



Vacuum toilet



Manual

- Installation
- Instruction

S
T
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VOD
Vacuum On Demand

E-04-VODS4



Content



Congratulations on your choice of a Jets vacuum toilet system! Your choice helps spare the environment for unnecessary use of water and sewage production, compared to a traditional toilet. We trust you will be delighted with your choice! All components are carefully checked before despatch from the Jets factory. Any damaged parts must be notified immediately.

The illustrations in the manual can differ from the actual products. All Vacuumator illustrations show a Jets Vacuumator 10NT. Some consignments may however involve a Jets Vacuumator 15 – a more powerful variant. The same principles for use, installation and maintenance apply to this model as for the Jets Vacuumator 10NT.

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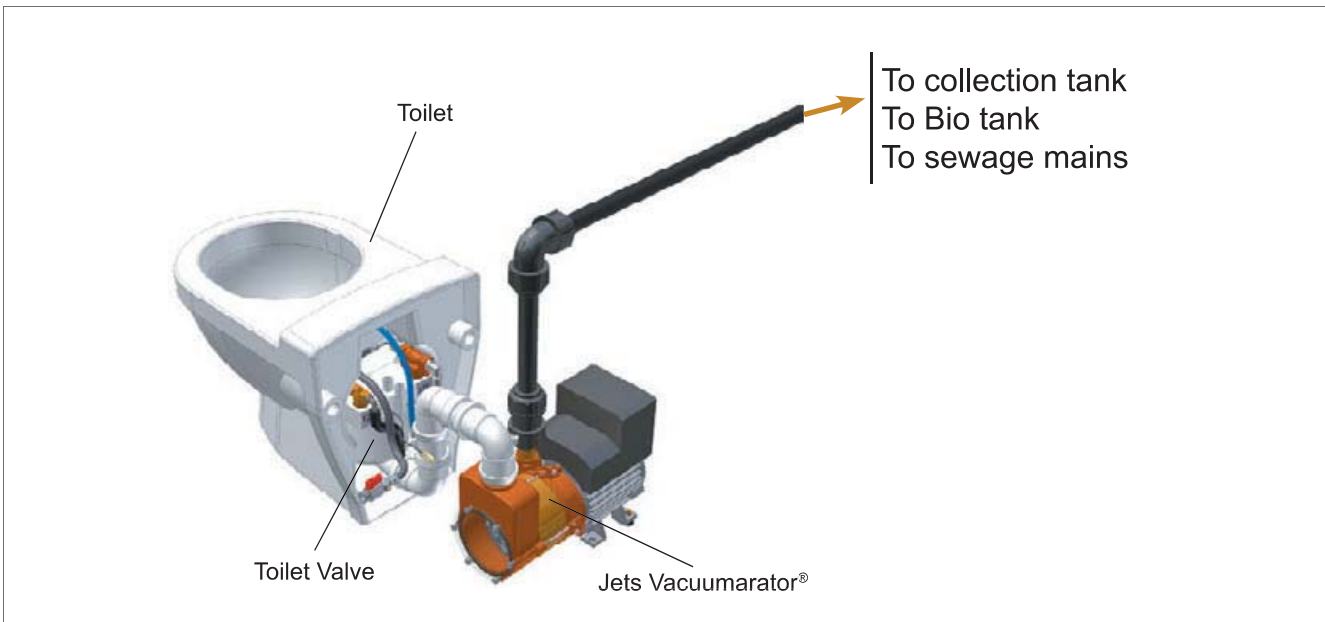
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Jets vacuum toilet system

Main principles, VOD (Vacuum On Demand)

A vacuum toilet system uses air, as opposed to water for transport of sewage. A Jets Vacuumator® evacuates air from the drain pipes automatically upon activation of the activator button. A valve opens in the toilet, and the difference in air pressure that results causes the sewage to be flushed.

Jets Vacuumator® shreds the sewage whilst pumping it onwards to a collection tank, a BIOTank or to the sewage mains. Clean water is automatically fed to the toilet as part of the cycle, ensuring good hygiene with minimum water consumption. The whole operation takes just a few seconds.



Jets vacuum toilet system

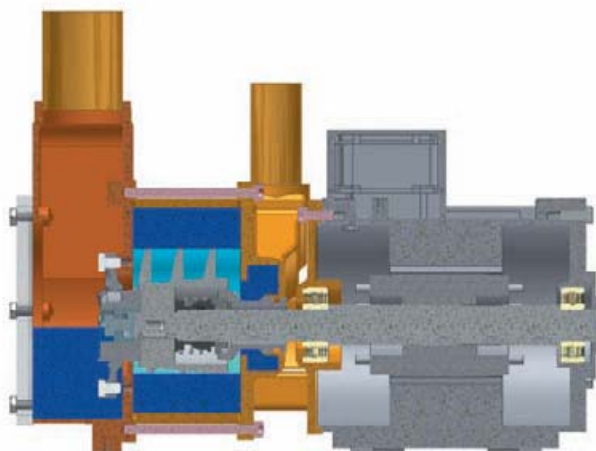
Jets vacuum toilet

The toilet consists of high quality porcelain, has the same level of comfort and is just as hygienic as a traditional flushing toilet. A vacuum toilet used 5 - 8 dl. water per flush, to keep the bowl clean. There is a valve in the toilet to facilitate discharging and flushing of the bowl.



