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Compact Water Plant

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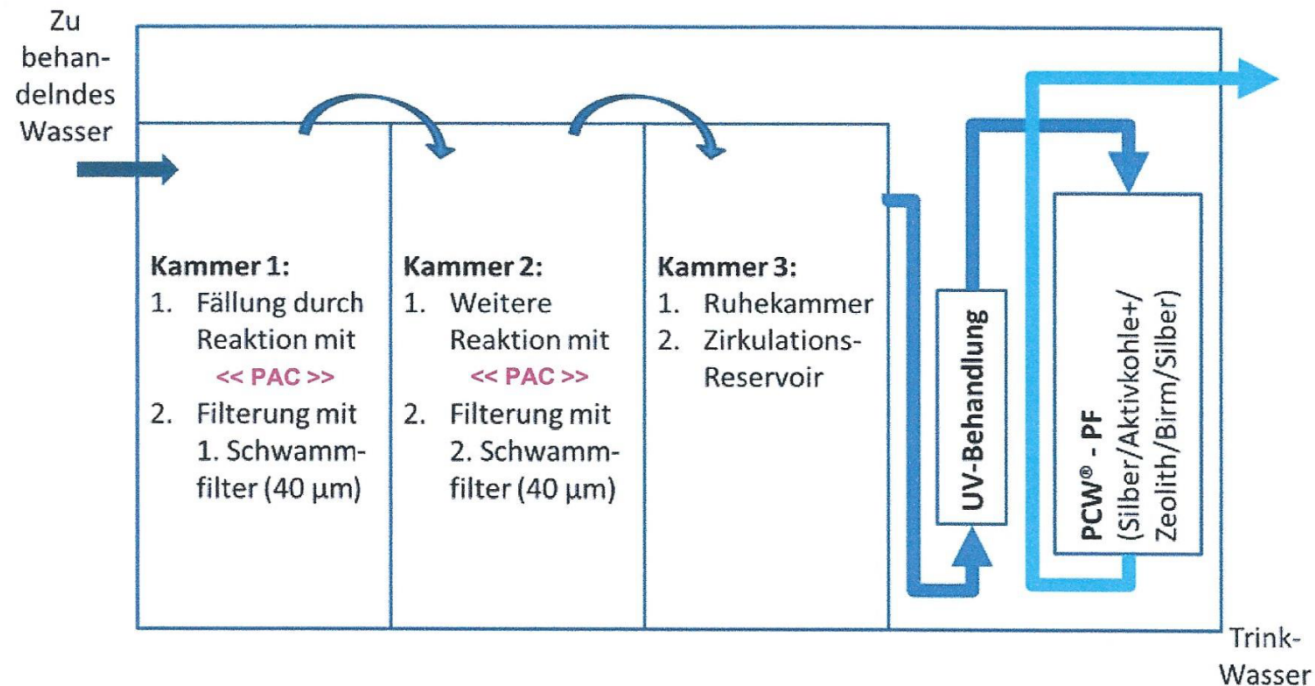


Compact Water Plant has been designed to fulfill the following criteria:

- Easily movable for use in remote areas or in disaster areas
- Compact for easy, safe and inexpensive shipment
- Use with or without mains electricity supply
- Low energy consumption
- Low running cost
- Installation easy and fast
- Easy maintenance
- **Output up to 1500 L/h
= 25L/min potable water**

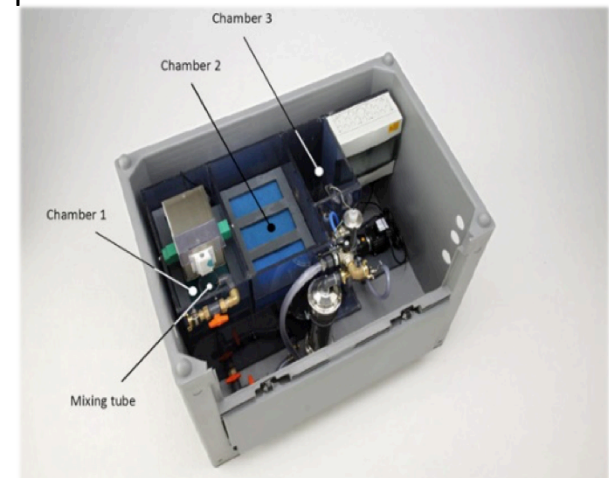


Overview of Mode of Operation



Mode of Operation:

