



ZONS[®] eco duo
Installation guide
General technical approval
Z-55.3-96, Z-55.3-142, Z-55.3-222

ZONS[®] eco duo Installation Guide

RHEBAU GmbH

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RHEBAU GmbH

Service-Hotline: 02133-770360

1. Delivery packing List

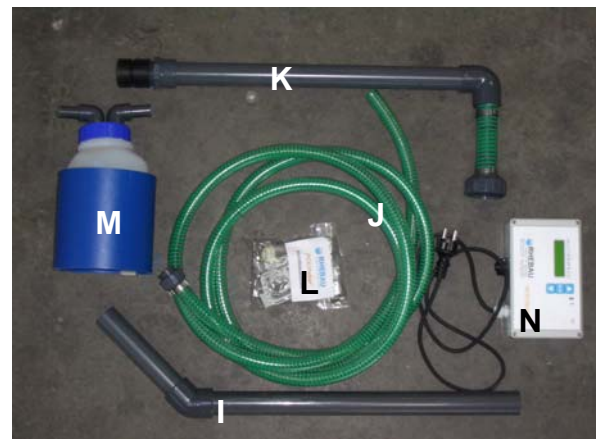
ZONS® eco duo T

- A] Case
- [B] Submersible pump for clear water (M2)
- [C] Submersible pump for feed, aeration, stirring and reverse flow (M1)
- [D] Air valve (V1)
- [E] Reverse flow valve (V2)
- [F] Connection box
- [G] Float gauge
- [H] 7 x 1,0 mm² x 25m connection cable with special connector



- I] "T" aeration pipe
- J] Clear water hose (3/4 inch, 4,20 m)
- K] Feed pipe with hose piece and non-return valve
- [L] Kit of mounting material
- [M] Sampling bottle with cap and attachment device
- [N] MULTICOM ECO control unit

1 ZONS® eco duo manual

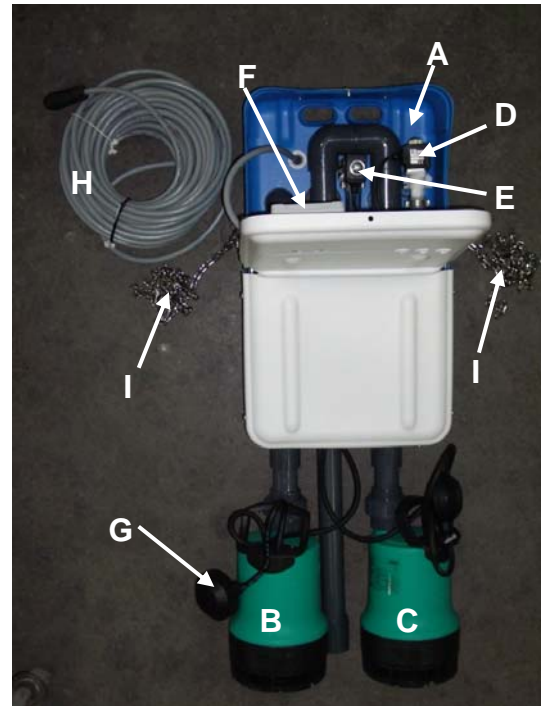


Content fastening-parts kit [L]

- 6 Stck. Screws 4.5 x 45 mm
- 4 Stck. Screws 4.0 x 45 mm
- 10 Stck. Dowel 6 mm
- 4 Stck. Cable Connector
- 2 Stck. Hose clamps 16-25 mm
- 1 Stck. Cable bracket
- 2 Stck. Quick-clamp DN 25

ZONS® eco duo K

- A] Case
- [B] Submersible pump for clear water (M2)
- [C] Submersible pump for feed, aeration, stirring and reverse flow (M1)
- [D] Air valve (V1)
- [E] Reverse flow valve (V2)
- [F] Connection box
- [G] Float gauge
- [H] 9 x 1,0 mm² x 25m connection cable with special connector
- [I] Sockets with chains



- J] "K" aeration pipe, 105 cm
- K] 4,20 m return sludge hose (3/4 inch)
- L] Feed hose (1 1/2 inches, 5 m)
- [M] Clear water hose (3/4 inch, 5 m)
- [N] Kit of mounting material
- [O] Sampling bottle with cap and attachment device
- [P] Feed pipe with non-return valve
- [Q] MULTICOM ECO control unit

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Content fastening-parts kit [N]

- 6 Stck. Screws 4.5 x 45 mm
- 4 Stck. Screws 4.0 x 45 mm
- 10 Stck. Dowel 6 mm
- 4 Stck. Cable Connector
- 2 Stck. Hose clamps 16-25 mm
- 1 Stck. Cable bracket
- 2 Stck. Quick-clamp DN 25

2. Introduction

Type of Plant
Sequential Batch Reactor (SBR) System
Biological Wastewater Treatment Plant

Intended Use

On-site treatment of domestic wastewater and wastewater of similar consistency.