Jets Vacuumarator®

This is the main component in our vacuum system. The Vacuumarator is a viscous pump fitted with blades. It extracts the sewage and then shreds it into tiny particles all in one operation. The Vacuumarator is equally capable of handling air and liquids, combining both elements at once. This means it can be used to produce a vacuum, or for suction and pumping of liquids.



Jets grey water tank

A grey water tank is used where the drains from sinks, showers etc are connected to the vacuum system. The waste water is fed to the tank via a gravity feed system. The tank is fitted with a drain valve connected to the vacuum system and when full, it empties automatically via the Vacuumarator. This system cannot be connected to Jets Bio.



Goods supplied

Depending on your order, you have received one of the component packs shown below. Check that everything is present and correct!



S10NT-AFV230

Toilet (wall/floor), Vacuumator 230V, controller, wall screws, activator button and wire, pipe pack and installation guide



S10NT-TFV230

Toilet (wall/floor), Vacuumator 230V, controller, wall screws, activator button and wire, pipe pack, collecting tank and installation guide



S10NT-BFV230

Toilet (wall/floor), Vacuumator 230V, controller, wall screws, activator button and wire, pipe pack, composting tank and installation guide



S10NT-AFV12

Toilet (wall/floor), Vacuumator 12V, controller, wall screws, activator button and wire, pipe pack and installation guide



S10NT-TUV12

Toilet (wall/floor), Vacuumator 12V, controller, wall screws, activator button and wire, pipe pack, collecting tank and installation guide



S10NT-BFV12

Toilet (wall/floor), Vacuumator 12V, controller, wall screws, activator button and wire, pipe pack, composting tank and installation guide



S10NT-AUV230

Toilet (wall/floor), Vacuumator 230V, controller, wall screws, activator button and wire, water container and pump, pipe pack and installation guide



S10NT-TUV230

Toilet (wall/floor), Vacuumator 230V, controller, wall screws, activator button and wire, water container and pump, pipe pack, collecting tank and installation guide



S10NT-BUV230

Toilet (wall/floor), Vacuumator 230V, controller, wall screws, activator button and wire, water container and pump, pipe pack, composting tank and installation guide



S10NT-AUV12

Toilet (wall/floor), Vacuumator 12V, controller, wall screws, activator button and wire, water container and pump, pipe pack and installation guide



S10NT-BFV12

Toilet (wall/floor), Vacuumator 12V, controller, wall screws, activator button and wire, water container and pump, pipe pack, collecting tank and installation guide



S10NT-BUV12

Toilet (wall/floor), Vacuumator 12V, controller, wall screws, activator button and wire, water container and pump, pipe pack, composting tank and installation guide

Installation, general

Vacuuarator positioning

For installation of a single toilet, the Vacuumarator should be positioned immediately behind the toilet, if possible. See next page. The pipe between the toilet and the Vacuumarator can however be extended to allow locating the Vacuumarator in an adjoining room, basement, outbuilding, etc. Protect from frost.

Vertical Lift, Vacuumarator

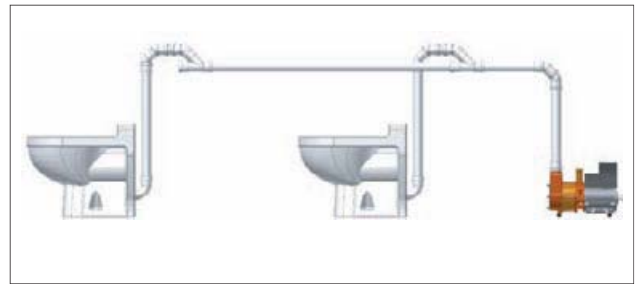
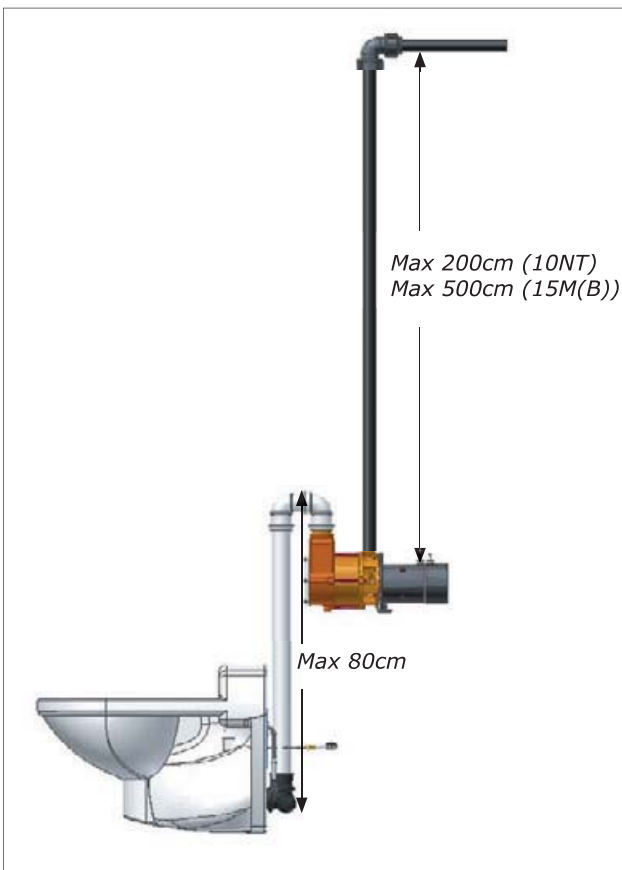
No fall (gravity feed) is necessary between toilet and Vacuumarator. The vertical lift (the max. height the pump can propel sewage) on the vacuum side for a Jets Vacuumarator is approx. 80 cm (Models 10NT and 15MB). On the pressure side (after the Vacuumarator), max. vertical lift for model 10NT is 2m. For model 15MB the max. vertical lift is 5m.

