hence reducing costs.

Depending on the transmission of the water and the desired irradiation does, the product range can be used with flows up to 80 gpm

Features

- Flow: up to 80 gpm (depending on transmission)
- Auto-adjusting wiper elements made from food grade PTFE
- Cleaning possible without interrupting operation: The manual or automatic wiper is easy to use even at maximum system operating pressure. Thanks to their self-sharpening function, the wiper elements achieve maximum cleaning effect combined with a long service life
- High efficiency low pressure Opti-Flux lamp with special amalgam technology, increased UV output, largely independent of temperature
- Lamp service life up to 14,000 h
- Increased output with fewer lamps: a lamp power output of 300 W enables a higher flow rate per lamp, longer service cycles and lower operating costs
- Electronic ballasts with BUS interface for ignition and monitoring of each individual lamp
- Variable lamp current, hence lamp-friendly ignition process and exact adaptation of optimal lamp operation
- Factory calibrated UV-C sensitive sensor
- Large graphical display for output of the sensor signal and operating message in plain text
- Freely programmable control, e.g. for different flushing, warning and shutdown procedures
- Hydraulically optimized radiation chambers made from high-grade stainless steel 1.4404
- Control cabinets of painted steel
- Now also available with motor-driven automatic wiper for the Dulcodes 2 – 4x300R

Main applications

Drinking water	Industrial water	Swimming pool water	Wastewater	Salt water
–	✔	✔	–	–

Technical Data

Type	Max. flow (GPM)	Lamp Power (kW)	Connected Load (kW)	Radiation Chamber Length (in)	Minimum clearance for maintenance work (in)	Min. distance from wall (in)	Empty weight / Operating weight (Lbs)	Connection nominal diameter (in)
1x300R	5.5*	1x300	320	61.4	56.6	5.5	99/148	3
2x300R	17.4*	2x300	650	64.3	56.6	8.7	165/295	6
3x300R	32.8*	3x300	1000	64.5	56.6	10.7	198/401	8
4x300R	50.3*	4x300	1300	65	56.6	12.9	265/558	10

Lamp type Opti-Flux low-pressure
Controller type Deluxe controller
Permissible operating pressure 87 psi
Permissible ambient temperature 41 – 104 °F
Permissible water temperature 41 – 104 °F

* 95 %/cm transmission; 600 J/m^2 UV dose

Spare Parts For Dulcodes R UV Systems

Name of the item	Part No.
Opti-Flux UV lamp 300 W	1020929
Lamp protection tube for Dulcodes R	1020846
O-ring lamp protection tube/lamp cover	1023569
Wiper element (2 required per UV lamp)	1027879
UVC-U sensor P/D/W/R 1.4539 from Sep. 2006	1028115
Lamp cable, 11.5 ft long	1017867
Lamp cable, 24.5 ft long	1024826
Sensor connection cable, 16.5 ft long for systems supplied since Sep. 2006	1021041
Extension for sensor cable, 16.5 m long	1024825
O-ring for screw plug G ¼"	792872
Replacement filter mats control cabinet ventilation (2 mats required per control cabinet)	1004212

Accessories For Dulcodes UV Systems

Transmission Photometer TMX 02

A Photometer for measurement of the UV transmission at 254 nm in accordance with DIN 38404 is supplied in sturdy aluminum case complete with 1.5 in quartz cuvette, 4 x NiMH rechargeable batteries and charger.

Technical Data

Dimensions L x W x H (in)	14.5 x 13 x 6
Weight	6.6 lbs
Voltage supply	4 x 1,500 mAh NiMH batteries
UV-C lamp	Mercury medium pressure lamp
Measurement resolution	Transmission in 0.1 %
Measurement accuracy	Transmission in ± 0.5 %

	Part No.
Transmission Photometer TMX 02	1027956

Protective gloves

Protective gloves made from white cotton to avoid fingerprints on UV lamps and lamp sleeves. 1 pair, universal size.

	Part No.
Protective gloves	1032815

Sampling cock

Fireproof sampling cock made from stainless steel.

	Part No.
Sampling cock	on request

Cleaning System

The cleaning system for flushing the radiation chamber with a cleaning solution to remove deposits on the lamp tubes and internal surfaces of the UV system consists of chemical tanks, booster and dosing pumps, valves and complete automatic or manual controller. Design and technical equipment are matched to the particular UV system and its application.

	Part No.
Cleaning system	on request

Clip-on thermostat

A thermostat is fitted to the outside of the radiation chamber. It monitors the temperature of the water and can be connected to the control. The flushing valve opens when the preset limit temperature is exceeded.

	Part No.
Clip-on thermostat	on request

Fittings

Fittings provided for quick and easy wall mounting of the UV radiation chamber. Fitting parts comprise 2-off screw-in pipe clips of high alloy steel (V2A), 2-off base plates with M12 nut, 2-off set screws and 4-off M12 hexagon nuts.

Two-part clip with increased material cross section to ensure high bearing strength and breaking resistance. A sound proofing layer ensures a marked resistance in the sound level.

	For type*	Order No.
Fittings A2	D 89	1039826
	D 114	1039827
	D 140	1039828
	D 219	1039829
	D 273	1039830

* D = in mm of the corresponding UV radiation chamber

Overvoltage protection

Overvoltage protection for Dulcodes UV systems, which are operated at 230 V 50-60Hz.

The external overvoltage protection is intended for the operating case in which the device internal protection is not sufficient for surge voltages of 1 kV between the conductors and of 2kV to earth. To protect the system when the supply mains are prone to power transients an overvoltage trip can be fitted as a low protection surge arrestor to significantly increase the stability of the Dulcodes systems.

Whether the low protection surge arrestor requires further measures such as medium and main protection can only be determined by thorough investigation of the voltage behavior on site.

	Part No.
Fine protection PT 2-DE IS 230 IAC	733010

Replacement plug-in insert after tripping

	Part No.
Replacement plug-in insert PT 2-DE / S 230 / AC - ST	733011

OZONFILT® And Bono Zon® Ozone Plants

Ozone In Water Treatment

As the most powerful oxidant that can be used in water treatment, ozone enables a broad spectrum of possible applications:

Outstanding disinfection action against

- Bacteria and viruses
- Fungi and parasites

Oxidation of undesirable inorganic substances in the water

- Iron and manganese
- Arsenic
- Nitrite and sulfide

Oxidation of undesirable organic substances in the water

- Strong-smelling and strong-tasting compounds
- Humic substances and other compounds which, affect the color of the water
- Cyclic hydrocarbons
- Trihalomethanes, chloramines and other chlorine compounds

Microflocculating action

- After oxidation with ozone, substances and colloids dissolved in the water become insoluble and can be filtered

Significantly less environmentally harmful by-products occur in the production and use of ozone, than with other comparable oxidants and disinfectants. As a highly reactive gas, ozone is produced on site, and introduced to the water directly, without interim storage. Because of its high reactivity, ozone decomposes into oxygen again in the water, with a half-life of several minutes. All components of an ozone handling system must be perfectly matched with each other and with the planned application, to achieve an optimum relationship between ozone production and effect.

For every new project, our engineers can draw on the experience that we have continually accumulated since 1971, in the following applications:

Drinking water supply

- Oxidation of iron, manganese or arsenic
- Improvement in appearance and taste
- Disinfection

Food and beverage industry

- Disinfection of mineral water
- Disinfection at the rinser in the beverage industry
- Disinfection of production water

Swimming pools

- Reduction of chloramines and trihalomethanes, so avoiding typical swimming pool smell
- Crystal-clear water thanks to microflocculating action
- Reliable microbiological barriers in therapy pools
- Reduction of investment and operating costs through the possibility of reducing the circulating power and throttling the fresh water inlet

Industry

- Cooling water treatment
- Combating legionella in cooling water circuits
- Disinfection of process water
- Removal of odorous substances in air scrubbers

Performance Overview Of Ozone Plants

ProMinent® ozone plants function according to the proven principle of dielectric barrier discharge. By applying a high voltage of several thousands of Volts, ozone is produced from oxygen between two electrodes separated by an insulating dielectric. Depending on the plant type, either dried ambient air or concentrated oxygen is used as oxygen source. ProMinent® ozone plants are optimized to ensure maximum profitability and operating safety. They meet the German standard for ozone generation plants DIN 19627 and are characterized by low energy and cooling water consumption.

Medium frequency pressure systems

In case of the series OZONFILT® OZVa and OZMa, the operating gas air or oxygen is fed to the ozone generator under pressure. Ozone is generated using medium-frequency high voltages.

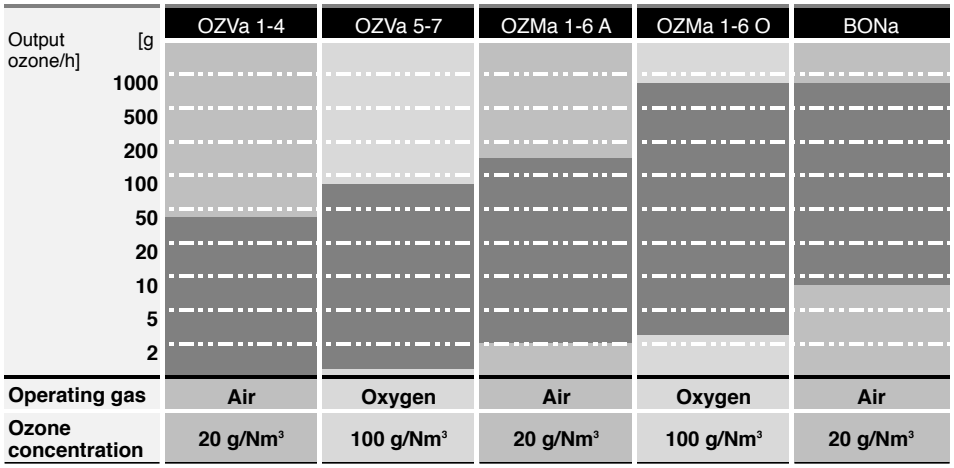
The use of an integrated variable pressure swing dryer and of a dielectric with optimum thermal conductivity results in an extraordinarily compact design of the plant.

Thanks to operation under pressure, the generated ozone can be directly fed to water systems with a backpressure of up to 29 psi. Additional pressure-increasing pumps and injectors thus become superfluous in many applications.

Vacuum systems

In case of the series Bono Zon® BONa, the operating gas air is suctioned through the air-drying and the ozone generator with the help of a pressure-increasing pump and an injector system. The ozone itself is generated under mains frequency and is controlled by changing the high voltage. The vacuum operation ensures a very safe operation.

ProMinent® offers numerous ozone plants for diverse applications. The overview below shows the capacity ranges of our type series:



Larger systems available on request

ProMinent® provides all the advice needed for the safe operation of an ozone plant:

- Evaluation of the situation on site by trained, expert field sales staff.
- In our water laboratory, we can measure all of the key water parameters required for an optimum plant design.
- Planning of the plant.
- Commissioning and plant service by our trained service technicians.

OZONFILT® OZVa

Ozone plants of the OZONFILT® OZVa range have been designed as pressurized plants, in which the operating gas – air or oxygen – is fed into the ozone generator under pressure. The ozone is generated using medium-frequency high voltage and is primary current controlled. The introduction of PCC (primary current controlled) technology, specially developed in-house by ProMinent®, provides complete protection for the electrical components (high-voltage transformer and power stage) and also permits the correct digital dis- play of the ozone feed rate in “grams/hour”. As a result, any required ozone volume between 3 and 100% of the nominal capacity can be set reproducibly, and largely independently of voltage and pressure fluctuations.

The use of an integrated pressure swing dryer and a dielectric with optimum thermal conductivity makes the plant extremely compact. The unique design of the generator ensures outstanding cooling performance with low cooling water consumption and removes the heat produced quickly before the ozone produced can decompose due to excessive heat.