Power Supply Requirements

Electric supply:	230 V~50Hz +10 %
Aggregates:	230V / 50 Hz
M1, M2	P < 0,75 KW
V1, V2	P < 0,10 KW
max. total connection mode:	2500 VA
Current metering range:	0,50 - 10 A +/- 10% v.E.
Power input:	typ. 5 VA
Required pre-fuse:	16A
Alarm relay:	typ. 70dB(A)

Performance test

Both ZONS® eco duo T" and ZONS® eco duo" K" conform to the standards of the German authority, DIBt, and the European Norm EN 12566 part 3.

Test Institution

PIA GmbH, Prüfinstitut für Abwassertechnik, Prüfeinrichtung des Prüf- und Entwicklungsinstitutes für Abwassertechnik an der RWTH Aachen.
Test report from September 2004.

Number of test report:	PIA 2004-003
Approval numbers:	Z-55.3-96 (Ablaufklasse D) Z-55.3-142 (Ablaufklasse C)
Approval grades:	D; C
Date of production:	see packing list

Start-up Period

The **plant** automatically runs a six month start-up program, which is operated by the

MULTICOM ECO control unit. After six months, the program will automatically turn off. We recommend injecting the aeration tank with 30 litres of activated sludge per Population. Total (PT).

Site Selection Care should be taken in selecting a location for the plant. The location should allow for maintenance and repair works at any time. In particular, access for a sludge disposal vehicle is vital. The location needs to allow for maintenance and repair work.

The MULTICOM ECO(B*H*D: 215*185*95 mm) control unit must be mounted in a sheltered environment protected from rain. The standard length of the connection cable is 25 m. Cables with up to a length of 50 m can be supplied if required.

Installation and Configuration

Work in the plant must be carried out by authorised personnel only. The operational safety of the ZONS® eco duo on-site wastewater treatment plant is assured only when it is used for its intended application. Modifications or any inappropriate repairs to the plant will lead to loss of coverage under the warranty.

Installation technicians should take care to familiarise themselves with this manual and the installation process before commencing any work on the plant.

During the configuration process, the plant operator must be adequately trained, by qualified technical staff, in the operation and functions of the plant (see also section G).

References to the installation and preparation of the containers are under point 4 and 8 of this guide. In order to grant the normal function of the plant, the measures which can be required in these points are to be kept absolutely.

Tank Capacity

Ring construction tanks	Nominal inflow [m ³ /d]	Nominal daily organic BOD ₅ load [kg BSB5/d]	Energy consumption*	Total height [m]
			[kWh/a] KI. D / KI. C	
ECO 4/1 A	0,60	0,24	519,69 / 391,94	2,40
ECO 6/1 A	0,90	0,36	695,13 / 567,38	2,90
ECO 8/1 A	1,20	0,48	773,67 / 645,92	3,15
ECO 8/1 B	1,20	0,48	773,67 / 645,92	2,40
ECO 12/1 B	1,80	0,72	845,82 / 718,07	2,90
ECO 16/1 B	2,40	0,96	978,87 / 851,12	3,40
ECO 12-16 /2 A	2,40	0,96	978,87 / 851,12	2,90
ECO 12-16 /2 B	2,40	0,96	978,87 / 851,12	2,40
ECO 20-24 /2 B	3,60	1,44	1225,31 / 1097,56	2,90
ECO 28 /2 B	4,20	1,68	1306,00 / 1123,50	3,15
ECO 32 /2 B	4,80	1,92	1387,65 / 1168,65	3,40
ECO 36 /2 B	5,40	2,16	1469,30 / 1250,30	3,65
ECO 40 /3 AB	6,00	2,40	1526,27 / 1307,27	3,65/3,65/3,90
ECO 44 /3 AB	6,00	2,40	1578,67 / 1359,67	4,15
ECO 53 /3 BC	7,95	3,18	1691,74 / 1472,74	3,65/3,65/3,90