Setting running time, Vacuumarator

When the toilet is activated, the Vacuumarator starts and creates a vacuum in the pipe between toilet and Vacuumarator. In its standard configuration, this takes 1 second. If the pipe is extended, the Vacuumarator running time has to be increased by approx. 1 second for every 2 metres of pipe length. (See chapter on adjustment of running time.)

Several toilets/grey water tanks on one system

Up to 10 toilets/grey water tanks can be connected to a single Vacuumarator. In such instances, the total pipe length will determine the setting required for the Vacuumarator running time.



Installing the toilet

Vacuuarator positioning: In some instances, the Vacuumarator can be positioned in an adjoining room behind the toilet. Alternatively, a simple box can be built to house the Vacuumarator, which the wall-mounted toilet can also be attached to.

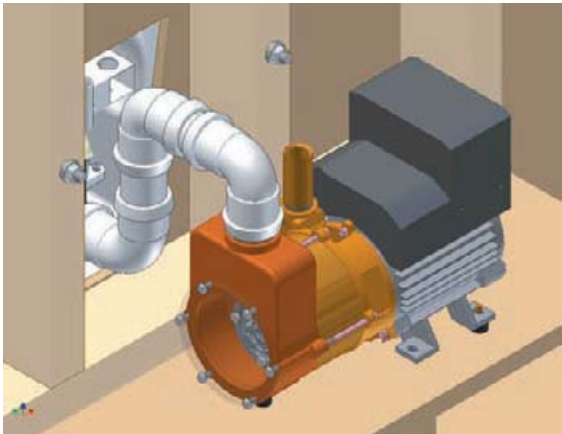
If required, the Vacuumarator can be located in a frost-proof basement.

Examples of installation methods for a toilet system are shown here.

Toilets must be installed in rooms with a drain.

Installation of wall-mounted model, Jets 59, with Vacuumarator installed in a box behind the toilet:

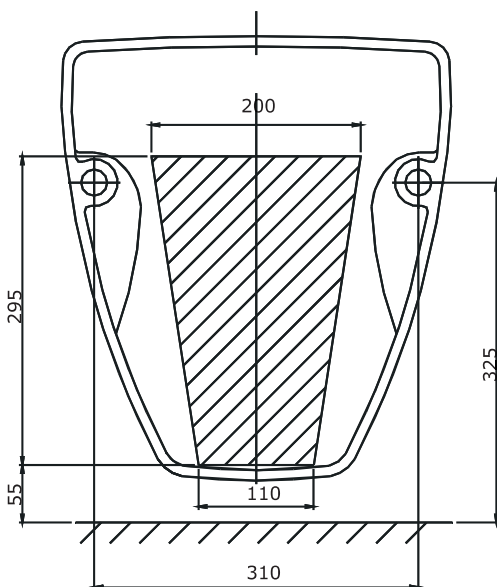
1



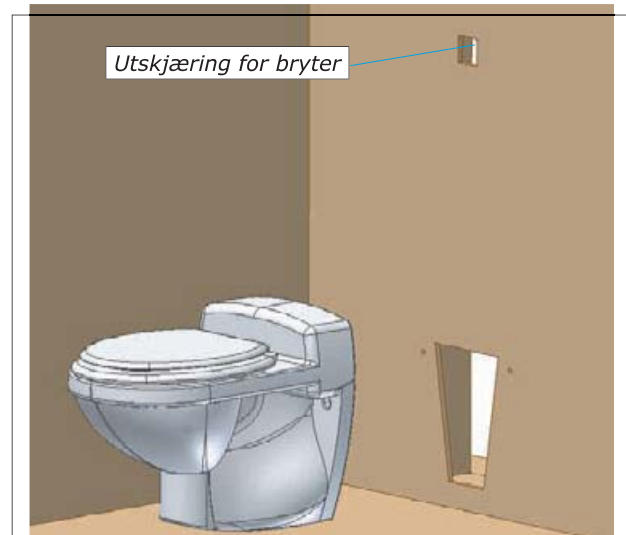
The back wall can be built of 48 x 98mm laths. The laths the toilet is to be mounted on must be placed 310mm apart. The minimum dimensions of the Vacuumarator box are 500 x 500 x 350mm (w x h x d) (d is the distance between the wall the toilet is mounted on and the wall behind the Vacuumarator).

The hole behind the toilet must be cut to the dimensions shown in the diagram below.

Drill holes for the screws as shown in the diagram.



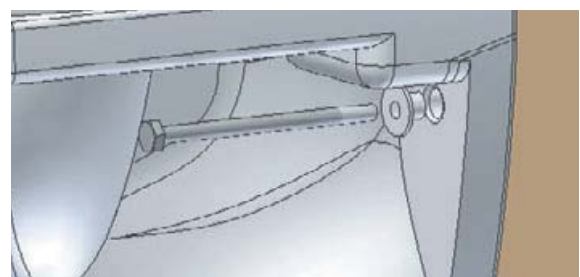
2



If the activator button is to be positioned above the toilet seat when raised, we recommend it is positioned as shown in the diagram: 900mm above the floor (measured from the centre of the button). The hole required must be 55 x 55mm.