- Raw water is pumped into the system by powerful pump
- **Chamber 1**
- Precipitation agent is dosed into the water by patented dosing pump
- Impurities and suspended solids precipitate and are filtered out
- **Chamber 2**
- Continued reaction of precipitation agent with water. More suspended solids are precipitated and filtered out
- **Chamber 3**
- Chamber 3 is a collection chamber. When full, supply pump and dosing pump will automatically stop. When water is drawn and reaches a minimum level, supply pump and dosing pump will automatically re-start.



Chamber 1 in detail

Precipitation agent*) causes the following:

- Emulsion of all suspended turbidity $\geq 0.1 \mu\text{m}$
- Better and faster elimination of turbidity
- Significant improvement of water quality
- Enhances service life of downstream filters

Removes: Oils
Grease,
Impurities to particle size $>40 \mu\text{m}$

These impurities are then removed by pre-filter sponges

- *) Precipitation agent is supplied in 4L bags
1L is sufficient for approx. 25 000L of
raw water**). Contact time approx. 60 – 90 sec.
- **) Depending on contamination degree of raw water

Once chamber 1 is full, it overflows into chamber 2



Chamber 2 in detail

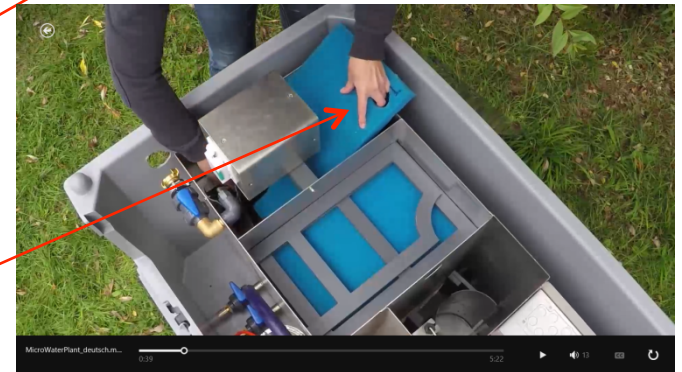
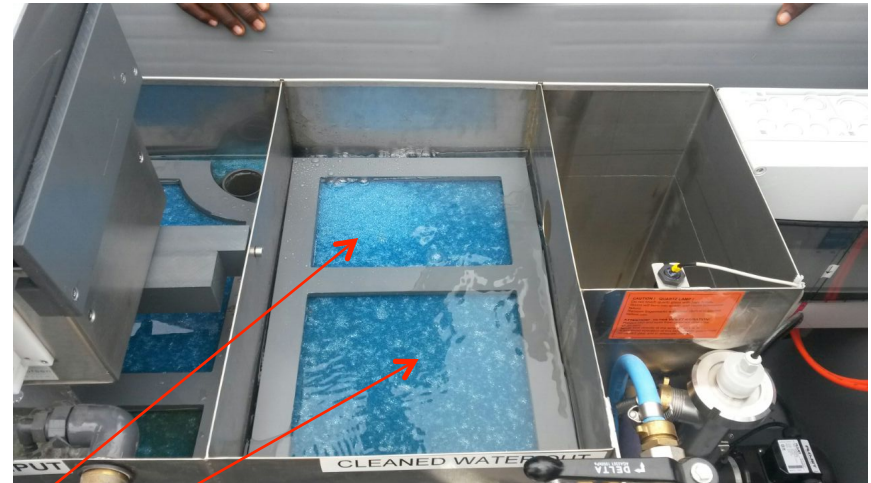
Water will continue to react with precipitation agent.

A second sponge filter filters the water again before it overflows into the third chamber.