Monolithic tanks	Nominal inflow [m ³ /d]	Nominal daily organic BOD ₅ load [kg BSB5/d]	Energy consumption*	Total height [m]
			[kWh/a] KI. D / KI. C	
ECO 4/1 A mon	0,60	0,24	519,69 / 391,94	2,62
ECO 8/1 B mon	1,20	0,48	773,67 / 645,92	2,62
ECO 12/ 1 B mon	1,80	0,72	845,82 / 718,07	3,17
ECO 16/ 1 B mon	2,40	0,96	978,87 / 851,12	3,37
ECO 12-16 /2 A mon	2,40	0,96	978,87 / 851,12	2,62
ECO 12-16 /2 B mon	2,40	0,96	978,87 / 851,12	2,62
ECO 20-24 /2 B mon	3,60	1,44	1225,31 / 1097,56	3,17

* Valid for the basic settings, these values may vary according to the actual inflow and organic load.

3. Cautionary notes

CAUTION: Waste water creates gases that are dangerous and can lead to loss of consciousness. Before entering a tank, the tank must be emptied and sufficiently ventilated.

CAUTION: Always make sure that a second person is present outside the tank area in case of incident.

CAUTION: The control unit and parts of the plant use an electric power supply. Before starting any repair work, all electrical power must be completely disconnected. Work in the plant must be carried out by authorised personnel only.

CAUTION: It is prohibited to execute changes or arbitrary conversion of the plant. Unauthorised reworking and improper treatment will lead to the loss of all claims based on defects.

CAUTION: If the plant has not been in operation for a period of time, all tanks must be opened and ventilated before the plant is re-commissioned.

CAUTION: If tank covers become stuck, extreme caution must be taken to avoid using any tools that might create sparks. Please remember, the tank may contain flammable gases.

CAUTION: Effective safety regulations must be respected.

4. Preparation

4.1 New plants:

- All tanks must be clean and empty.
- Test all tanks to ensure they are completely watertight and do not leak.
- Mount the tank or tanks according to chapter 7 of this manual.
- Ensure that the control unit is mounted in a sheltered location and is accessible to personnel and sludge removal vehicles.
- Install the 150 mm intake and drain pipelines.
- Ensure that the tank, the inflow pipe and the outflow pipe are all sufficiently ventilated.
- Install a power supply line (230 V) to the control unit with a dedicated 16A (max.) fuse.
- Install an empty conduit (100 mm) for the 25 m connection cable from the plant to the control unit. The connection cable can be extended up 50 m by a special extension cable.

4.2 Retrofitting:

- One or two days before the installation, empty and cleanse tank(s) and ventilate them thoroughly.
- Check all tanks to ensure that they are in structurally sound condition.
- Test all tanks to ensure they are completely watertight and do not leak.
- Using a smoke test, check that the tank, the inflow pipe, and the outflow pipe are sufficiently ventilated. This is the case when smoke is discharged by the ventilation pipe.
- Tank covers must be equipped with adequate ventilation holes.
- Ensure all tanks of the plant are accessible.
- Install or alter the intake pipeline according to the layout.
- Ensure that the control unit is mounted in a sheltered location and is accessible.
- Install a power supply line (230 V) to the control unit with a dedicated 16A (max.) fuse.
- Install an empty conduit (100 mm) from the plant to the control unit to accept a 25 m connection cable. The connection cable can be extended up 50 m by a special extension cable.
- Tightly close all openings or slots between the primary settlement tanks and the aeration tank.
- Install an emergency spillway (50 mm diameter) into the partition between primary settlement basin and aeration tank, about 10 cm under the upper end of the partition.

5. Installation

5.1 Installation ZONS® eco duo T

To carry out the installation, all tanks must be empty.