The activator button can however be placed wherever it is most convenient.

3

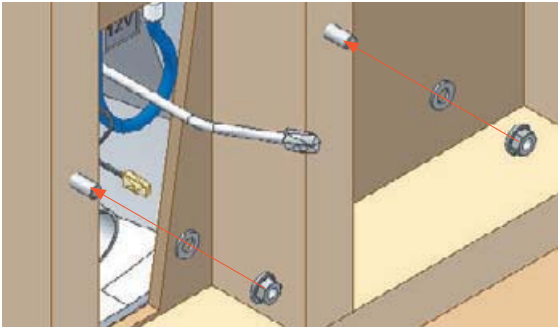


Install the eccentric plastic bushing and bolt.

NB! All toilet valves are marked 12V. This is correct regardless of the power supply voltage. Current to the toilet valves is fed from the controller.

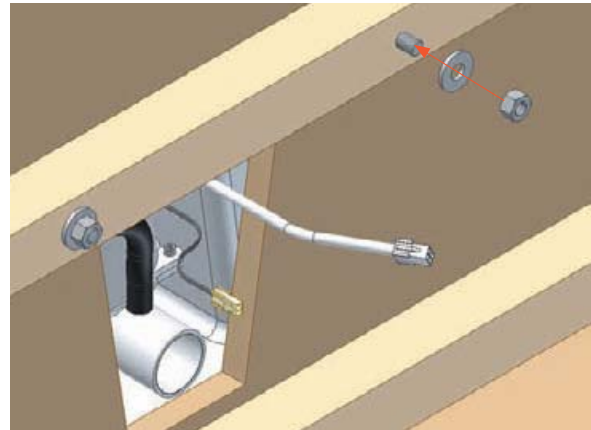
Installing the toilet

4



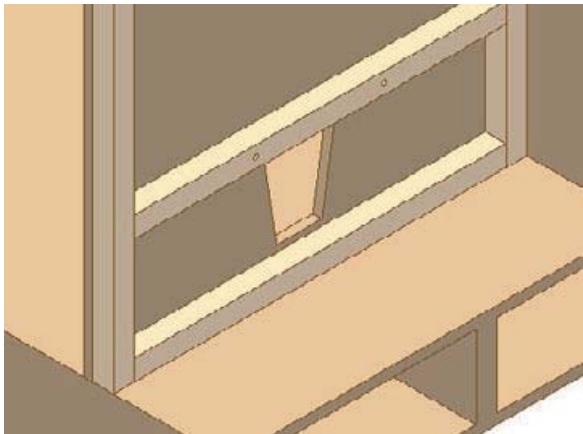
Fit the nuts and washers at the back of the toilet.

6



Fit the nuts and washers at the back of the toilet.

5



If 22mm plywood is used as a backplate, it will not be necessary to mount the toilet on laths. We do however recommend fitting a lath across the back, held in place by the bolts to securely hold the toilet in place.

Drill holes for the screws as shown in the diagram on page 7.

7

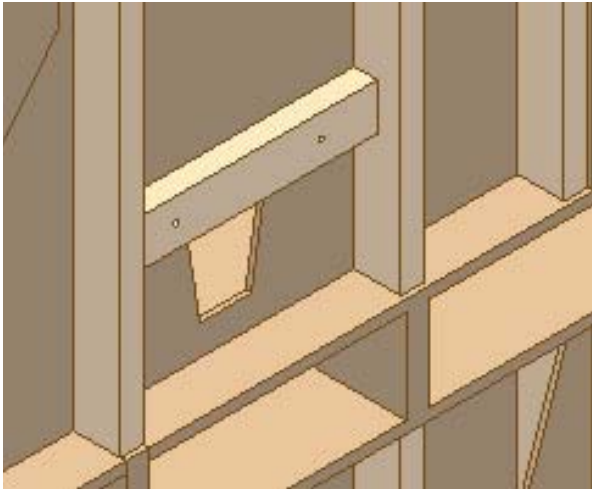


Fully installed toilet.

Installing the toilet

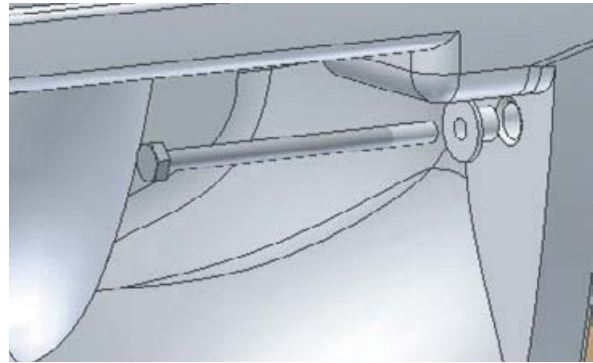
Installing wall-mounted model, Jets 59, correctly:

1



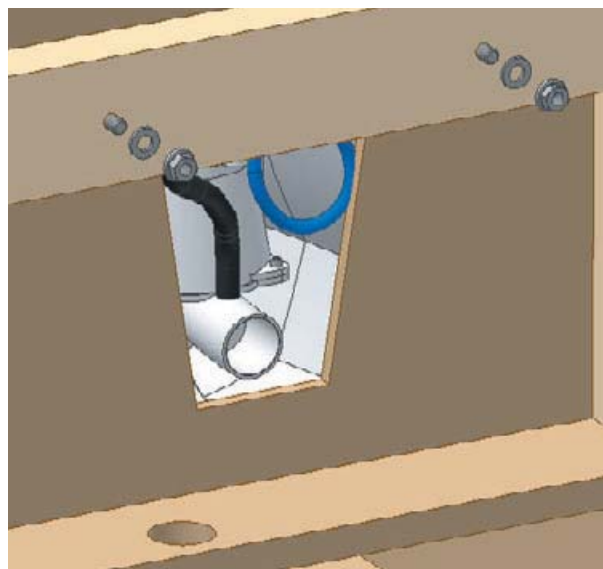
Fit a 48 x 98mm lath horizontally between the wall laths. The hole behind the toilet must be cut to the dimensions shown in the diagram on page 7.

2



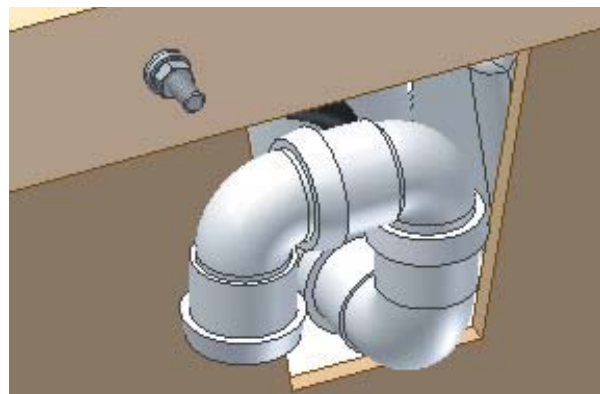
Install the eccentric plastic bushing and bolt.

3



Fit the nuts and washers at the back of the toilet.

4

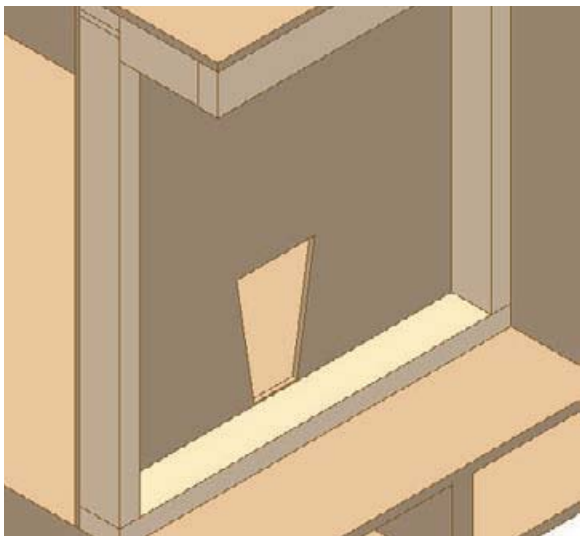


Detail of the water lock to be used. This is installed to prevent the water in the toilet seeping into the pipe system.

Installing the toilet

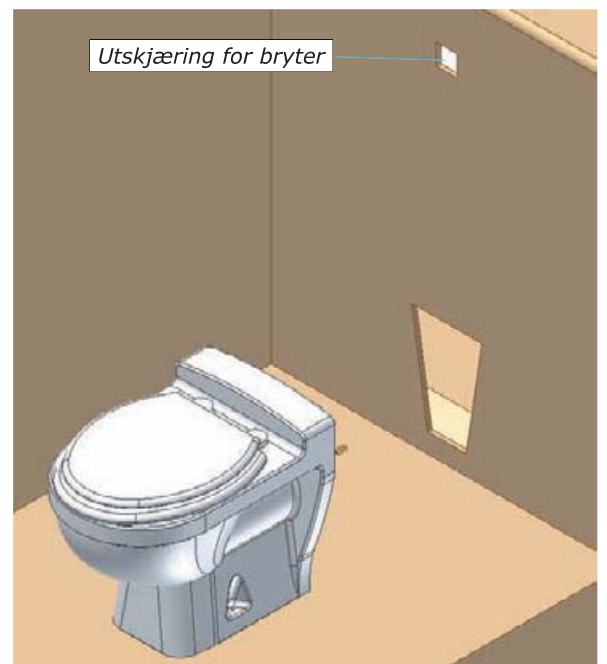
Installation of floor-mounted model, Jets 50, with Vacuumator installed in a box behind the toilet:

1



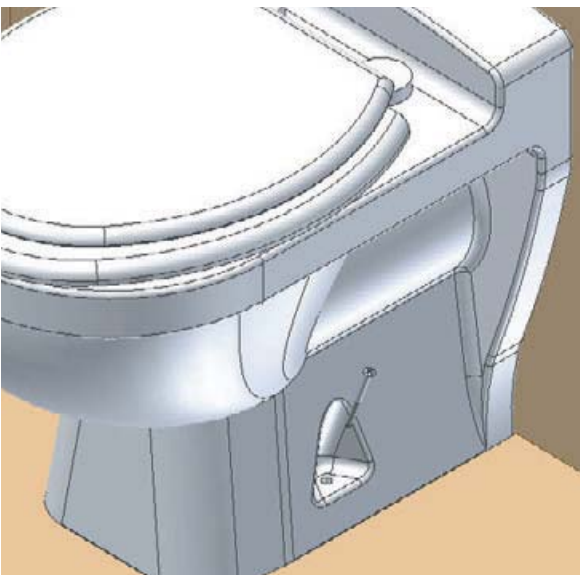
The box can be positioned as show in the diagram. Minimum box dimensions are 500 x 500 x 350mm. Installation is simpler than for the wall-mounted model, as it does not have to bear the weight of the toilet. The hole in the wall behind the toilet must be the same size as that for the 59 model.