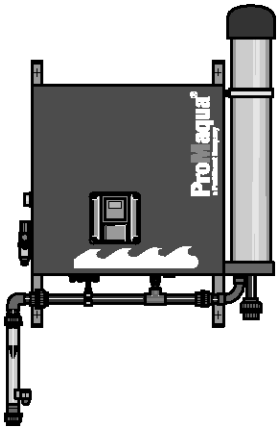
Operation under pressure means that the ozone generated can be introduced directly into water systems with backpressures of up to 29 psi. Additional booster pumps and injectors can therefore be dispensed with in many applications.

Combined with DULCOMETER® measuring and control technology and DULCOTEST®OZE ozone sensors, these systems are especially suitable for use where the operation is dependent on, and is controlled, by the measured data.

Features

- Simple operation
- Fully equipped
- High efficiency
- Low consumption of energy and cooling water
- High ozone concentration thanks to operation with oxygen
- PCC technology ensures complete protection of electrical components
- Correct digital display of ozone output in g/h
- Reproducible setting of the desired ozone quantity between 3 and 100% of nominal capacity

OZONFILT® Ozone Production Plants OZVa 1-4 (Operating Gas – Air)



pk_7_001_1_V2
OZONFILT® OZVa 1; capacity: 5 g/h

Under nominal conditions, the OZVa 1-4 range produces up to 40 g/h of ozone from oxygen in the surrounding air at a concentration of 20 g/Nm^3. Using the designated mixing devices, ozone concentrations between 3 and 12 ppm can be achieved in the water to be treated, depending on the temperature (theoretical value at 30 or 0 °C).

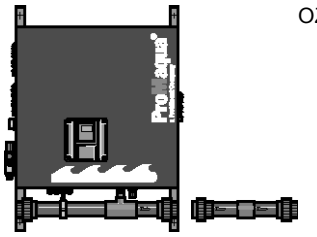
Types OZVa 1 and 2 are installed in a control cabinet for wall mounting; types OZVa 3 and 4 are installed in a freestanding cabinet.

An adequate supply of compressed air and a mixing device designed for the operating conditions must be provided for the operation of the ozone plant.

Compressed air requirements

- Oil- and dust-free, non-corrosive
- Constant upstream pressure of 6 - 10 bar
- Required air quantities:
  - OZVa 1: 7 l/min
  - OZVa 2: 20 l/min
  - OZVa 3: 40 l/min
  - OZVa 4: 45 l/min

Mixing device



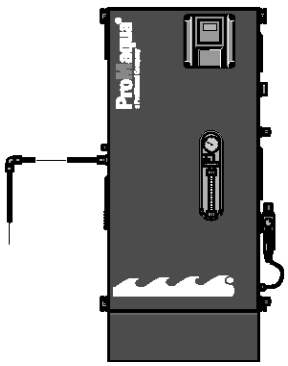
pk_7_042_V2
OZONFILT® OZVa 2; capacity: 15 g/h

OZVa 1 can be ordered in the following versions:

- Transparent mixing system with flow monitor mounted at the side of the plant (see fig. pk_7_001_1_V2)
- Static helical mixer mounted directly below the plant, made of PVC, with 4 helical blades (pressure drop approx. 0.4 bar at maximum throughput) (see fig. pk_7_042_V2)
- Without mixing system for connection of 12/10 mm stainless steel pipes or 12/9 mm PTFE pipes

OZVa 2 can be ordered in the following versions:

- Static helical mixer mounted directly below the plant, made of PVC, with 4 helical blades (pressure drop approx. 0.4 bar at maximum throughput) (see fig. pk_7_042_V2)
- Without mixing system for connection of 12/10 mm stainless steel pipes or 12/9 mm PTFE pipes



pk_7_043_V2
OZONFILT® OZVa 3; capacity: 35 g/h

OZVa 3 and 4 are in principle delivered as versions without mixing system; a suitable mixing system must be ordered separately (see Fig. pk_07_043_V2).

Notes

- The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a removable joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT® plants are equipped for fitting a gas detector such as e.g. type GMA 36 Ozon
- For all installations the ozone generator must be interlocked with the water flow into the metering point.
- To prevent any return of ozonized water into the ozone-transporting pipe, a non-return valve is to be installed upstream of the OVZa.

OZONFILT® OZVa 5-7 (Operating Gas – Oxygen)

The OZONFILT® OZVa 5-7 range is a new development based on proven PSG technology, which enables ozone concentrations of up to 150 g/Nm^3 through the use of oxygen as operating gas. Using the designated mixing devices, ozone concentrations in the water to be treated of up to 90 ppm can be achieved (theoretical value at 0 °C).

Depending on the plant type, ozone is produced in 1-3 generators from oxygen provided from special oxygen generators or bottles. The rated output of the individual generators is 30 g/h at 100 g/Nm^3.

Type 5 is installed in a wall cabinet corresponding to OZVa 2; the types 6 and 7 are installed in a freestanding cabinet corresponding to OZVa 4. In all three plants, the ozone is transported to the mixing device through a separate 12/10 mm stainless steel pipe or 12/9 mm PTFE pipe.

Operating gas specification

- Oxygen
- Concentration: > 90 vol%
- Dew point: < -50 °C
- Pressure: 3-6 bar

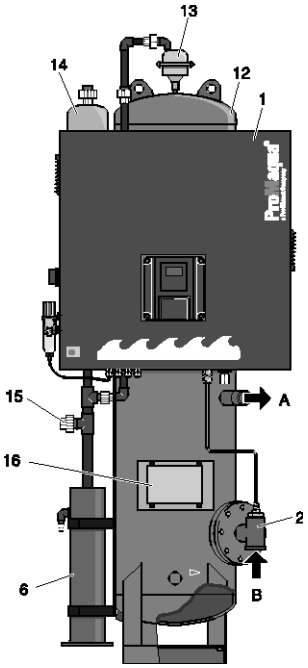
Mixing device

Because of the high ozone concentrations, we recommend mixing systems made of stainless steel. Mixing systems made of PVC may show a reduced service life, depending on the operating conditions.

Notes

- The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT® plants are equipped for fitting a gas detector such as e.g. type GMA 36 Ozone.
- Depending on the operating and installation conditions, it might be necessary to also monitor the room air for excessive oxygen content. For this purpose, the gas detector GMA 36 Oxygen can be used.
- For all installations the ozone generator must be interlocked with the water flow into the metering point.
- To prevent any return of ozonized water into the ozone-transporting pipe, a non-return valve is to be installed upstream of the OVZa.
- All gas-transporting accessories must be resistant to ozone and oxygen (e.g. fat-free).
- Because of the high ozone concentrations, only catalytic residual ozone destructors can be used. Residual ozone destructors on the basis of active carbon ignite spontaneously if subjected to increased ozone concentrations.

OZONFILT® Compact OMVa



A to filtration
B Raw water

The OZONFILT® Compact OMVa is a complete, fully-assembled, ready for use ozone stage for treatment of drinking water, service water or swimming pool water in the capacity range from 5-40 g ozone/h, and consists of the following modules:

Ozone generation module (1), built in accordance with DIN 19627:

The ozone is produced with an OZONFILT® OZVa in a pressure-resistant ozone generator using an electronically produced and controlled medium-frequency voltage.

Ozone mixing module (2):

This module consists of an ozone dosing point and a downstream mixing section made from stainless steel, with a series of static mixing elements for intensive mixing of the ozone/air mix with the water to be treated. The pipelines carrying the ozone, and the pipeline from the raw water connection to the entry to the reaction tank are fabricated totally in stainless steel and have been factory pressure tested.

With back pressures up to max. 1.8 bar, no injector is required to suck out the ozone, as the ozone production takes place at positive pressure.

Reaction tank module (12):

The stainless steel reaction tank incorporates all necessary fitments for water distribution and an automatic vent valve (13) The ozone generation module (1), the residual ozone gas destructor (14) and room air monitoring (16) are mounted on this tank (12).

Residual ozone gas destruction module (14):

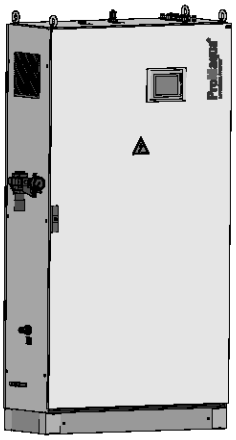
The residual ozone gas destruction (14) incorporates an integrated water separator, (6) to remove traces of ozone gas in the exhaust air coming from the reaction tank (12). A connection is also available for the exhaust air from any downstream filter plant (15) that may be fitted.

Room air monitoring module (16):

The room air is monitored for traces of ozone gas by a calibrated gas-warning device with an electrochemical sensor with good long-term stability.

If the alarm threshold is exceeded, ozone production is stopped and an alarm signaled. A buzzer is activated at the same time.

OZONFILT® OZMa



Ozone plants of the type series OZONFILT® OZMa are pressure systems, which generate ozone using compressed air or oxygen under medium-frequency high voltage. The electronic power module offers complete protection for the electrical components (high-voltage transformer and power stage) and also permits a correct digital display of the ozone output in "gram/hour". It is thus possible to adjust any desired ozone quantity between 3 and 100 % of rated output reproducibly and largely independent of voltage and pressure fluctuations.

The use of an integrated, self-optimizing (dynamic) variable pressure wing dryer ensures a minimum compressed air consumption of the air systems. The use of a dielectric with optimum thermal conductivity results in an extraordinary compact design of the plant and minimum energy consumption. The novel design of the generator ensures excellent cooling with low cooling water consumption and quickly removes the generated heat before the ozone produced can degrade because of the high temperature.

Simple and safe operation is ensured by the industry standard programmable logic controller (PLC) and the clearly laid out touch panel with data logger and screen recorder. A PROFIBUS DP communication interface ensures easy integration into industrial control systems. Remote diagnostics and communication are optionally available with a remote control module over a LAN, MPI, ISDN or GSM communication interface.

The automatic control of the gas flow ensures the concentration of the ozone in the gas flow is maintained constant, independent from the transported ozone quantity. This reduces the quantity of operating gas to a minimum and ensures constant ozone solubility.

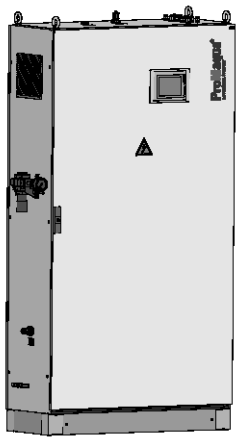
An ozone sensor can be directly connected to the ozone measuring and control device integrated in the PLC. Thus, the ozone fed to the water can be monitored and the ozone output can be directly controlled.

Operation under pressure means that the ozone generated can be introduced directly into water systems with backpressures of up to 2 bars. Additional booster pumps and injectors can therefore be dispensed with in many applications.

Features

- Simple installation thanks to compact design and single-phase voltage supply
- Low compressed air consumption thanks to dynamic variable pressure swing dryer with low priming pressure (air systems)
- Minimum energy and cooling water consumption thanks to new, maintenance-free generator concept
- Electronic power module with automatic ozone generation largely independent of voltage and pressure fluctuations. Thus maximum error tolerance with regard to influences from installation environment
- Infinitely variable adjustment of any desired ozone quantity between 3 and 100 % of rated output
- PCL with integrated ozone measurement and control
- 5.7" touch panel with data logger and screen recorder
- Multiple communications interfaces (e.g. LAN, Profibus DP, ISDN, GSM)
- Easy integration of customer-specific control requirements
- Automatic control of the gas volume flow ensures minimum process gas consumption at constant ozone concentration

OZONFILT Ozone Generation Plants OZMa 1-6 A (Operating Gas – Air)



Under nominal conditions, the OZMa 1-6 A range produces up to 420 g/h of ozone from compressed air at a concentration of 20 g/Nm^3. Using the designated mixing devices, ozone concentrations between 3 and 12 ppm can be achieved in the water to be treated, depending on the temperature (theoretical value at 30 or 0 °C).