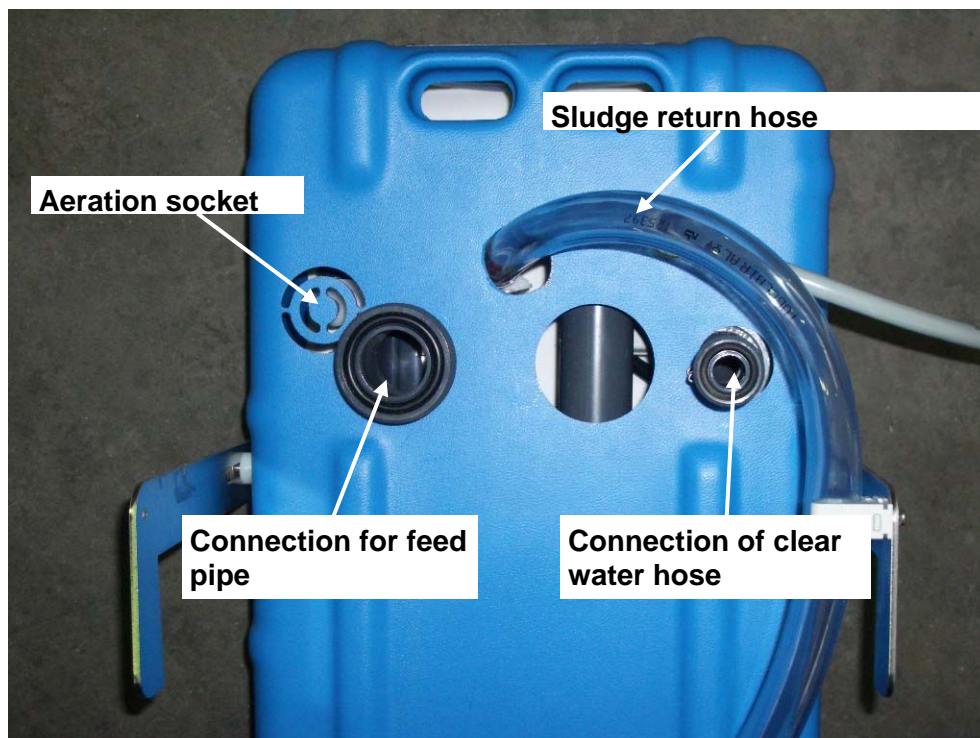
Note: For a retrofit, it is important that the tanks have been emptied, cleaned and sufficiently ventilated before work commences.

For transport reasons, there are loose parts in the delivery packaging that must be assembled prior to installation.

Make sure all hoses and cables are left long enough to ensure the ZONS® eco duo can be removed from the tank easily when necessary.

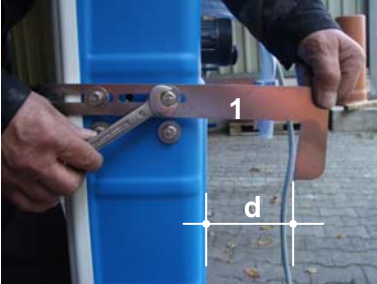
IMPORTANT: Prior to installation, check all delivered parts for any damage caused in transit and against the delivery packing list to ensure that nothing is missing.

Before you attach the ZONS® eco duo to the power supply system, follow the instructions in section F of this manual.





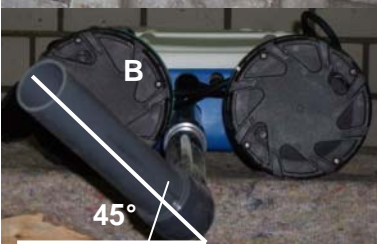
The pre-mounted retainers (1) to the partition strength adjust (d). The screws only so firmly tighten, until the spring washer is flat.

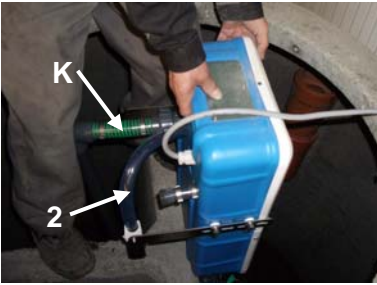


The feed pipe [K] on the 1 1/4 "screw connection turn and firmly tighten. Make sure that the sealing ring of the screw connection, with remove for the transport lock, is lost. Respect on a clean and grease-free connection, since a close Connection a condition for the perfect function of the ZONS eco duo .

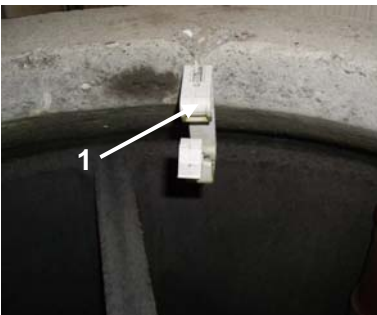


The air supply pipe [I] into the sleeve [2] put and with the tightening screw fasten. The air supply pipe in such a way turn that the withdrawal is aligned in the angle from approx. 45° to the plant toward the clear water pump [B].