Pore size of sponge filters is $40\text{ }\mu\text{m}$ and filters should be cleaned frequently. To facilitate this, filter sponges can easily be removed from system.

filter sponge (blue)

No tools required for filter cleaning or change

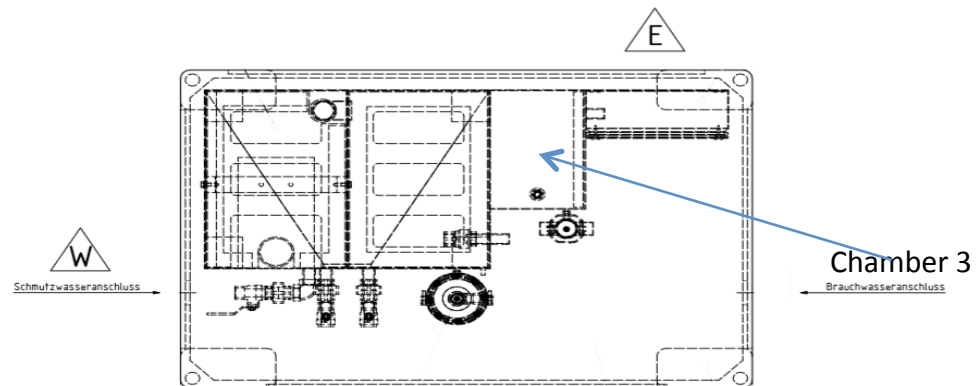


Chamber 3 in detail

Water is accumulated here. When full, supply pump and dosing pump will stop.

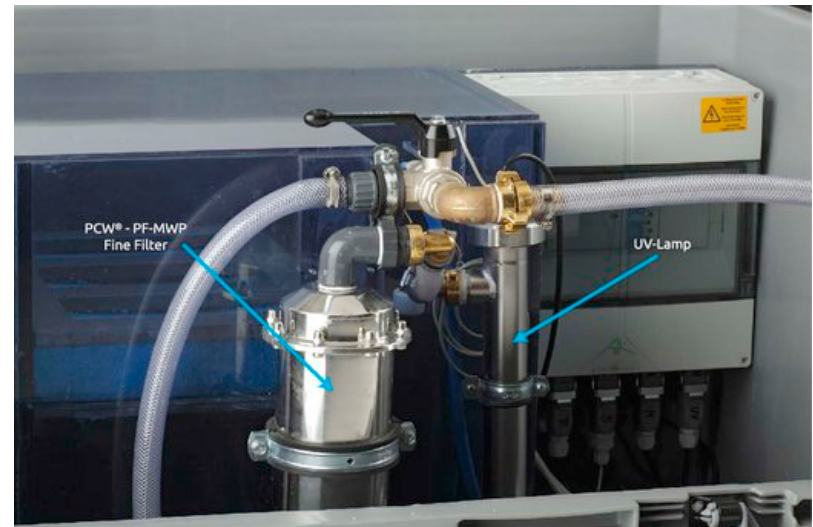
Only when delivery valve is opened to draw drinking water will the water continue to flow into the UV treatment lamp and into the final filtration unit.

When minimum level is reached supply pump and dosing pump will start operating again



UV-Lamp and Fine Filter

- When water tap is opened to draw potable water, water will move from chamber 3 through UV-Lamp for deactivation of bacteria (99.95%).
- Fine filtration with: PCW-PF CWP: silver as agent/birm/zeolith/active carbon
Removes: trihalomethanes, iron, heavy metals, ammonium caesium, strontium, drug residues, hormones, fluorides, lead particles, solvents, chlorine, ozone, remaining bacteria.



Installation and commissioning

Units were installed in Ghana by completely uninformed and untrained persons:



Unit was commissioned for an orphanage and was sponsored by two young ladies from Germany

Installation and commissioning

Installation took no longer than 20 min:



Installation and commissioning

Now they all have an abundance of good drinking water



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AGROLAB GROUP

Your labs. Your service.