Different feature options can be compiled by combining different Identcode characteristics.

The plants are pre-mounted ready for connection in a painted steel cabinet (optional stainless steel control cabinet) and must only be connected to a single-phase voltage supply, compressed air, cooling water/ waste water and ozone metering point at the customer's site.

For the operation of the ozone plant, an adequate compressed air supply and a mixing device designed for the operating conditions are to be integrated.

Requirements on the compressed air supply

- Oil- and dust-free, non-corrosive, constant upstream pressure of 4.5 - 10 bar
- Required air quantity:
  - OZMa 1 A: 73 l/min
  - OZMa 2 A: 110 l/min
  - OZMa 3 A: 147 l/min
  - OZMa 4 A: 220 l/min
  - OZMa 5 A: 293 l/min
  - OZMa 6 A: 440 l/min

Mixing device

All OZMa plants are in principle delivered without mixing device, a suitable mixing system must be ordered separately. When selecting a suitable mixing device, please note that the mixing of ozone is the more efficient the higher the water flow in the mixing system is. The mixing system should thus be designed such that the flow of the water to be treated is at the upper range of the flow specification.

Notes on installation

The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a removable joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT® plants are equipped for fitting a gas detector such as e.g. type GMA

Ozonization contributes a large amount of gas to the water of which only a small percentage can dissolve. An adequate bleeding is thus to be integrated. Because the gases discharged this way have a considerable residual ozone concentration, suitable residual ozone destructors must be installed

For all installations the ozone generator must be interlocked with the water flow into the metering point. To prevent any return of ozonized water into the ozone-transporting pipe, a non-return valve is to be installed between OZMa and ozone metering point.

To prevent any return of ozonized water into the ozone-transporting pipe, a non-return valve is to be installed between OZMa and ozone metering point.

OZONFILT Ozone Generation Plants OZMa 1-6 O (Operating Gas – Oxygen)

Under nominal conditions, the OZMa 1-6 O range produces up to 735 g/h of ozone from oxygen at a concentration of up to 150 g/Nm^3. Using the designated mixing devices, ozone concentrations in the water to be treated of up to 90 ppm can be achieved (theoretical value at 0 °C). Ozone concentration in g/Nm^3 and system feed rate in g/h can be varied depending on the operating conditions and can thus be individually matched to the application conditions. Examples for various combinations are listed in the table of the technical data.

Different feature options can be compiled by combining different Identcode characteristics.

The plants are pre-mounted ready for connection in a painted steel cabinet (optional stainless steel control cabinet) and must only be connected to a single-phase voltage supply, oxygen, cooling water/waste water and ozone metering point at the customer's site.

Requirements on the oxygen supply

- See technical data
- Required gas quantities: see technical data

Mixing device

All OZMa plants are in principle delivered without mixing device, a suitable mixing system must be ordered separately. When selecting a suitable mixing device, please note that the mixing of ozone is the more efficient the higher the water flow in the mixing system is. The mixing system should thus be designed such that the flow of the water to be treated is at the upper range of the flow specification.

Because of the high ozone concentrations, we recommend mixing systems made of stainless steel. Mixing systems made of PVC may show a reduced service life, depending on the operating conditions.

Notes on installation

The length of ozone gas transporting pipes and the number of joints should be kept to a minimum. All rooms with a removable joint are to be monitored with a gas detector according to the valid German accident prevention regulations. All OZONFILT® plants are equipped for fitting a gas detector such as e.g. type GMA 36 Ozone.

Depending on the operating and installation conditions, it might be necessary to also monitor the room air for excessive oxygen content. For this purpose, the gas detector GMA 36 Oxygen can be used.

All gas-transporting accessories must be resistant to ozone and oxygen (e.g. fat-free).

Ozonization contributes a large amount of gas to the water of which only a small percentage can dissolve. An adequate bleeding is thus to be integrated. Because the gases discharged this way have a considerable residual ozone concentration, suitable residual ozone destructors must be installed. Because of the high ozone concentrations, only catalytic residual ozone destructors can be used. Residual ozone destructors on the basis of active carbon ignite spontaneously if subjected to increased ozone concentrations.

For all installations the ozone generator must be interlocked with the water flow into the metering point. To prevent any return of ozonized water into the ozone-transporting pipe, a non-return valve is to be installed between OZMa and ozone metering point.

Bono Zon® Ozone Plants

BONa Range: Capacity Range 40-720 g/h

BONa plants are designed as vacuum plants and so comply with the highest safety measures. A clear, easy to read display panel provides information on airflow, voltage, power consumption and the status of the air treatment.

The ozone capacity can be steplessly adjusted over the full capacity range. The entire process control and monitoring of safety-related parameters takes place with the aid of the integrated PLC.

Minimal operating costs are achieved through the load-dependent regeneration of the air treatment and a significant reduction in the cooling water requirement.

Bono Zon® plants comply with the German standard for ozone production plants, DIN 19 627.

Bono Zon® plants are fitted with a reliable and economical adsorption drying system. The load-dependent control of the adsorption regeneration ends the heating phase when the breakdown temperature is reached. The required dew point is ensured at all times and the operating costs are minimized at the same time. This ensures optimum operational safety of the ozone plant.

The control for the booster pump and the protection device are integrated in the electrical cabinet of the BONa plant.

Features

- Choice of stainless steel or PVC ozone generation modules
- Automatic electronic overload detection linked to safety disconnection, even with part load operation.
- PLC Siemens® Simatic S7 controls all process sequences and issues fault messages if anomalies occur.
- Clear, easy to understand display and operating panel: the ozone generation sequence is displayed on the flow diagram. LED displays inform the operator of the current operating status and the set values, e.g. volume flow (takeoff gas), primary voltage and primary current are displayed.
- Ozone generator(s) optimized for minimum power consumption. Power requirement 18.7 Wh/g.
- Step less adjustment of ozone generation to demand by means of a regulating transformer, fitted with an electric actuator if required.
- Our DULCOTEST® OZE ozone sensor can be connected directly.
- The control for booster pump and the protection device are integrated in the electrical cabinet
- Clear, easy to read display area with operating and fault lamps and digital measuring instruments integrated in a display panel.
- Vacuum operation ensures highest possible protection against ozone escape.
- Air treatment using cost-effective adsorption drying plant. An optimum dew point is ensured by means of thermostatically controlled regeneration.
- Bono Zon® plants comply with the German standard for ozone production plants, DIN 19627.

Nominal ozone concentration

20 g/m^3 (based on standard conditions p=1.013x10^5 Pa, T=273 K), measured with a cooling water temperature of 15 °C max. at an ambient air temperature of 20 °C max.

Design Conditions in Accordance with DIN 19627

Max. 30 °C; 60 % rel. humidity, dust-free installation, no aggressive gases, supply and extract air ventilation of the installation room.

An air conditioning system may be required with elevated ambient temperature and/or humidity at the installation position of the plant. Please specify separately at time of ordering! Suitable measures (e.g. air conditioning of the installation room) must be taken to prevent condensation forming, even when the plant is shut down.

Standard values for cooling water quality:

- Temperature < 25 °C
- Replaceable substances < 0.1 ml/l

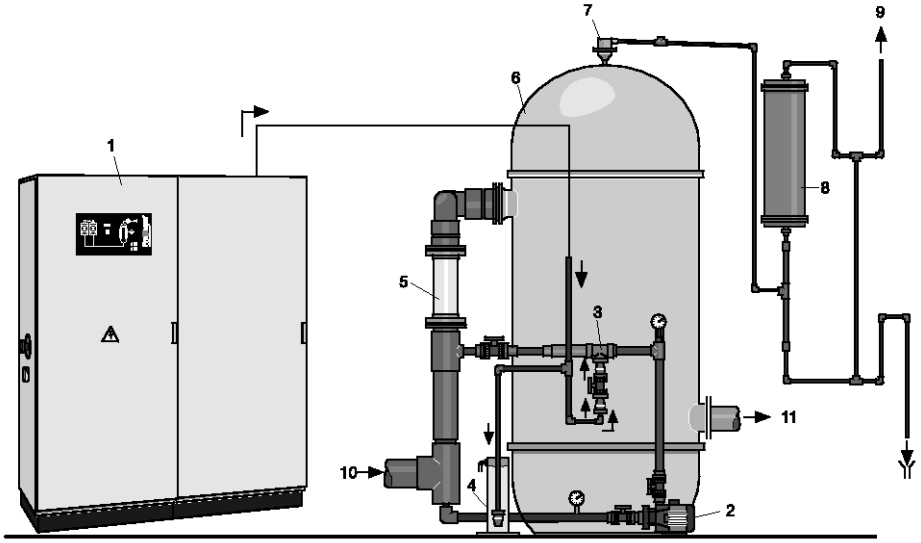
- Iron < 0.2 mg/l
- Manganese < 0.05 mg/l
- Chloride < 250 mg/l (BONa D und E)
- No tendency to form lime deposits
- No corrosive components

Design

For optimum operation of a water treatment system using ozone, it is essential that all components are carefully matched with each other:

- Ozone generation:
  Selection of a suitable ozone plant is not just determined by the required quantity of ozone/hour but also by other limiting conditions such as the nature and temperature of the cooling water and the environmental conditions, etc.
- Mixing:
  First and foremost, the parameters of the water to be treated, such as flow rate, back pressure, etc. are required for the design the mixing system.
- Reaction tank:
  Whether a reaction tank is required, and if so, what size and equipment is required, depends primarily on the requirements of the particular application.
- Residual ozone destruction:
  Similarly, the choice of the suitable ozone destructor is determined by the ozonization application. As an example, no catalytic residual ozone destructors can be used in the swimming pool, because of their sensitivity to chlorine.

The diagram below shows a typical arrangement of an ozone treatment system. For each ozone project, our project engineers combine all the right components to meet specific customer requirements.



1 Ozone plant type BONa
2 Booster pump
3 Injector system
4 Water trap
5 Mixer
6 Reaction tank
7 Vent valve
8 Residual ozone destructor
9 Ozone-free exhaust air
10 Raw water
11 Ozonized water

BONa ozone production plant with mixing device, reaction tank and residual ozone destruction

Bono Zon Ozone Plant With Ozone Generator Made Of Stainless Steel

Depending on capacity, the ozone plants in this range are equipped with 1 – 9 ozone generators made from stainless steel. Indirect cooling of the dielectrics eliminates the possibility of cooling water ingress. Individual electrodes can be easily replaced without any need to empty the entire reactor. This ensures a high level of reliability and makes the plant very service-friendly.

The operating pressure of the ozone generator is -0.08 to 0 bar and must be produced with an injector system matched to the particular application.

Ozone generators made from PVC are optionally available for use in connection with corrosive cooling water.