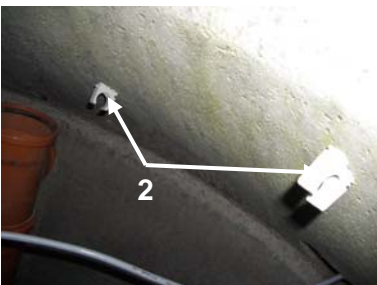


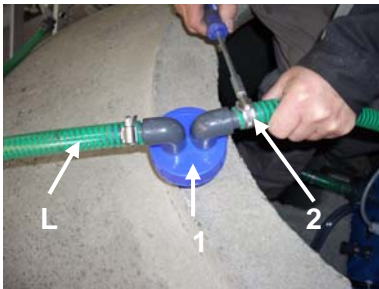


Hang the ZONS eco duo on the partition wall. Route the feed pipe [K] into the last chamber of the pre-treatment volume. The activated sludge return pipe [2] has to lead into the first chamber of the pre-treatment volume



Install the holder [1] for the sample bottle [M] at the cone near the cover. Ensure the sample bottle does not interfere with future removal of the ZONS eco duo. Shorten the clear water hose [2] to the desired length, attach the end to one of the sample bottle's grommets and unite it with a hose clamp. Attach the remaining hose onto the other grommet and attach with a hose clamp. Insert the sample bottle into its holder. Insert the end of the clear water pipe into the tank's outlet and attach it with a tie-wrap.





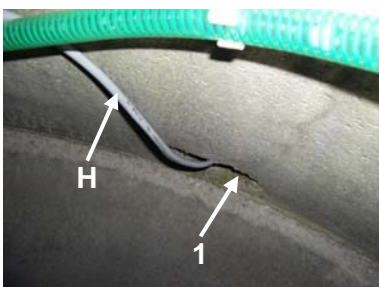
Shorten the clear water hose [L] to the desired length, attach the end to one of the sample bottle's grommets (1) and unite it with a hose clamp (2). Attach the remaining hose onto the other grommet and attach with a hose clamp. Insert the sample bottle into its holder.



The clear water hose [L] at the 1/2 "screw connection at the plant turn and firmly tighten. Make sure that with remove for the transport lock, the sealing ring of the screw connection is lost.



Insert the end of the clear water pipe into the tank's outlet and attach it with a tie-wrap.



Drag the connection cable (25 m) (H) of the ZONS eco duo through the empty conduit (1) using a wire-pull. If an extension cable is necessary, attach it before dragging the cable through the empty conduit. Make sure the cable is sufficiently long to allow removal of the ZONS eco duo® from the tank.



Wind the rest of the cable [H] and fit to the provided cable holder [2]. Leave enough length so that the ZONS eco duo may be removed from the tank.



Attach the provided warning sign [1] near the aeration volume, to avoid that it is being desludged.



Install the control unit on the wall. Plug the connector into the control unit's socket. Do not connect the control unit to the power supply system yet. Before connecting the plant to the power supply system, fill all tanks (including the primary settlement tank) with water until the ZONS eco duo is submerged into the water by about 20 cm. The plant is now ready to be commissioned. Please refer the instructions on the commissioning process

5.2 Installation of ZONS® eco duo K

To carry out the installation, all tanks must be empty.

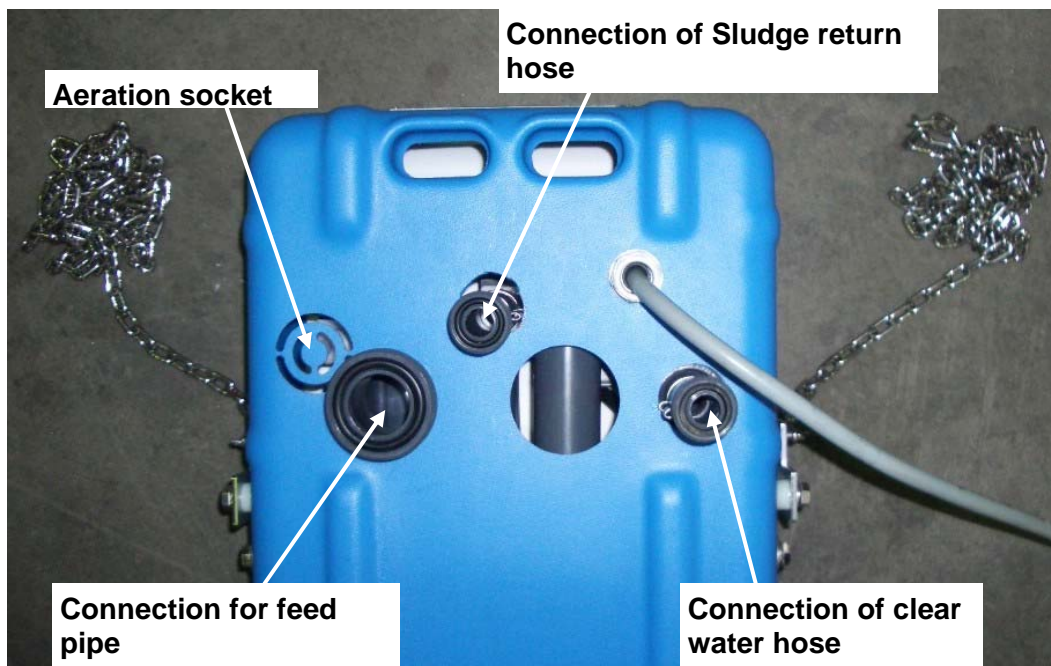
Note: For a retrofit, it is important that the tanks have been emptied, cleaned and sufficiently ventilated before work commences.