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Datum 15.03.2014
Kundennr. 27032262
Seite 1 von 1

PRÜFBERICHT 63120 - 165987

Auftrag 63120
Analysenr. 165987 Rohwasser
Probeneingang 12.03.2014
Probenahme 11.03.2014 08:55
Probennehmer Agrolab Raimund Schmitze
Kunden-Probenbezeichnung RS 76
Entnahmestelle Jagstwass. nach Kläranlage vor Trinkwasseraufbereitungsaggreg

Einheit	Ergebnis	Best.-Gr.	Grenzwert	Methode
Sensorische Prüfungen				
Färbung (vor Ort)		farblos		EN ISO 7887
Geruch (vor Ort)		ohne		DEV B1/2
Trübung (vor Ort)		schwach getrübt		DIN 38404-C2-1

Vor-Ort-Untersuchungen				
Wassertemperatur (vor Ort)	°C	11,3		DIN 38404-C4
Leitfähigkeit bei 25°C (vor Ort)	µS/cm	603	1	EN 27888 (C8)

Mikrobiologische Untersuchungen				
Enterokokken	KBE/100ml	71	0	EN ISO 7899-2
E. coli	KBE/100ml	2400	0	EN ISO 9308-1
Coliforme Keime	KBE/100ml	2400	0	EN ISO 9308-1
Koloniezahl bei 20°C	KBE/1ml	960	0	TrinkwV 2001 (2011) Anl. 5.1 d) bb)
Koloniezahl bei 36°C	KBE/1ml	120	0	TrinkwV 2001 (2011) Anl. 5.1 d) bb)

TrinkwV: zulässiger Höchstwert / geforderter Bereich der Trinkwasserverordnung vom 21. Mai 2001 - aktueller Stand
DIN 50930: geforderter Bereich der DIN 50930 "Korrosionsverhalten von metallischen Werkstoffen gegenüber Wasser"

Agrolab Stuttgart Cornelia Haubrich, Tel. 0711/92556-47
Kundenbetreuung

Beginn der Prüfungen: 12.03.2014
Ende der Prüfungen: 15.03.2014

Die Prüfergebnisse beziehen sich ausschließlich auf die Prüfgegenstände. Bei Proben unbekannten Ursprungs ist eine Plausibilitätsprüfung nur bedingt möglich. Die auszugsweise Vervielfältigung des Berichts ohne unsere schriftliche Genehmigung ist nicht zulässig.



Seit dem 01.01.2014 nach DIN EN
ISO 15189:2013
akkreditiert
Die Akkreditierung gilt für alle in
den Normen aufgeführten
Parameter

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Datum 29.05.2014
Kundenr. 27032262
Seite 1 von 1

PRÜFBERICHT 67417 - 188833

Auftrag 67417
Analysennr. 188833 Trinkwasser
Probeneingang 27.05.2014
Probenahme 26.05.2014 15:30
Probenehmer Auftraggeber
Kunden-Probenbezeichnung nach Fertigprodukt
Entnahmestelle nach Fertigprodukt

Indikatorparameter der Anlage 3 TrinkwV /chemisch-technische und hygienische Parameter

Einheit	Ergebnis	Best.-Gr.	TrinkwV	Methode
Sensorische Prüfungen				
Färbung (vor Ort)	farblos			EN ISO 7887
Trübung (vor Ort)	klar			DIN 38404-2-1 (C 2-1)
Vor-Ort-Untersuchungen				
Wassertemperatur (vor Ort)	°C	16,4		DIN 38404-4 (C 4)
Mikrobiologische Untersuchungen				
Enterokokken	KBE/100ml	0	0	EN ISO 7899-2
E. coli	KBE/100ml	0	0	EN ISO 9308-1
Coliforme Keime	KBE/100ml	0	0	EN ISO 9308-1
Koloniezahl bei 20°C	KBE/1ml	0	0	TrinkwV 2001 (2013) Anl. 5 I d) bb)
Koloniezahl bei 36°C	KBE/1ml	0	0	TrinkwV 2001 (2013) Anl. 5 I d) bb)

1) für Anlagen mit weniger als 10 m³ pro Tag (Kleinanlagen zur Einzelversorgung) gilt ein Grenzwert von 1000 KBE/ml

TrinkwV: zulässiger Höchstwert / geforderter Bereich der Trinkwasserverordnung vom 21. Mai 2001 - aktueller Stand
DIN 50930: geforderter Bereich der DIN 50930 "Korrosionsverhalten von metallischen Werkstoffen gegenüber Wasser"

TrinkwV: Verordnung über die Qualität von Wasser für den menschlichen Gebrauch (TrinkwV 2001, zuletzt geändert durch Art. 1 V v. 3.5.2011)

Im Rahmen des Untersuchungsumfangs sind die geltenden Grenzwerte eingehalten.