Technical Data

Bono Zon Ozone Plant With Ozone Generator Made of Stainless Steel

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Number of generator modules		1	2	2	3	4	5	6	7	8	9
Ozone capacity, measured in accordance with DIN, with air 20°C, cooling water 15°C	g/h	80	120	160	240	320	400	480	560	640	720
Airflow for ozone production max.	m^3/h	4	6	8	12	16	20	24	28	32	36
Ozone generation power consumption (without air treatment)	kW	1.5	2.2	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5
Ozone connection		DN 15	DN 20	DN 20	DN 32	DN 32	DN 32	DN 40	DN 40	DN 40	DN 50

Cooling water

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Cooling water requirement cooling water temperature 15°C and air temperature < 25 °C	m^3/h	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Cooling water requirement cooling water temperature 25°C and air temperature < 30 °C	m^3/h	0.3	0.6	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7
Cooling water inlet pressure (before pressure reducer)	bar	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6	1.5–6
Cooling water inlet	G..i	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
Cooling water outlet, open discharge		1/2	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4

Overall dimensions

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Width	mm	800	1,600	1,600	2,000	2,400	2,400	2,800	3,200	3,400	3,400
Height	mm	1,950	1,950	1,950	1,950	2,200	2,200	2,200	2,200	2,200	2,200
Depth	mm	500	500	500	500	600	600	600	600	600	600

Weight

Type		1D	2E	2D	3D	4D	5D	6D	7D	8D	9D
Weight	kg	360	700	720	820	1,200	1,280	1,360	1,920	1,980	2,000

Oxygen Generator for OZONFILT OZVa 5-7

OXYMAT 020

This compact oxygen generator works on the principle of pressure swing filtration of the surrounding air via a molecular sieve. When supplied with suitably dried compressed air, oxygen is generated with a purity of up to 95 % and a dew point of –70 °C. The plant develops a pressure of 4 bars at the oxygen outlet and can be directly connected to the OZVa 5-7.

Technical Data

(at 90% oxygen yield)

Type		Version 1	Version 2
Capacity	Nm^3/h	0.9	1.2
Air requirement (min. 6 bar)	Nm^3/min	0.17	0.24
Power consumption incl. compressor	kW	1.5	2.5
Specific energy requirement	kWh/Nm^3	1.7	2.1

Required Components for Version 1

	Part No.
OXYMAT 020, 110-240 V / 50-60 Hz	1025383
Reciprocating compressor (oil-lubricated) Atlas Copco LE 2-10 E/100, with 100 l air receiver, 400 V / 50 Hz	
Refrigeration dryer FD 5, 230 V / 50 Hz	1025385
Filter set 006, for LE 2-10 and GX 2-10 FF	1025387
Hose set with quick-release couplings, LE 2-10 to OXYMAT 020 LE 2-10 to OXYMAT 020	
Connecting set with connections for 6x4 mm PTFE hose, between OXYMAT and OZVa	

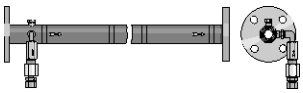
Required Components for Version 2

	Part No.
OXYMAT 020, 110-240 V / 50-60 Hz	1025383
Atlas Copco Aircenter GX 2-10 FF/200, with screw compressor (oil injection), integrated refrigeration drying and 200 l air receiver, 400 V / 50 Hz	
Filter set 006, for LE 2-10 and GX 2-10 FF	1025387
Hose set with quick-release couplings, For connection of air treatment GX 2-10 FF with OXYMAT 020	1025389
Connecting set with connections for 6x4 mm PTFE hose, between OXYMAT and OZVa	1025395

Accessories

	Part No.
PTFE hose 6x4 mm, Admissible operating pressure 15 bar, sold in meters	037426
Service kit for Atlas Copco LE 2-10, (recommended after 8000 running hours)	1025390
Service kit for Atlas Copco GX 2-10 FF, (recommended after 8000 running hours)	1025391
Service kit 006, for Atlas Copco LE 2-10 and GX 2-10 FF	1025392

Static Helical Mixer Made From PVC Or Stainless Steel



Designed for intensive mixing of gas with liquid flows. 4 helical blades ensure optimum mixing of the ozone with minimal pressure drop (0.1 bar per blade at maximum flow). For optimum mixing results, the specified flow range of the static helical mixer must be complied with.

Version with loose flanges to DIN 2501 and integrated injection point made from stainless steel with couplings for 12 mm diam. stainless steel tube, or 12/9 mm PTFE hose, using stainless steel support inserts. In addition, the injection point is fitted with a non-return valve to protect the ozone plant from reverse flowing water. The mixers are manufactured as grease-free, so they are also suitable for Types OZVa 5-7. The stainless steel version has a G 1/4“ pressure gauge tapping at the ozone mixing point.

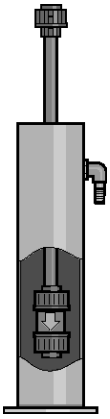
Flow m^3/h	Material	Overall Length mm	Connector	Part No.
5 – 10	PVC-U	718	DN 40	1024324
10 -15	PVC-U	718	DN 50	1024325
15 – 25	PVC-U	718	DN 65	1024326
25 – 35	PVC-U	1,100	DN 80	1024327
35 – 50	PVC-U	1,100	DN 100	1024328
50 – 90	PVC-U	1,300	DN 125	1034641
95 – 160	PVC-U	1,700	DN 150	1034640
5 – 10	1.4404	718	DN 40	1022503
10 – 15	1.4404	718	DN 50	1022514
15 – 25	1.4404	718	DN 65	1022515
25 – 35	1.4404	1,100	DN 80	1022516
35 – 50	1.4404	1,100	DN 100	1024154

Other sizes on request

Connecting Parts For The Gas Pipeline

	Part No.
Stainless steel pipe 12/10 mm, Sold by meter	**015743**
Stainless steel pipe 12/10 mm, grease-less, 1.4 m	**1022463**
PTFE hose 12/9 mm, grease-less, sold in meters	**037428**
Stainless steel support inserts, 2 pcs. for 12/9 mm PTFE hose, grease-less	**1025397**
Stainless steel coupling 12 mm – R 1/4, grease-less	**1025755**
Stainless steel fitting 12 mm – R 3/8, grease-less	**1034642**
Stainless steel 90° elbow D 12 – D 12, grease-less	**1022462**
Stainless steel pressure relief valve, Adjustable pressure	**1029032**
Range 0.07 – 2 bar, Connection size: 1/4” NPT, 2 additional inputs For connecting 2 pressure gauges.	

Accessories For Bono Zon Ozone Plants



Water trap

Water trap is a vacuum breaker that prevents backflow of water into the ozone generator.

Pre-assembled unit consisting of PVC loss vessel including overflow with DN 10 hose spigot, and a non- return valve with DN 20 PVC coupling.

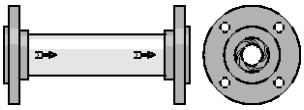
	Part No.
Water trap	1008781

Ozone mixing

Static mixer designed for intensive mixing of gas with liquid flows. Made from PVC-U with two built-in helical mixers and a mixing section matched to the throughput.

The size depends only on the quantity of water to be ozonized. Pressure rating: PN 4, other pressure ratings available on request.

Connection DN 65-200: loose flanges PN 10.



Recommended flow m^3/h	Flange connection DN mm	mm	Part No.
15 – 25	65	350	1007841
25 – 35	80	450	1007842
35 – 50	100	550	1007843
50 – 90	125	650	1007864
90 – 160	150	800	1007865
160 – 250	200	1,000	1007866
250 – 350	200	1,000	1007867

Higher flows on request

Stainless steel version: on request

Ozone pumping devices

Complete ozone pumping devices consist of booster pump, injector and mixer and are assembled to suit specific project requirements. Design and technical details on request.

Vent valves

Vent valves made from stainless steel 1.4571 in ozone-resistant version for mounting on reaction tanks.

Suitable for BONa Types	Connector	Pressure (bar)	Part No.
1B	R 3/4” internal x R 1/2” external	0.5-6.0	302525
1A, 1D	R 1” internal x R 1/2” external	0.5-6.0	302526
to 3A, 3d	R 1” internal x R 3/4” external	0.5-2.0	303845

Residual Ozone Gas Destructor

Residual ozone gas destruction is used to remove traces of ozone gas from the exhaust air coming from the reaction tank. Because the exhaust air from the reaction tank still contains water, the pipework should be suitably routed so as to ensure that the water is drained off at the inlet side.

As the exhaust air after the residual ozone gas destructor is still up to 100 % saturated with water vapor, and because small temperature fluctuations, even on the outlet side, can lead to flow back of condensate, a suitable drainage connection must be provided here too.

The exhaust air from any downstream filter plant that may be fitted can also be routed via this ozone gas destruction unit.

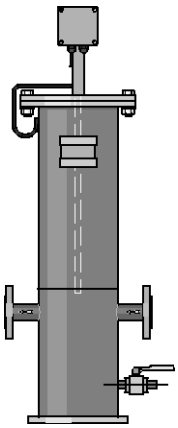
PVC version

Residual ozone destructor based on active carbon granules in a PVC housing.

	Type	Ozone quality (g/h)	Part No.
Residual ozone destructor 3 L	10	10	879022
Residual ozone destructor 14 L	40	40	1004267
Residual ozone destructor 30 L	100	100	879019
Residual ozone destructor 60 L	200	200	879018

Note:

The stated ozone quantities refer to quantities added to the raw water. The residual ozone destructor is designed for the normal residual ozone concentration found in swimming pool applications. It may only be used in plants with air as operating gas and a maximum added quantity of 1.5 g of ozone/m^3 treated water.



Stainless steel version

Residual ozone destructor based on a maintenance-free MnO catalytic converter with integrated heating, 230 V, 50-60 Hz. Connections Rp 1/2“ or flanges to DIN 2642, PN10. Types 18 to 110 m^3/h also fitted with Rp 1/2" ball valve as condensate drain.

Max. gas flow m^3/h	Heating power (W)	Dimensions H x W x D (mm)	Connector	Part No.
1.5	100	700 x 110 x 180	Rp 1/2”	1018440
8.0	100	735 x 110 x 235	Rp 1/2”	1018406
18.0	140	1,154 x 275 x 240	DN 25	1019155
28.0	140	1,154 x 300 x 249	DN 25	1021037
40.0	500	1,156 x 330 x 264	DN 25	1026335
73.0	500	1,158 x 400 x 320	DN 32	1019971
110.0	500	1,160 x 450 x 375	DN 40	1027238

Note:

The catalytic residual ozone destructor must only be used in chlorine-free gas flows. The PVC version must therefore be used for swimming pool applications.

Gas detectors GMA 36 ozone and oxygen

Calibratable gas warning devices with digital display of the detected gas concentration. 2 relay outputs for issue of infringements of warning and alarm thresholds, to switch external alarm sounder and for interlocking with the ozone plant. The warning message relay is self-resetting; the alarm relay is a latching type and must be acknowledged at the device. 1 self-resetting relay for connection to an alarm horn is switched on fault conditions and when the alarm limit is exceeded.

The ozone sensor responds to all strongly oxidizing gases, hence it responds to chlorine gas or chlorine dioxide too.

The GMA 36 oxygen-warning device is intended for installations where an unacceptably high oxygen enrichment of the ambient air is possible.

Technical Data

Type		Ozone	Oxygen
Warning at approx.	ppm/vol%	0.3	23.0
Alarm at approx.	ppm/vol%	0.5	25.0
Permissible ambient temperature	°C	-15 – 45	-15 – 45
Protection class housing		IP 54	IP 54
Dimensions (without PGs, without sensor) H x W x D	Mm	247 x 135 x 95	247 x 135 x 95
Supply	V/Hz	85 – 264/50	85 – 264/50 – 60
Power consumption	W	5	5
Warm-up phase max.	S	150	20
Relay contact “Warning”, self-resetting	V/A	230/1	230/1
Relay contact “Alarm”, latching	V/A	230/1	230/1
Relay contact “Horn”, latching, can be acknowledged	V/A	230/1	230/1
Sensor measuring principle		electrochemical	electrochemical
Sensor service life (depending on environmental cond.)	Years	2 – 3	2 – 3

	Type	Part No.
Gas warning device Type GMA 36	Ozone	1023155
Gas warning device Type GMA 36	Oxygen	1023971

Spare parts

	Part No.
Replacement sensor for chlorine, chlorine dioxide, ozone	1023314
Replacement sensor for oxygen	1023851
Replacement sensor for gas warning devices in the Life CGM range	

Mounting kit

	Part No.
Mounting kit for direct mounting of the CGM 1060 and GMA 36 ozone warning devices on the housing of the OZVa plants	
Support bracket for mounting kit for all types of OZVa except OZVa 1/2 with transparent mixing system	

Warning light and horn

Combined horn and red warning lamp. IP 33 enclosure made from impact-resistant ABS. Dome made from clear polycarbonate. Connected load: 230 V AC, 50 mA. Supplied complete with B 15 d / 7 watt bulb.