2



Recommended hole for the switch (53 x 53mm): 900mm above the floor (measured to the centre of the switch).

3



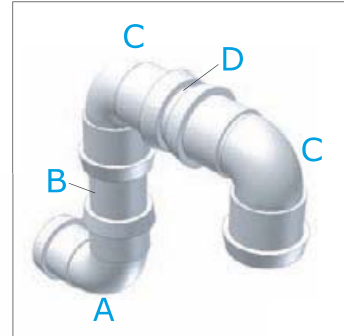
Screw the toilet securely to the floor using the screws supplied. For concrete floors, use the rawlplugs supplied.

Installing pipes

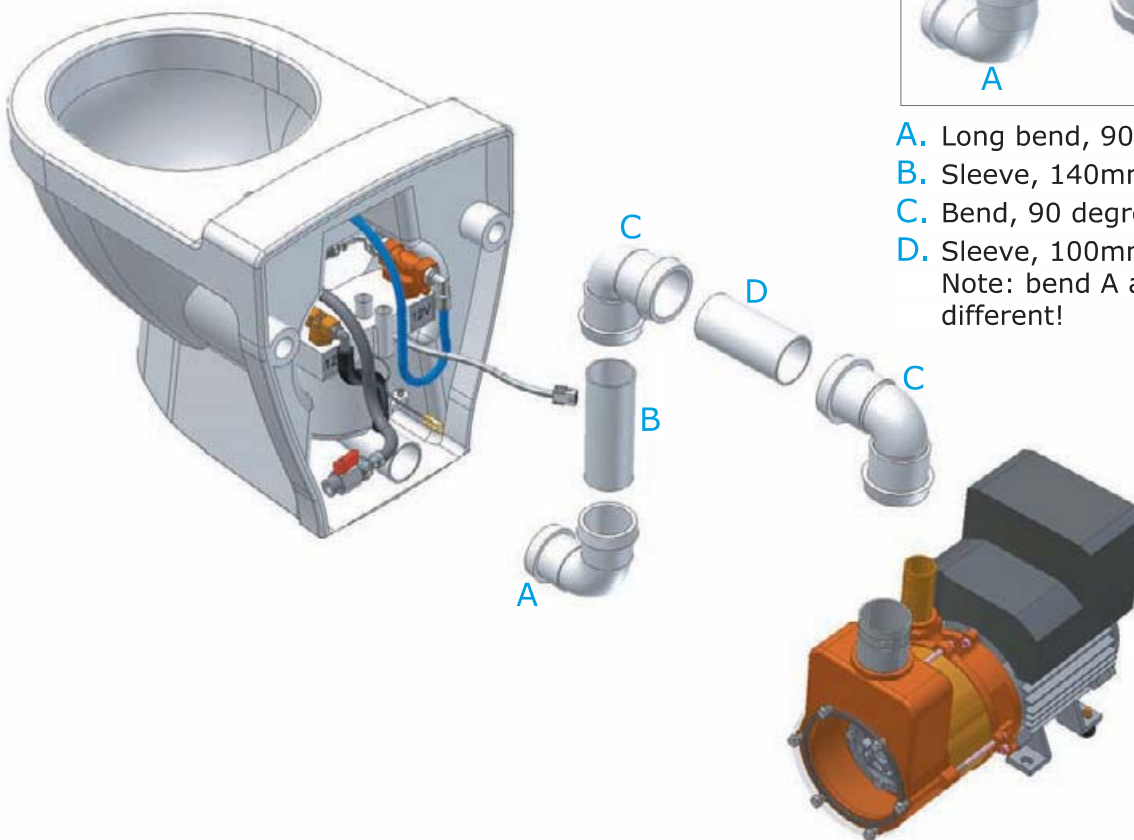
When assembled, the pipe pack supplied is the connection between the toilet and the Vacuumator when the latter is positioned immediately behind the toilet. (For greater distances 50mm PP pipes must be used. If the pipe pack is not used, ensure that a water lock is included when installing the pipes.)

When assembled, the pipe pack also acts as a water lock, and holds the Vacuumator in place. The pipe components can be joined by simply pressing them together. No form of sealant or adhesive is necessary. To make joining pipes easier, we recommend the use of soft soap, silicone spray or suchlike.