For transport reasons, there are loose parts in the delivery packaging that must be assembled prior to installation.

Make sure all hoses and cables are left long enough to ensure the ZONS eco duo can be removed from the tank easily when necessary.

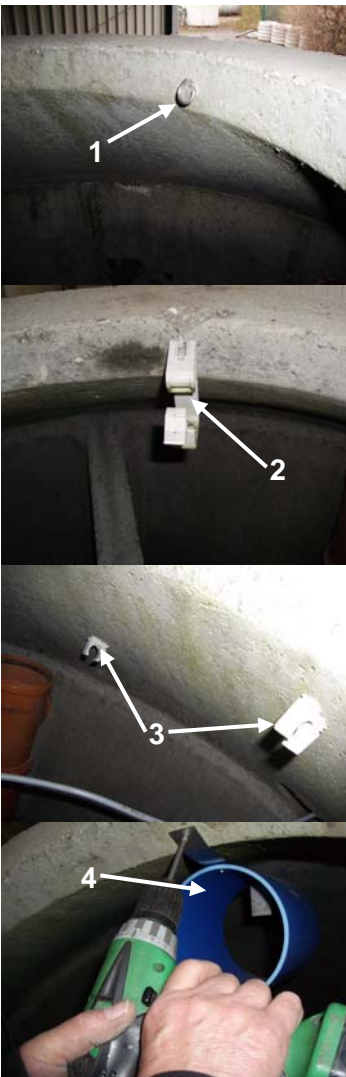
IMPORTANT: Prior to installation, check all delivered parts for any damage caused in transit and against the delivery packing list to ensure that nothing is missing.

Before you attach the ZONS eco duo to the power supply system, follow the instructions in this manual.

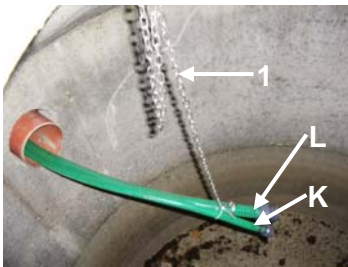




Place the aeration pipe [J] into the sleeve [1] and turn the tensioning screw . Turn the aeration pipe so that the outlet is adjusted to an angle of 90° toward the pumps.



Fasten now the screw hook [1], that the plant and those Hoses to be up-hung, the cable support [2], the clear water hose owner [3] and the mounting plate for the sample taking bottle [4] at the cone. For this you use the 6 mm provided of pegs and the Screws 4,5 x 45 mm. Respect with the attachment of the cable and sampling bottle mounting plate on the fact that no handicap when taking out of the ZONS eco duo exists.



Push the feed pipe 1 1/4 “ [L] and the 1/2 “surplus mud hose [K] by the feeder line between the pre tank and the tank of biology. Make sure that the screw connections into the biology tank show. Hang those, to which feed pipe fastened -chain [1], in the screw hook so in that this hangs horizontally in the tank. Fasten the surplus sludge hose by means of a cable strap to the feed pipe.

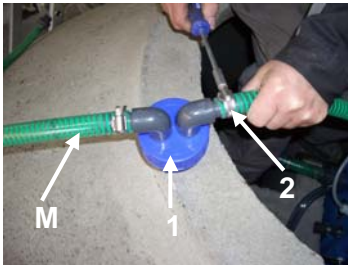


Hang those, at the plant attached, chains into those screw hook. With new installations you set the hanging up depth (honk) to the plant, like to page 20 of this guide described. With retrofits into existing tanks, you take that necessary measure (honk) of the clarify-technical computation. Hang those, at the plant attached, Chains into those screw hook. With new installations you set the hanging up depth (honk) to the plant, like to page 20 of this guide described. With retrofits into existing tanks, you take that necessary measure (honk) of the clarify-technical computation.