	Part No.
Warning light and horn	1010508

Chlorine Dioxide Plants Bello Zon®

Chlorine Dioxide In Water Treatment

Chlorine dioxide is an extremely reactive gas, which – because of its instability – cannot be stored, and must only be produced, in the required quantities in special plants on the site where it is to be used.

Chlorine dioxide offers a number of advantages for water disinfection compared with chlorine, the disinfect- ant mainly used. The disinfecting power of chlorine dioxide actually increases slightly with increasing pH, whereas with chlorine the disinfecting power reduces. Chlorine dioxide remains stable in the pipeline system over a long period and ensures microbiological protection of the water for many hours, or even several days. Ammonia and ammonium, which cause significant chlorine depletion, are not attacked by chlorine dioxide, so that the dosed chlorine dioxide is fully available for bactericidal action. Chlorophenols, compounds with intense odors, which can be produced during water chlorination in some circumstances, are not formed when chlorine dioxide is used. Trihalomethanes (THMs), a group of substances, which, like their best known example, chloroform, are suspected of being carcinogenic, are produced when chlorine reacts with natural water components (humic acids, fulvic acids, etc.). Measured THM concentrations, if present at all, are drastically reduced when chlorine dioxide is used as an alternative disinfectant.

Advantages of chlorine dioxide:

- Disinfection power is independent of pH.
- High residual effect thanks to long-term stability in the pipeline system.
- Reduction of the biofilm in pipelines and tanks, hence reliable protection of entire water systems against legionella contamination.
- No reaction with ammonia or ammonium.
- No formation of chorophenols and other intense odor compounds, which can be produced in water chlorination.
- No formation of THMs and other chlorinated hydrocarbons, no increase in the AOX value.

Chlorine Dioxide Applications

For every new project, our engineers can draw on the experience that we have continually accumulated since 1976, in the following applications:

Municipal drinking water and waste water plants

- Disinfection of drinking water
- Disinfection of waste water

Hotels, hospitals, retirement homes, sports facilities, etc.

- Combating legionella in cold and hot water systems
- Water disinfection in air conditioning system cooling towers

Food and beverages industry

- Disinfection of product and industrial water
- Bottle cleaning, rinser and pasteurizer
- Cold sterile bottling
- Disinfectant in CIP systems
- Condensate water treatment in the milk industry
- Washing water treatment for fruit, vegetables, seafood, fish, and poultry

Horticulture

- Disinfection of irrigation water in plant growing

Industry

- Cooling water treatment
- Combating legionella in cooling circuits
- Disinfection of process water
- Removal of odorous substances in air scrubbers
- Combating slime in the paper industry

Bello Zon Plant Technology

Bello Zon® chlorine dioxide generating plants and metering systems work according to the chlorite/acid process. These plants generate a chlorine dioxide solution free of chlorine based on the reaction of sodium chlorite solution with hydrochloric acid.

Decades of experience with Bello Zon® chlorine dioxide plants have shown that an extraordinary yield of 90 to 95 % is achieved with the process parameters chosen (with reference to stoichiometric ratios).

In most applications, the metering is proportional to the flow, i.e. flow-dependent on the signal from an inductive or contact flow meter or parallel with a delivery pump.

In circulation systems, such as e.g. bottle washing machines, cooling circuits, where a chlorine dioxide loss has only to be supplemented, the addition can also be controlled via a chlorine dioxide measurement de- pending on the measured value.

Features

- Precise and reproducible chlorine dioxide production thanks to calibratable metering pumps for the
  initial chemicals.
- Ease of operation thanks to microprocessor control with display of all relevant operating parameters and error messages in full text.
- Display of the current production quantity as well as the flow rate of the connected flow meter for CDV and CDK.
- Integrated measurement of ClO_2 and chlorite as well as controlling of ClO_2.
- Highest level of safety provided as standard thanks to design and operation in accordance with DVGW specifications W 224 and W 624.

Bello Zon® CDL Legio Zon®

Ideal for small water quantities and for both continuous and discontinuous treatment: The specialist in com- bating legionella and other pathogens supplies up to 10 g/h. The complete system with integrated metering pump is simple and safe to use thanks to its chlorine dioxide concentration of 2 g/l. An easy to understand user interface with self-explanatory menu navigation makes it simple to operate.

Bello Zon® CDV

The ideal system for medium to large water quantities for the production of 15 to 2,000 g/h of chlorine dioxide. The continuous treatment is safe and simple thanks to the use of diluted chemicals.

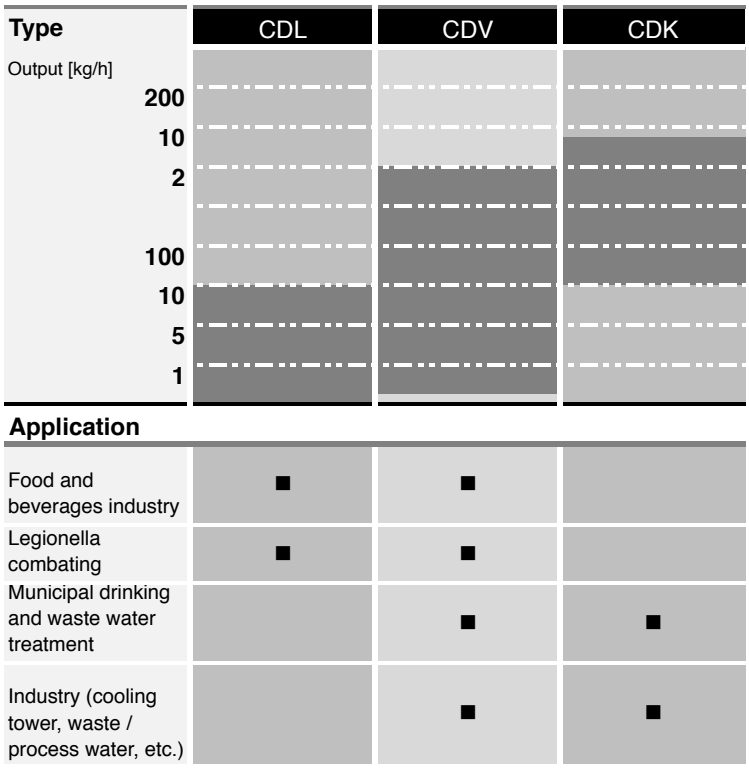
Bello Zon® CDK

This plant produces chlorine dioxide for large water quantities – 150 to 10,000 g/h. The continuous water treatment is particularly economic thanks to the use of concentrated chemicals.

ProMinent provides all advice and support services needed for the safe use of a chlorine dioxide plant:

- Evaluation of the situation at site by trained, competent field sales staff.
- In our water laboratory, all important water parameters, which are required for an optimum plant design, can be analyzed.
- Planning of the plant.
- Commissioning and plant service by our trained service technicians.

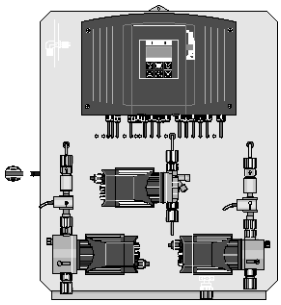
Performance Overview Of Chlorine Dioxide Systems



Chlorine dioxide is establishing itself more and more as a universal disinfectant in applications such as disinfecting drinking water and industrial water, washing food or in the treatment of cooling water and wastewater. Its effect independent of the pH value of the water ensures systems remain free of biofilms.

- Efficient disinfection in connection with best eco-compatibility
- Safe and reliable plant technology
- World-wide availability of know-how and service

Bello Zon® Chlorine Dioxide Plants Type Legio Zon®



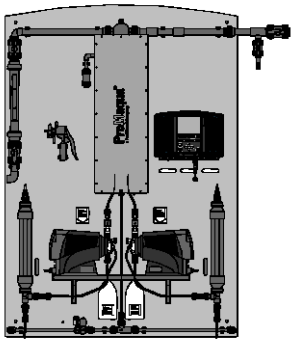
The Bello Zon® plants Legio Zon® are fully pre-mounted and are delivered ready for connection. A stylish cover protects against incorrect operation. Legio Zon® has an integrated metering pump whose capacity is matched to system requirements.

- Generation of 0-10 g/h of chlorine dioxide in batch mode, equally suitable for both continuous and discontinuous operation
- High level of safety in accordance with DVGW specifications W 224 as well as W 624 and no hazardous operating conditions thanks to the optimum chlorine dioxide concentration (2 g/l)
- High stability of the generated chlorine dioxide solution lasting over several days
- High operational safety thanks to automatic restart following a mains failure, automatic monitoring functions and maintenance messages
- Controller with menu-guided operation, flushing and service functions

The following optional accessories are available:

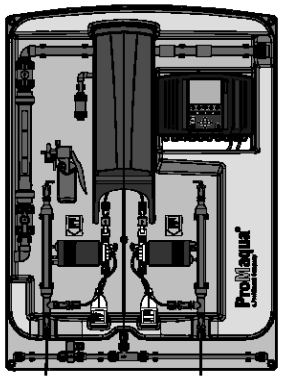
- Corrosion-resistant metering point with integrated mixing elements
- Pressure-retaining valve
- Drip pan for 1 chemicals container 25 l and 10 l each
- Photometer for determination of chlorine dioxide and chlorite
- Ready-to-use chemicals in 25 l or 10 l containers

Bello Zon® Chlorine Dioxide Plants Type CDVc



Complete chlorine dioxide systems Bello Zon® CDVc, wired ready for connection, are used for the production, metering and monitoring of 20 to 2,000 g/h of chlorine dioxide with diluted base chemicals. A completely newly developed reactor concept ensures the innovative production and metering of chlorine dioxide. Instead of the PVC hitherto used in the industry, PVDF is used for the first time. This results in higher operating safety and a better purity of the generated chlorine dioxide. The stroke lengths of the latest generation of ProMinent® metering pumps are monitored online. Hazardous operating statuses owing to incorrect operation of stroke length adjustment of the pumps can thus be avoided.

The precise production of chlorine dioxide is managed by the central plant control. Chlorine dioxide, chlorite, pH or redox potential sensors DULCOTEST® can be connected directly via the two mA inputs. The chlorine dioxide in the treated water, as well as its main by-product chlorite, can thus be monitored and documented online. Using the integrated PID controller, the chlorine dioxide concentrations in the water can be adjusted automatically depending on the measurement. All status messages and measured values are documented in the integrated data logger and visualized in the clear color display via the screen recorder. Using the embedded web server, the user interface can be called up remotely including all of the values and messages shown on the display. All that is needed to view this is a browser, with no need for further software.



The plants meets all of the requirements of the DVGW guidelines W 224 and W 624 with regard to design and operation and are intended for operation with pre-diluted chemicals Bello Zon® chlorite (7.5 % $NaClO_2$) and acid (9 % HCl).

In the bypass version for storage module, the plants are designed for filling of intermediate storage tanks for ClO_2 solution. For this purpose, the plants include a water supply line consisting of a shut-off valve, pre- filter, pressure reducer, solenoid valve (alternatively 230 V or 24 V), water meter and needle valve. The float flow meter integrated in the bypass line is designed for the low flow rate required to produce a stock solution of 500 - 2,000 ppm of ClO_2.