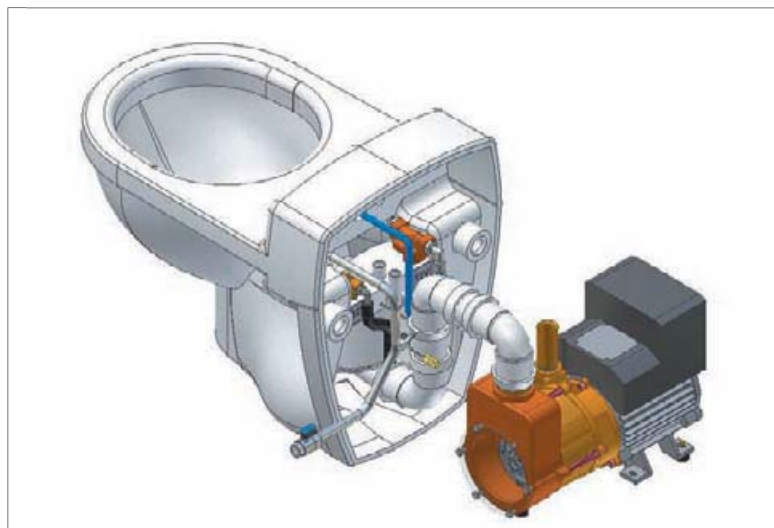
Assemble the pipe pack in accordance with these diagrams:



- A. Long bend, 90 degrees
 - B. Sleeve, 140mm
 - C. Bend, 90 degrees
 - D. Sleeve, 100mm
- Note: bend A and C are different!



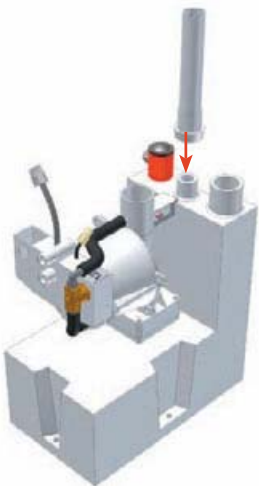
Fully assembled pipe pack:



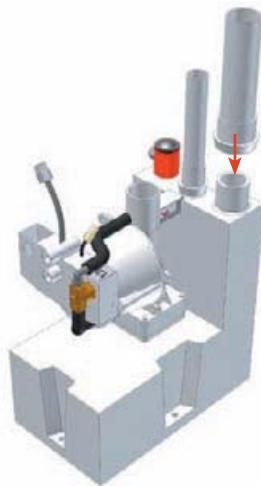
Installation of grey water tank

Grey water tanks are optional extras.

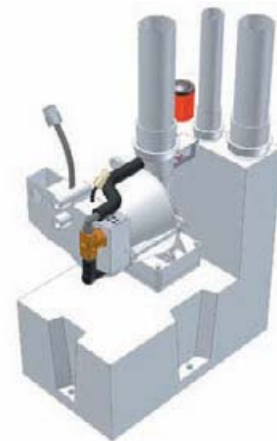
They are used to collect water from sinks, washing machines, showers etc in a vacuum system. The water is fed into the tank by gravity and they must be installed in rooms with a drain.



Pipes from sinks, drains etc are connected to the top of the tank using a single sleeve muff. Pipe diameter 32 mm.



An air vent is mounted on the tank and connected to sinks, drains etc to prevent overflow. Pipe diameter 50mm.



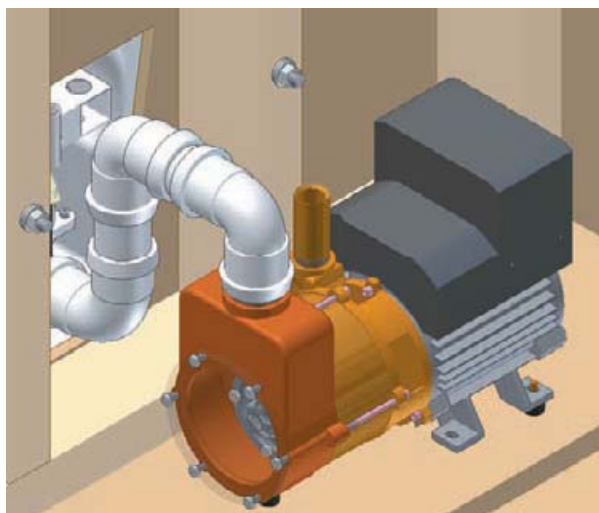
Pipe from the Vacuumator (50mm) connected to the vacuum valve on the tank. Ensure all hose clips are screwed tightly.

If required, the feed pipe and air vent can be switched.

Installation of Vacuumarator

The Vacuumarator must be positioned on a flat surface. We recommend it is positioned in a room with a drain. Ensure it is protected from frost if it is to be used in the winter. The Vacuumarator does not have to be secured to the floor if placed immediately behind the toilet. The rubber feet and pipe pack will provide sufficient stability.