Agrolab Stuttgart Cornelia Haubrich, Tel. 0711/92556-47

Kundenbetreuung

Beginn der Prüfungen: 27.05.2014

Ende der Prüfungen: 29.05.2014

Die Prüfergebnisse beziehen sich ausschließlich auf die Prüfgegenstände. Bei Proben unbekannten Ursprungs ist eine Plausibilitätsprüfung nur bedingt möglich. Die auszugsweise Vervielfältigung des Berichts ohne unsere schriftliche Genehmigung ist nicht zulässig.

Analysis water after
Treatment

Microbiological analysis shows
Zero count on bacteria and on
coliform count

Within the framework of the analysis
criteria all values have been within the
applicable limits.

Running cost for water

Assumptions:

- Run time 10 hrs/ day
= 365 days /year
= 3650 hrs/year
- Output per hour approx. 1200 L
= per day approx. 12000L
= per 365 days **= 4.380.000L**

M.W.P. cost per liter using mains electricity					
Usage			per hour	10 hours per day	365 days per annum
Power consumption 400W			0,1106 €	1,1060 €	403,69 €
Precipitation agent 1L - 10 E			0,3000 €	3,0000 €	1.095,00 €
UV-Lamp					
Service life 8000 h,			0,0168 €	0,1688 €	61,59 €
Filter material					30,00 €
Membrane replacement					29,75 €
Filter mats					26,50 €
Depreciation (7years) p.a.					1.714,00 €
Total cost per year incl. depreciation					3.360,53 €
Total drinking water output per year at 10 hours service time per day and					
Liters per year @ 10 hours per day, 365 days					<u>4.380.000</u>
					-
Cost per liter incl. depreciation of unit					<u>0,000767 €</u>

Sample calculation for
water cost including
depreciation of equipment
when using mains electricity



M.W.P. cost per liter using generator and fuel				
Usage		per hour	10 hours per day	365 days per annum
Fuel cost at 0.80€ per liter		0,880 €	8,800 €	3.312,00 €
Precipitation agent 1L - 10 E		0,3000 €	3,0000 €	1.095,00 €
UV-Lamp				
Service life 8000 h,		0,0168 €	0,1688 €	61,59 €
Filter material				30,00 €
Membrane replacement				29,75 €
Filter mats				26,50 €
Depreciation (7years) p.a.				1.714,00 €
Total cost per year incl. depreciation				6.172,84 €
Total drinking water output per year at 10 hours service time per day and				
Liters per year @ 10 hours per day				<u>4.380.000</u>
Cost per liter incl. depreciation of unit				<u>0,00141 €</u>

Sample calculation for
water cost including
depreciation of equipment
when using generator powered
with petrol

Maintenance

- Precipitation agent: Check daily before start-up
- Sponge filters: clean daily
replace once per year
- Empty water reservoir once per week (or on demand) and clean
- Change carbon filter 1 – 2 times per year
- When red light illuminates exchange UV lamp (approx. 8000 service hours)
- Once every two years at service 10 hours per day

Maintenance

- Suspended solids retained by the unit through precipitation with the precipitation agent

This demonstrates the efficiency of the unit but also the necessity of cleaning the unit after use

Dirt is flushed out through taps at the bottom of the chambers



Scope of Delivery

Box 1

- Compact Water Plant

Box 2

- Power generator (petrol, 230V)*)
- Submersible pump
- Petrol can (UN licence)*)
- Flexible nozzle spout*)
- UV Lamp (42W)
- Spare bag for filter
- Spare membrane for water pump
- 2 X filter mats
- 6 X precipitation agent à 4 L

*) Delivery possible without generator,
petrol can and spout

Spare parts list

Power generator

Submersible pump

Petrol can

Flexible nozzle spout

UV-Lamp complete

UV-Lamp 42W

Membrane pump 230V

Membrane for pump

Waterfilter complete

Spare bag for filter

Control box elec. Complete

Wave pump complete

Float switch

Bagholder

2 X spare filter mats

Precipitation agent 4L