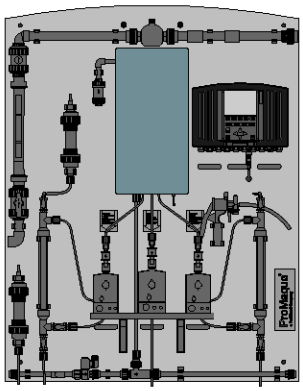
Advantages

- Efficient operation thanks to the production, metering, and monitoring of ClO_2 with only one system
- Maximum operating safety and purity of the ClO_2 generated with PVDF reactors
- Maximum operating safety thanks to stroke length-monitored pumps
- Perfect quality management thanks to integrated storage of all operating parameters and measured values
- Automatic monitoring of operating parameters and maintenance dates
- Easy and safe operation thanks to clear menu navigation in plain text

Features

- Capacity range: 20-2,000 g/h of ClO_2
- PVDF reactor
- Stroke length monitoring for metering pumps
- Control with large color display, integrated data logger and screen recorder
- Measurement, documentation, and visualization of ClO_2 and chlorite or redox potential

Bello Zon® Chlorine Dioxide Plants Type CDKc



Chlorine dioxide systems Bello Zon® CDKc, wired ready for connection, are used for the production, metering and monitoring of 170 to 7,500 g/h of chlorine dioxide with concentrated base chemicals. A completely newly developed reactor concept ensures the innovative production and metering of chlorine dioxide. Instead of the PVC hitherto used in the industry, PVDF is used for the first time. This results in higher operating safety and a better purity of the generated chlorine dioxide. The stroke lengths of the latest generation ProMinent® metering pumps are monitored online. Hazardous operating statuses owing to in- correct operation of stroke length adjustment of the pumps can thus be avoided.

The precise production of chlorine dioxide is managed by the central plant control. Chlorine dioxide, chlorite, pH or redox potential sensors DULCOTEST® can be connected directly via the two mA inputs. The chlorine dioxide in the treated water, as well as its main by-product chlorite, can thus be monitored and documented online. Using the integrated PID controller, the chlorine dioxide concentrations in the water can be adjusted automatically depending on the measurement. All status messages and measured values are documented in the integrated data logger and visualized in the clear color display via the screen recorder. Using the embedded web server, the user interface can be called up remotely including all of the values and messages shown on the display. All that is needed to view this is a browser, with no need for further software.

The plants meet all the requirements of the DVGW specifications W 224 and W 624 with regard to design and operation and are designed for operation with sodium chlorite 24.5 % in accordance with DIN EN 938 and hydrochloric acid 30-33 % in accordance with DIN EN 939.

In the bypass version for storage module, the plants are designed for filling of intermediate storage tanks for ClO_2 solution. For this purpose, the plants include a water supply line consisting of a shut-off valve, pre- filter, pressure reducer, solenoid valve (alternatively 230 V or 24 V), water meter and needle valve. The float flow meter integrated in the bypass line is designed for the low flow rate required to produce a stock solution of 500 - 2,000 ppm of ClO_2.

Advantages

- Efficient operation thanks to production, metering, and monitoring of ClO_2 with only one plant
- Highest operating safety and purity of the produced ClO_2 thanks to PVDF reactors
- Highest operating safety thanks to stroke length-monitored pumps
- Perfect quality management thanks to integrated storage of all operating parameters and measured values
- Automatic monitoring of operating parameters and maintenance dates
- Easy and safe operation thanks to clear menu navigation with full text

Features

- Capacity range: 170-7,500 g/h ClO_2
- PVDF reactor
- Stroke length monitoring for metering pumps
- Control with large color display, integrated data logger and screen recorder
- Measurement, documentation, and visualization of ClO_2, chlorite or redox potential

Gas warning device GMA 36 – chlorine dioxide

The gas warning device Type GMA 36 for chlorine dioxide is designed as a compact measurement and switching unit for monitoring the surrounding air for dangerous concentrations of chlorine dioxide.

Technical Data

Type	Chlorine Dioxide
Warning at approx.	0.1 ppm/vol%
Alarm at approx.	0.3 ppm/vol%
Permissible ambient temperature	-15 – 45 °C
Protection class housing	IP 54
Dimensions (without PGs, without sensor) H x W x D	247 x 135 x 95 mm
Supply	85 – 264/50 – 60 V/Hz
Power Consumption	5 W
Warm-up phase max.	150 s Relay
Contact “Warning”, self-resetting	230 / 1 V/A
Relay contact “Alarm”, latching	230 / 1 V/A
Relay contact “Horn”, latching, can be acknowledged	230 / 1 V/A
Sensor measuring principle	electrochemical
Sensor service life (depending on environmental cond.)	2 – 3 years

Note: The sensor responds to all oxidizing gases

	Part No.
Gas warning device GMA 36 – chlorine dioxide	1023156

Spare Parts

	Part No.
Replacement sensor	
Replacement sensor	

Warning label in accordance with Safety Rules for Chlorine Dioxide

Chlorination of water”, Appendix 3 Sheet 3, soft PVC film, yellow/black, 300 x 200 mm, self-adhesive.

	Part No.
Warning label	607320

Acid fume separator

Acid fume separator SDA-90 filled with 0.7 l of acid-absorbing granules for absorption of hydrochloric acid fumes. Connection: DN 25 PP coupling with G 1/2“ union nut.

	Part No.
Acid fume separator	1009987
Replacement pack of absorbent material 0.7 L	1010500

Reactor chamber vent valve

Vent valve for reactor space, adjustable, instead of vent line, which is led to open air (already included in standard delivery package on CDVb).

	Part No.
Reactor chamber vent valve	791801

Safety collecting pans for the chemicals containers:

Photometers DT1, DT2 and DT4

- Portable and compact photometer
- Simple operation with text support
- Safe, simple measurement of chlorine, chlorine dioxide, fluoride, chlorite, H_2O_2, bromine, ozone, pH and cyanuric acid
- Calibratable

Technical Data

Ranges DT1	0.5-6.0 mg/l free chlorine (DPD1) + total chlorine (DPD1+3) 0.1-13.0 mg/l bromine (DPD1) 0.05-11 mg/l chlorine dioxide (DPD1) 0.03-4 mg/l ozone (DPD4) 6.5-8.4 pH (phenol red) 1-80 mg/l cyanuric acid
Ranges DT2B	0.05-2.0 mg/l fluoride 0.05-6.0 mg/l free chlorine and total chlorine 0.05-11.0 mg/l chlorine dioxide
Ranges DT4	0.03-2.5 mg/l chlorite 0.05-11.0 mg/l chlorine dioxide 0.05-6 mg/l chlorine
Measuring tolerance	Dependent upon measured value and measuring method
Battery	9 V battery (approx. 600 x 4-minute measurement cycles)
Permissible ambient temperature	5 – 40 °C
Relative humidity	30 – 90% (non-condensing)
Material	Housing material: ABS Keypad: Polycarbonate
Dimensions L x W x H (mm)	190 x 110 x 55
Weight	0.4 kg

		Part No.
Photometer DT1	Complete with carrying case	1003473
Photometer DT2B	Complete with carrying case	1010394
Photometer DT4	Complete with carry case	1022736

The standard delivery package for the photometers includes accessories, cuvettes and reagents.

Consumables for analysis

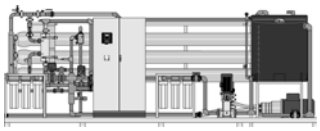
	Part No.
DPD 1 buffer, 15 ml	1002857
DPD 1 reagents, 15 ml	1002858
DPD 3 solution, 15 ml	1002859
Phenol red tablets R 175 (100 in each)	305532
Cyanuric acid tablets R 263 (100 in each)	305531
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l for calibration of photometer (fluoride detection)	1010382
3 off spare cells: round cells with covers for DPD phenol red and cyanuric acid detection (DT1 and DT2B)	1007566
3 off spare cells for fluoride detection (DT2A and B)	1010396
DPD reagents set, 15 ml each : 3 x DPD 1 buffer, 1 x DPD 1 reagent, S2 x DPD 3 solution	1007567
Chlorine dioxide tablets Nr. 1 R 127	501317
Chlorine dioxide tablets Nr. 2 R 128	501318

DPD reagents for measurement of excess chlorine, ozone or chlorine dioxide in the water, in conjection with a Lovibond comparator.

	Amount	Part No.
DPD tablets No. 1	100	501319
DPD tablets No. 2	100	501320
DPD tablets No. 3	100	501321
DPD tablets No. 4	100	501322

Backwash Water Reclamation Systems

Backwash Water Reclamation Systems



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Dulcoclean® ultrafiltration systems 1-352 gpm

Dulcosmose® nanofiltration systems 1-220 gpm

Contact factory upon inquiry

Electrolysis Plants CHLORINSITU®

Electrolysis Plants CHLORINSITU®

In electrolysis, chlorine and sodium hydroxide are produced on site by passing an electric current through salt water.

In **tubular cell electrolysis** (types CHLORINSITU® II), the electrochemical reaction takes place in one chamber, so that the chlorine gas produced immediately reacts with sodium hydroxide to form sodium hypochlorite. A saturated brine is used as saline solution, which is produced in a separate salt dissolving tank from salt of a predefined quality. The advantage of tubular cell electrolysis lies in the simple design of the equipment. The disadvantage is the relatively poor yield, which, leads to a high entrainment of chloride in the water to be treated and the relatively low chlorine concentrations in the reaction mixture.

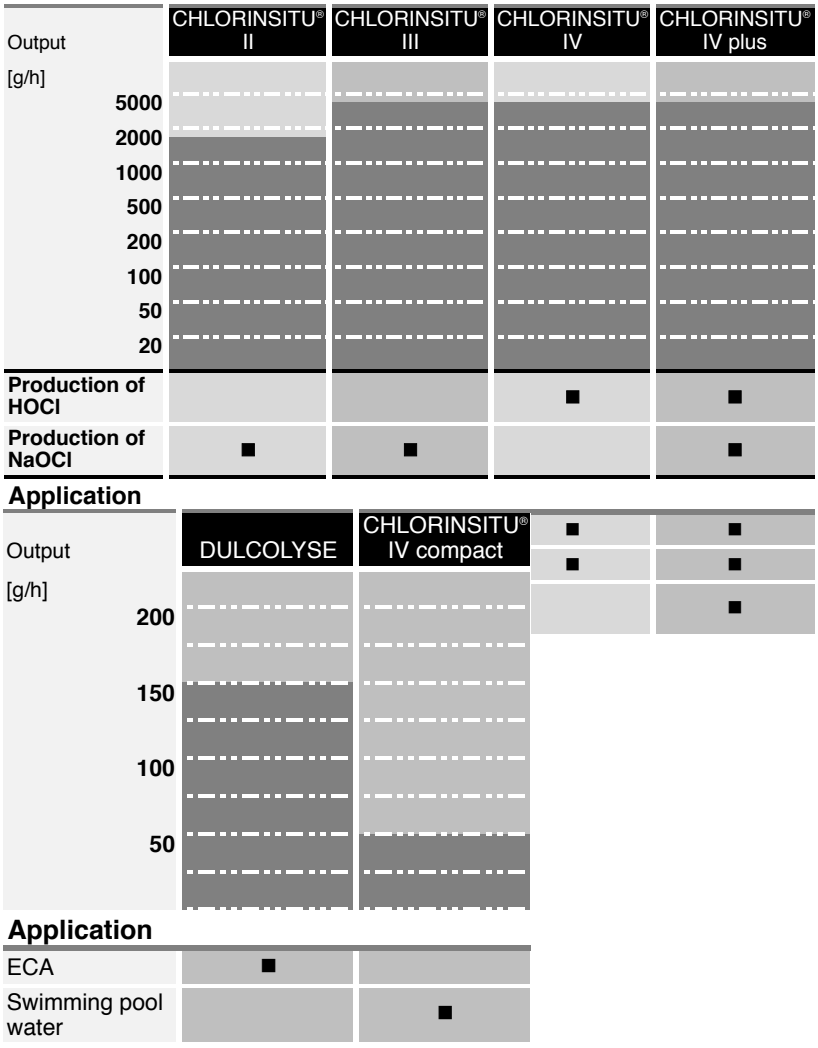
In **membrane electrolysis**, the electrochemical reaction takes place in two electrode chambers separated by a membrane, so that the formation of the chlorine and sodium hydroxide is physically separated. CHLORINSITU® III systems bring the reaction mixtures of both electrode chambers together again after the electrochemical reaction to produce a stock solution of sodium hypochlorite, which can be stored intermediately and metered as needed. With the CHLORINSITU® IV compact and CHLORINSITU® IV systems, the chlorine is transferred directly into the water to be treated where it dissolves as hypochloric acid. In CHLORINSITU® IV plus systems, excess chlorine gas produced is bound to the sodium hydroxide solution and stored temporarily as sodium hypochlorite, similarly as with the CHLORINSITU® III system. This means that the systems need only be designed for medium chlorine demand because capacity peaks can be compensated from the intermediate storage. With all CHLORINSITU® IV systems, the sodium hydroxide solution is temporarily stored and metered, as required, to correct the pH.