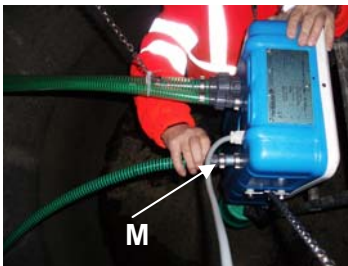


Screw now the 1 1/4 “feed hose [L] and the 1/2 “ Surplus sludge hose [K] to the intended connections at that And you turn plant firmly the screw connections. Make sure that the sealing rings of the screw connections, with remove for the transport lock, are lost. To a clean and grease-free connection, thus those is to be paid attention perfect function of the ZONS eco duo is ensured. . Make sure that the tube lengths in the container sufficiently Are, so that the ZONS eco duo can be pulled problem-free out of the container.





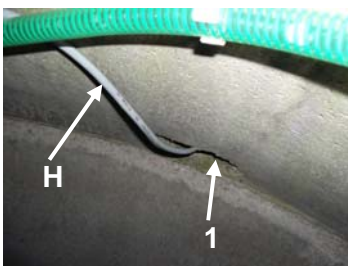
Shorten the clear water hose [M] to the desired length, attach the end to one of the sample bottle's grommets(1)with a hose clamp [2]. Attach the remaining hose onto the other grommet and attach with a hose clamp. Insert the sample bottle into its holder. Insert the end of the clear water pipe into the tank's outlet and attach it with a tie-wrap.



The clear water hose [M] on the connection at the plant turn and firmly tighten. Make sure that with remove for the transport lock, the sealing ring is lost.



The free end of the clear water hose [L] into the expiration pipe [1] put and against slipping out with a cable strap fix.



Drag the 25 mm connection cable of the ZONS eco duo through the empty conduit using a wire-pull. If an extension cable is necessary, attach it before dragging the cable through the empty conduit. Make sure the cable is sufficiently long to allow removal of the ZONS eco duo from the tank.



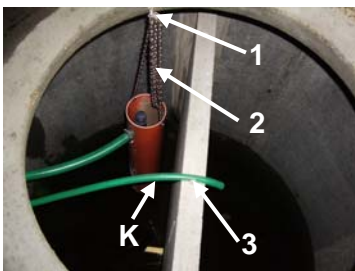
Wind the rest of the cable [1] and fit to the provided cable holder [2]. Leave enough length so that the ZONS eco duo may be removed from the tank.



Attach the provided warning sign [1] near the aeration volume, to avoid that it is being desludged.



Fasten in the pre tank the screw hook [1] at the cone and there hang up the chain [2] of the feed hose [P]. You stop the hanging up depth in such a way that the pipe union of the feed pipe at height of the flow sole of the connecting tube to biology lies. Accordingly afterwards you cut the feed pipe to length [L] and put it on the pipe union to the feed pipe and fasten it with a hose clip. If the pre clear process is a partition, fasten a hose clip [3] there and fasten there the surplus sludge hose [K], after it the hose accordingly cut to length have. If no partition is present, fasten the hose with one Cable strap at the feed hose Make sure with cut to length the hoses that sufficient Tube length in biology remains available, so that the ZONS eco duo can be pulled if necessary problem-free out of the plant.



Install the control unit to the wall. Plug the connector into the control unit's socket. Do not connect the control unit to the power supply system yet.

Before connecting the plant to the power supply system, fill all tanks (including the primary settlement tank) with water until the ZONS eco duo is submerged into the water by about 20 cm.

The plant is now ready to be configured. Please refer the instructions on the configuration process.

Index 1: Mounting depths of ZONS® eco duo K

New plants:

	Hwmin m	Hup m
ZAQ 12A	1,05	0,90
ZAQ 16A	1,40	1,25
ZAQ 12B	0,88	0,73
ZAQ 16B	0,90	0,75
ZAQ 20B	1,12	0,97
ZAQ 24B	1,35	1,20
ZAQ 28B	1,57	1,42
ZAQ 32B	1,79	1,64
ZAQ 36B	2,02	1,87
ZAQ 40AB	2,24	2,09
ZAQ 44AB	2,47	2,32
ZAQ 53BC	2,06	1,91