The **Dulco®Lyse** is a membrane electrolysis system for the production of ECA water (electrochemically activated water). The use of this systems engineering has been specially developed for processes in which the chloride content must be minimized to avoid corrosion of the system parts, e.g. in the food and beverage industry.

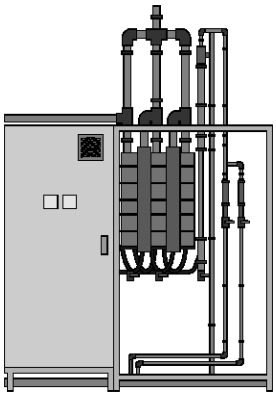
The advantage of membrane systems is their excellent efficiency and the prevention of entrainment of chloride from the electrolytic cell to the water to be treated. In plants for the production of sodium hypochlorite, the high yield results in solutions that have significantly higher chlorine content than when produced by tubular cell electrolysis.

- Disinfection using natural sodium chloride
- No handling of hazardous chemicals
- Economical method thanks to minimal consumption of salt and power
- Ultra-pure chlorine thanks to production on site and short temporary storage periods
- Chlorine generation and pH correction with one system (CHLORINSITU® IV)
- Maximum operating safety thanks to design as vacuum systems
- Improved working conditions for operating personnel
- No risk of confusing hazardous chemical containers

Performance Overview



Tubular Cell Electrolysis Plants CHLORINSITU® II



Electrolysis systems of the CHLORINSITU® II series generate sodium-calcium hypochlorite with a concentration of 5 g/l. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included with the delivery that is then electrolyzed in an open cell after corresponding dilution. The resulting solution is collected in a storage tank and, from there, metered with separate metering pumps as needed. Because of the moderate pH value of approx. 8.5 to 9, the pH value of the treated water is significantly less affected than when using commercially available sodium-calcium hypochlorite (pH 12-13.5). The hydrogen produced is then diluted with fresh air using an ATEX-approved ventilator and is dissipated harmlessly. Both the salt dissolving and the diluent water come from a softener integrated in the system. Thus, lime de- posits can be prevented and the long service life of the electrolytic cell can be ensured.

The systems are controlled with a modern PLC with a large, illuminated display and integrated modem for remote diagnosis and troubleshooting.

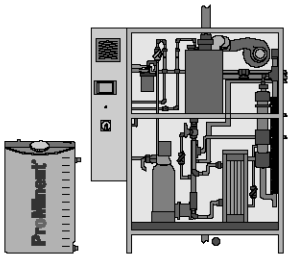
Electrolysis systems of the CHLORINSITU® II series are specifically suitable for applications where a robust and clearly laid-out technology is required, and where the entrainment of sodium chloride into the water to be treated is not problematic. Systems are available from 2.4 ppd up to 116 ppd.

- Robust, simple technology
- Compact, space-saving design
- Safe system control with remote diagnosis by modem
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and lower chemical consumption for pH correction
- Improved working conditions for operating personnel
- No risk of confusing hazardous chemical containers

Scope of delivery:

Electrolysis system, mounted ready for operation on a powder coated stainless steel frame with programmable logic controller (PLC) in a control cabinet, integrated softener, electrolytic cell, ATEX-certified bleeding system and separate salt-dissolving tank with level monitor. Level sensors to monitor the storage tanks for the sodium-calcium hypochlorite to be provided by the customer. Automatic monitoring of water hardness downstream of the softener system and chlorine gas detector for systems from 600 g/h.

Membrane Electrolysis Plants CHLORINSITU® III



Electrolysis systems of the CHLORINSITU® III type generate sodium hypochlorite with a concentration of approx. 2.5 percent without major entrainment of sodium chloride from the electrolytic cell into the finished product. For this purpose, a saturated solution of sodium chloride is produced in a salt-dissolving tank included with the delivery that is then electrolyzed in a membrane cell. Sodium hydroxide and hydrogen are produced in the chloride-free cathode chamber and chlorine gas and scaled down residual brine are produced in the anode chamber separated by the membrane. The resulting chlorine gas is bound with sodium hydroxide, collected in a storage tank as sodium-calcium hypochlorite and from there metered with separate metering pumps as needed. Because of the moderate pH value of approx. 9 to 9.5, the pH value of the treated water is significantly less affected than when using commercially available sodium-calcium hypochlorite (pH 12-13.5). The hydrogen produced is then a diluted with fresh air using an ATEX-approved ventilator and is dissipated harmlessly. The salt dissolving water comes from a softener integrated in the plant, thereby preventing the formation of lime deposits and ensuring the long service life of the electrolytic cell. The efficiency of the electrolysis is monitored by an integrated pH measurement of the sodium hydroxide production.

The systems are controlled with a modern PLC with a large, illuminated display and integrated modem for remote diagnosis and troubleshooting.

Electrolysis systems of the CHLORINSITU® III series are specifically suitable for applications where an ultra-pure and low-chloride sodium-calcium hypochlorite is required.

- Robust, simple technology
- Minimum acid consumption for pH correction
- Excellent service life of electrolysis cells
- Compact, space-saving design
- Safe system control with remote diagnosis by modem
- Low-chloride sodium-calcium hypochlorite with a high chlorine concentration
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and lower chemical consumption for pH correction

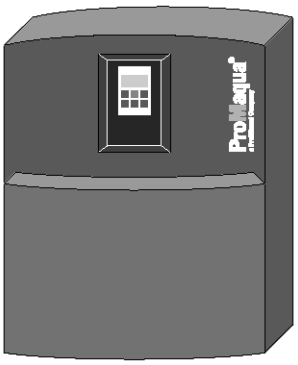
Technical Data

Type / Output (ppd)	Voltage Supply	Power Uptake (kW)	Salt consumption (lb/h)	Process water consumption (gpm)	Cooling water consumption (gpm/h)	Dimensions L x W x H (in)	Brine Tank (gal)	Recommended capacity storage tank (gal)
2.4	3 x 400 V	0.90	.2	.01	-	49 x 24 x 61	21	27
3.6	3 x 400 V	1.00	.5	.01	-	49 x 24 x 61	21	27
4.9	3 x 400 V	1.10	.5	.02	-	49 x 24 x 61	21	55
9.7	3 x 400 V	1.50	.9	.04	-	49 x 24 x 61	21	80
14.6	3 x 400 V	1.9	1.3	.07	.44	49 x 24 x 61	55	106
19.4	3 x 400 V	2.30	1.8	.08	.44	49 x 24 x 61	55	133
24.3	3 x 400 V	2.70	2.4	.11	.44	49 x 24 x 61	55	159
29.1	3 x 400 V	3.10	2.9	.13	.44	49 x 24 x 61	55	185
48.5	3 x 400 V	4.70	4.6	.21	.44	70 x 24 x 79	55	320
72.8	3 x 400 V	6.70	7.0	.32	.44	70 x 24 x 79	100	415
97.0	3 x 400 V	8.70	9.2	.43	.88	71 x 48 x 79	140	660
121.3	3 x 400 V	10.70	11.7	.53	.88	71 x 48 x 79	140	793
145.5	3 x 400 V	12.70	13.9	.64	.88	91 x 24 x 79	140	1000
169.8	3 x 400 V	14.70	16.2	.74	.88	91 x 24 x 79	140	1057

Scope of delivery:

Electrolysis plant mounted ready for operation on a powder-coated stainless steel frame with programmable logic controller (PLC) in control cabinet, integrated softener, electrolytic cell, pH value monitoring, ATEX-certified bleeding system and side salt dissolving tank with level monitor. Level sensors to monitor the storage tanks for sodium hypochlorite to be provided by the customer. Automatic monitoring of the water hardness downstream of the softener and chlorine gas detector for plants from 600 g/h.

Membrane Electrolysis Plants CHLORINSITU® IV compact



Electrolysis systems of the CHLORINSITU® IV compact type generate ultra-pure chlorine gas in a vacuum process. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included with the delivery that is then electrolyzed in a membrane cell. Sodium hydroxide and hydrogen are produced in the cathode chamber and ultra-pure chlorine gas and scaled down residual brine are produced in the anode chamber separated by the membrane. The resulting chlorine gas is suctioned off through an injector integrated in the system and dissolved in the water to be treated as hypochloric acid. The generated hydrogen is discharged through a bleed line and the scaled down residual brine is disposed of. The sodium hydroxide is disposed of or optionally used with a metering pump integrated in the system to correct the pH of the water to be treated. The salt dissolving water comes from a softener integrated in the plant, thereby preventing the formation of lime deposits and ensuring the long service life of the electrolytic cell.

The microprocessor controller integrated in the system digitally indicates the actual feed rate and monitors all key functions. All operating and error messages are shown in plain text on the clearly arranged display. The feed rate can be controlled manually or externally.

Electrolysis systems of the CHLORINSITU® IV compact series are especially suitable for use with smaller swimming pools in residential properties and hotels.

- Robust, simple technology
- Compact, space-saving design
- Water disinfection and pH correction with one system
- Safe vacuum plant technology
- Production and metering of ultra-pure hypochloric acid
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and lower chemical consumption for pH correction
- Optional integral chlorine and pH control

Technical Data

Type / Output (ppd)	Voltage Supply	Power Uptake (kW)	Salt consumption (lb/h)	Process water consumption (gpm)	Dimensions L x W x H (in)	Brine Tank (gal)
25	230 V/50 Hz	0.11	.17	.4	24 x 14 x 26	32
50	230 V/50 Hz	0.22	.5	.8	24 x 14 x 26	32

Scope of delivery:

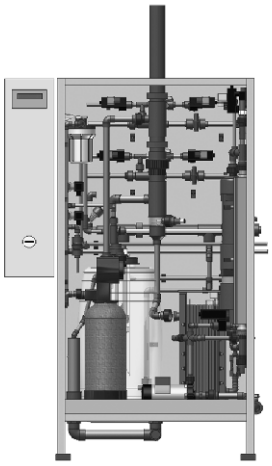
Chlorine electrolysis plant mounted on a wall plate, wired ready for connection, with integrated microprocessor control and softener system. Electrolytic cell with vacuum monitor, separate salt dissolving tank with level monitor. Fitted injector and metering equipment for sodium hydroxide (optional).

	Part No.
CHLORINSITU® IV compact 25	1036461
CHLORINSITU® IV compact 25 with pH correction	1036462
CHLORINSITU® IV compact 50	1036463
CHLORINSITU® IV compact 50 with pH correction	1036464
CHLORINSITU® IV compact 25 with integral pH and chlorine controller	1041405
CHLORINSITU® IV compact 25 integral pH and chlorine controller plus pH correction	1041403
CHLORINSITU® IV compact 50 with integral pH and chlorine controller	1041406
CHLORINSITU® IV compact 50 with integral pH and chlorine controller plus pH correction	1041404

Spare parts and maintenance kits

	Type	Part No.
Annual maintenance kit	CHLORINSITU IV compact 25	1041415
Annual maintenance kit	CHLORINSITU IV compact 50	1041417
3-yearly maintenance kit	CHLORINSITU IV compact 25	1041416
3-yearly maintenance kit	CHLORINSITU IV compact 50	1041418
Membrane cell	CHLORINSITU IV compact 25	1041419
Membrane cell	CHLORINSITU IV compact 50	1041420
Membrane	CHLORINSITU IV compact 25	1041421
Membrane	CHLORINSITU IV compact 50	1041422

Membrane Electrolysis Plants CHLORINSITU® IV



Electrolysis plants of the types CHLORINSITU® IV generate ultrapure chlorine gas in a vacuum process. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included in the scope of delivery, which is then electrolyzed in a membrane cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber and ultrapure chlorine gas and scaled down residual brine in the anode chamber separated by the membrane. The resulting chlorine gas is suctioned off through an injector included in the scope of delivery and dissolved in the water to be treated as hypochloric acid. The chloride-free sodium hydroxide is stored intermediately and can be transferred into the water through the same injector to adjust the pH value. To achieve this, an external pH value controller is directly connected to the plant's control. The generated hydrogen is diluted with fresh air through an ATEX-compliant ventilator and discharged safely, the scaled down residual brine is disposed of. The salt dissolving water comes from a softener integrated in the plant. Thus, lime deposits can be prevented and a long service life of the electrolytic cell can be ensured.

The plants are controlled with a modern PLC with large, illuminated display and integrated modem for re- mote diagnosis and troubleshooting. The chlorine metering and the pH value correction are controlled as standard through contact inputs; analogue inputs are optionally available.

Electrolysis plants of the types CHLORINSITU® IV are suitable for all applications, which require metering of hypochloric acid with simultaneous pH value correction.

- Robust technology
- Compact, space-saving design
- Safe vacuum plant technology
- Production and metering of ultrapure hypochloric acid without intermediate storage
- Chlorination and pH value adjustment with one single plant
- Economic operation thanks to the inexpensive raw material sodium chloride and less chemical consumption for pH value adjustment

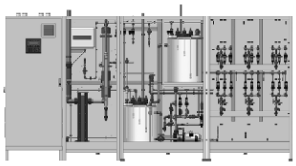
Technical Data

Type / Output (ppd)	Voltage Supply	Power Uptake (kW)	Salt consumption (lb/h)	Process water consumption (gal/h)	Cooling water consumption (gal/h)	Dimensions L x W x H (in)	Salt Tank (gal)	Recommended capacity storage tank (gal)
4.9	230 V	1.1	0.44	0.208	-	42 x 24 x 62	20.8	
7.3	3 x 400 V	1.3	0.66	0.338	-	43 x 24 x 62	20.8	
9.7	3 x 400 V	1.5	0.88	0.442	-	44 x 24 x 62	52	
14.6	3 x 400 V	1.9	1.32	0.62	-	45 x 24 x 62	52	
19.4	3 x 400 V	2.3	1.76	0.884	-	46 x 24 x 62	52	
24.3	3 x 400 V	2.7	2.42	1.092	-	47 x 24 x 62	52	
29.1	3 x 400 V	3.1	2.86	1.3	-	48 x 24 x 62	52	
36.4	3 x 400 V	3.7	3.52	1.638	-	49 x 24 x 62	98.8	
48.5	3 x 400 V	4.7	4.62	2.184	-	50 x 24 x 62	98.8	
60.6	3 x 400 V	5.7	5.72	2.86	-	51 x 24 x 62	98.8	
72.8	3 x 400 V	6.7	7.04	3.38	-	52 x 24 x 62	98.8	
84.9	3 x 400 V	7.7	8.14	3.9	-	53 x 24 x 62	98.8	
97.0	3 x 400 V	8.7	9.24	4.42	52	91 x 24 x 79	135.2	
121.3	3 x 400 V	10.7	11.66	5.46	52	92 x 24 x 79	135.2	
145.5	3 x 400 V	12.7	13.86	6.5	52	93 x 24 x 79	135.2	
169.8	3 x 400 V	14.7	16.28	7.54	52	94 x 24 x 79	135.2	

Scope of delivery:

Electrolysis plant mounted ready for operation on a powder-coated stainless steel frame with programmable logic controller (PLC) in control cabinet, integrated softener, electrolytic cell, pH value monitoring of electrolysis, ATEX-certified bleeding system and side salt dissolving tank with level monitor. The scope of delivery also includes a central injector system matched to the plant to meter chlorine gas and sodium hydroxide, inclusive of a booster pump. Automatic monitoring of the water hardness downstream of the softener and chlorine gas detector for plants from 600 g/h.

Membrane Electrolysis Plants CHLORINSITU® IV plus



Electrolysis plants of the types CHLORINSITU® IV plus generate ultrapure chlorine gas in a vacuum process. For this purpose, a saturated solution of sodium chloride is produced in a salt dissolving tank included in the scope of delivery, which is then electrolyzed in a membrane cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber and ultrapure chlorine gas and scaled down residual brine in the anode chamber separated by the membrane. The resulting chlorine gas is processed further in two ways. As with the plants CHLORINSITU® IV, it is suctioned off through an injector included in the scope of delivery and dissolved in the water to be treated as hypochloric acid. If the complete production output is not needed, excess chlorine gas can also be bound with the produced sodium hydroxide, as is the case with the plants of the types CHLORINSITU® III and stored intermediately as sodium hypochlorite. The plant thus does not have to be adjusted to the maximum demand of chlorine gas but can be adjusted to the average daily demand. Peaks of demand are covered by the additional metering of sodium hypochlorite from the intermediate storage. As with chlorine gas, metering will be carried out through a central injector system.

The chloride-free sodium hydroxide is also stored intermediately and can be transferred into the water to be treated through the central injector system to adjust the pH value. To achieve this, an external pH value controller is directly connected to the plant's control. The generated hydrogen is diluted with fresh air through an ATEX-compliant ventilator and discharged safely, the scaled down residual brine is disposed of. The salt dissolving water comes from a softener integrated in the plant. Thus, lime deposits can be pre- vented and a long service life of the electrolytic cell can be ensured. The efficiency of the electrolysis is monitored by an integrated pH measurement of the sodium hydroxide production.

The plants are controlled with a modern PLC with large, illuminated display and integrated modem for re- mote diagnosis and troubleshooting. The chlorine metering and the pH value correction are controlled as standard through contact inputs; analogue inputs are optionally available.

Electrolysis plants of the types CHLORINSITU® IV plus are a specifically economic alternative for all applications, which require metering of hypochloric acid with simultaneous pH, value correction.

- Robust technology
- Compact, space-saving design
- Safe vacuum plant technology
- Simultaneous production and metering of ultrapure hypochloric acid and sodium hypochlorite
- Chlorination and pH value adjustment with one single plant
- Economic operation thanks to the inexpensive raw material sodium chloride and less chemical consumption for pH value adjustment

Technical Data

Type / Output (ppd)	Voltage Supply	Power Uptake (kW)	Salt consumption (lb/h)	* Process water consumption (gpm)	Cooling water consumption (gpm)	Dimensions L x W x H (in)	Brine Tank (gal)	Recommended capacity storage tank (gal)
5	230 V	1.1	0.4	0.05	-	41.6 x 24 x 61 32 x 24 x 61	21	39.6
8	3 x 400 V	1.3	0.7	0.07	-	41.6 x 24 x 61 32 x 24 x 61	21	52.8
10	3 x 400 V	1.5	0.9	0.10	-	41.6 x 24 x 61 32 x 24 x 61	53	66
16	3 x 400 V	1.9	1.3	0.15	-	41.6 x 24 x 61 32 x 24 x 61	53	105.6
21	3 x 400 V	2.3	1.8	0.19	-	41.6 x 24 x 61 32 x 24 x 61	53	132
26	3 x 400 V	2.7	2.4	0.24	-	41.6 x 24 x 61 32 x 24 x 61	53	158.4
31	3 x 400 V	3.1	2.9	0.29	-	41.6 x 24 x 61 32 x 24 x 61	53	184.8
39	3 x 400 V	2.7	3.5	0.36	-	56 x 24 x 79 47.6 x 24 x 79	100	224.4
53	3 x 400 V	4.7	4.6	0.48	-	56 x 24 x 79 47.6 x 24 x 79	100	290.4
66	3 x 400 V	5.7	5.7	0.60	-	56 x 24 x 79 47.6 x 24 x 79	100	369.6
79	3 x 400 V	6.7	7.0	0.72	-	56 x 24 x 79 47.6 x 24 x 79	100	448.8
92	3 x 400 V	7.7	8.1	0.84	-	56 x 24 x 79 47.6 x 24 x 79	100	528
105	3 x 400 V	8.7	9.2	0.95	0.88	90.6 x 24 x 79 47.6 x 24 x 79	137	580.8
132	3 x 400 V	10.7	11.7	1.19	0.88	90.6 x 24 x 79 47.6 x 24 x 79	137	739.2
158	3 x 400 V	12.7	13.9	1.43	0.88	90.6 x 24 x 79 47.6 x 24 x 79	137	871.2
184	3 x 400 V	14.7	16.3	1.67	0.88	90.6 x 24 x 79 47.6 x 24 x 79	137	1029.6

* The process water consumption depends on the ratio between chlorine gas and stock production. Here, the value for a ratio 50% : 50% is given.

Scope of delivery:

Electrolysis plant mounted ready for operation on a powder-coated stainless steel frame with programmable logic controller (PLC) in control cabinet, integrated softener, electrolytic cell, pH value monitoring of electrolysis, ATEX-certified bleeding system and side salt dissolving tank with level monitor. Level sensors to monitor the storage tanks for sodium hypochlorite to be provided by the customer. The scope of delivery also includes a central injector system matched to the plant to meter chlorine gas, sodium hypochlorite and sodium hydroxide, inclusive of a booster pump. Automatic monitoring of the water hardness downstream of the softener and chlorine gas detector for plants from 600 g/h.

Gas Warning Device For Monitoring Chlorine Gas

The Type GMA 36 chlorine gas-warning device is a compact measurement and switching unit designed for monitoring the surrounding air for dangerous concentrations of chlorine gas.

Gas warning device type GMA 36

For chlorine monitoring

Type	Chlorine
Warning at approx.	2.0 ppm/vol%
Alarm at approx.	4.0 ppm/vol%
Permissible ambient temperature	-15 – 45 °C
Protection class housing	IP 54
Dimensions (without PGs, without sensor) H x W x D	247 x 135 x 95 mm
Supply	85 – 264 / 50 – 60 V/Hz
Power consumption	5 W
Warm-up phase max.	150 s **Relay**
Contact "Warning", self-resetting	230 / 1 V/A
Relay contact "Alarm", latching	230 / 1 V/A
Relay contact "Horn", latching, can be acknowledged	230 / 1 V/A
Sensor measuring principle	electrochemical
Sensor service life (depending on environmental cond.)	2 – 3 years

Note: The sensor reacts to all oxidizing gases.

	Part No.
GMA 36 chlorine gas detector	1023157

Spare parts

	Part No.
Replacement sensor for chlorine, chlorine dioxide, ozone	1023314
Replacement sensor for gas warning devices in the Life CGM range	1003009