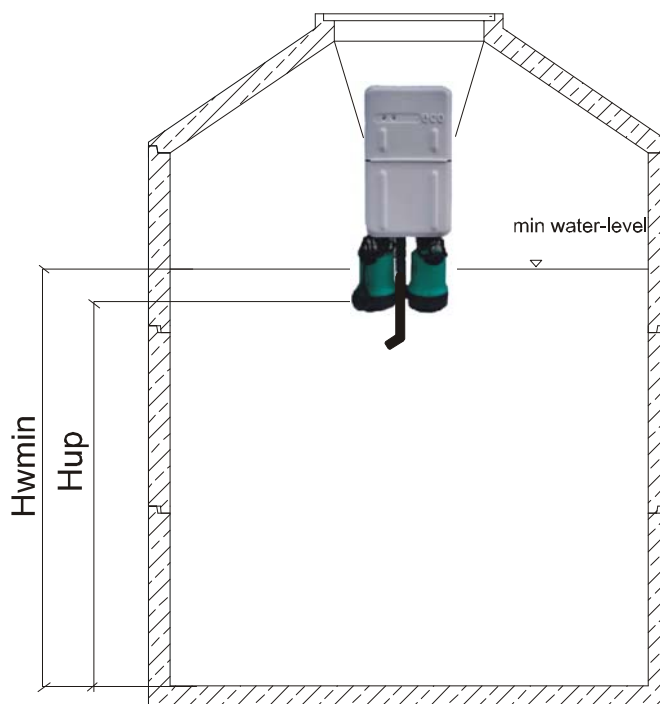
Hup = Lower edge clear water pump to tank bottom

The measure "Hup" is as minimum to be understood, which must be kept, in order to keep the necessary minimum stimulation volume.

Retrofits:

For each individual case, minimum mounting depths should be calculated from the sewage treatment requirements and must be adhered to.

Typ K



6. Configuration

IMPORTANT:

Ensure the MULTICOM eco control unit has been correctly and safely connected to the power supply.

Execute a function control using the test run.

Refer to the guide "Operation and Maintenance". Fill out the type label at the left hand side of the control unit. List the serial number, the maximum PT and the tank volume.

(see general build-up-obvious permission Z-55.3-96 bzw. Z-55.3-142.)

MULTICOM ECO:

Set the type of plant to ZONS eco duo. Set the actual PT, not the maximum PT capacity. Set time and date and restart the system by disconnecting the power supply for a short period.

ZONS MULTICOM ECO:

Set the actual PT, not the maximum PT capacity. Set time and date and restart the system by disconnecting the power supply for a short period

The operator of the plant should be thoroughly trained in the performance of the duties necessary for the operation of a wastewater treatment plant:

1. Insure that the substances listed in the "Operation and Maintenance" guide are not being added into the plant
2. Determine that the plant is running properly; regularly verify that the control unit's green light is on. A blinking red light indicates a malfunction. See the guide for operation and maintenance.
3. Regular maintenance is required. A service contract is recommended. Primary settlement tanks have to be desludged, **not** the activation tank. Operators need to be aware which is which. After desludging, the tanks need to be refilled with fresh water.

In connection with the latter point the operator is to be cleared up over the fact that only the pre treatment tank may to be emptied and these afterwards from the last chamber again with water be filled up is. Further carriers duties are in the general building-on-obvious permission (Z-55.3-96 and/or Z-55.3-142) as well as in the operating and maintenance guide.

7. Tank installation

Concrete components

In general, concrete components are delivered and offloaded by crane trucks.

NOTE: Free access to the site must be given.

The plant is inserted into a water free building pit provided with a 20 cm layer of small gravel. The building pit must meet the current earthworks specifications.

Check the installation depth since it may vary because of the mortar joints.

The joints between the walls and between the partitions have to be filled with mortar in a mixture ratio of one part cement and three parts of sand. Add a permitted sealant.

Keep the mortises at the top and the bottom of the components clean. All dirt must be removed in order to guarantee tight joints.

It is important to apply mortar evenly onto the entire joint.

After positioning the upper component, form a bead out of the discharging mortar and smooth it with a scoop or broom. This provides additional water tightness.

NOTE: Before installation, all components must be checked for damage. Damaged parts may not be used and should be replaced or repaired.

Now, attach the inflow and outflow pipes to the plant.

Temperature limits for tank installation

none

Maximum earth overlap for the tanks

When using a cone: 50 cm over cone

When using a flat cover: 35 cm over cover

Live load

Walkable cover: A 15 according to EN 124; driveable covers for passenger cars and driveable covers for trucks are available on demand.

Buoyancy protection

When the tank(s) is/are built in a below ground water level facility, a structural analysis must be carried out to ensure that buoyancy is avoided. If buoyancy cannot be excluded, then an additional anti-buoyancy device must be incorporated into the design.