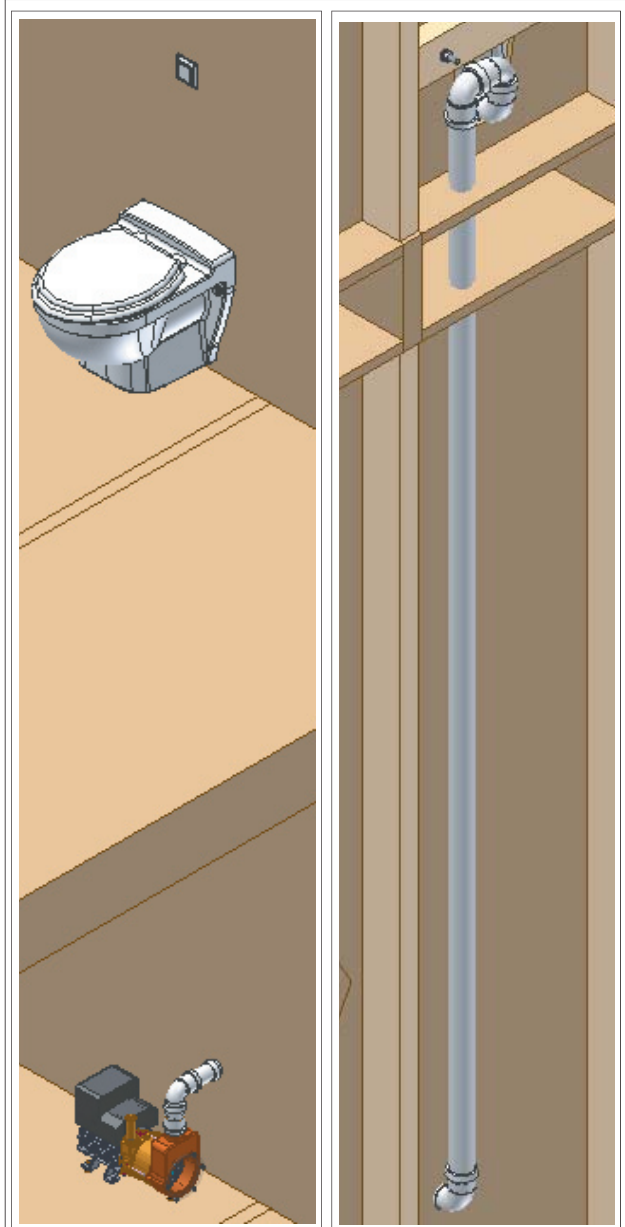
Positioning immediately behind the toilet:



In this instance, the Vacuumarator is positioned immediately behind the toilet, which allows installation before the toilet is installed.

The toilet and pump must be installed using the pipe pack supplied and in accordance with previous instructions.

Positioning of Vacuumarator on the floor below:

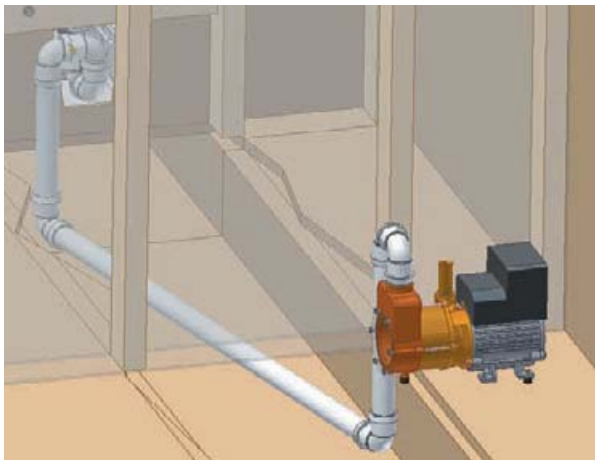


The Vacuumarator can be positioned on the floor below by installing the pipe through and down inside the wall and out again to the Vacuumarator, which does not necessarily have to stand on the floor. If required, it can be positioned on a strong shelf just under the ceiling or even in another room, e.g. a heated outbuilding.

Wherever it is located, a water lock must be installed immediately behind the toilet. If not, water may seep out of the toilet bowl, leaving it empty when not in use.

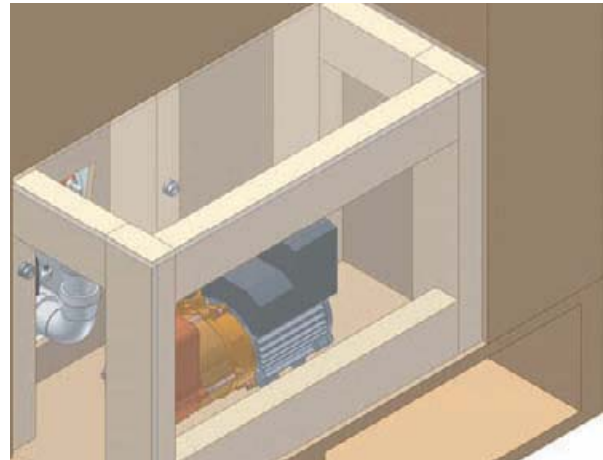
Installation of Vacuumator

Positioning the Vacuumator in another room on the same floor:



The diagram shows an example of positioning the Vacuumator in another room on the same floor. Ensure there is sufficient space for the water lock. The Vacuumator can be positioned wherever desired in the building, as long as installation is performed in close accordance with the instructions in the chapter on piping. The dimension of the pipes between the toilet and Vacuumator must always be 50mm.

Positioning the Vacuumator behind the toilet wall:



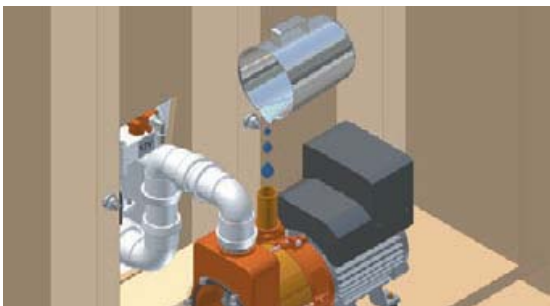
The diagram shows an example of positioning the Vacuumator in an adjoining room behind the toilet wall. In such instances, only the standard pipe pack supplied can be used.

NB!

Where the distance between toilet and Vacuumator is increased beyond that of the pipe pack supplied and flexible hoses are used the Vacuumator must be screwed to the floor. If PP pipes and clips are used, this will not be necessary.

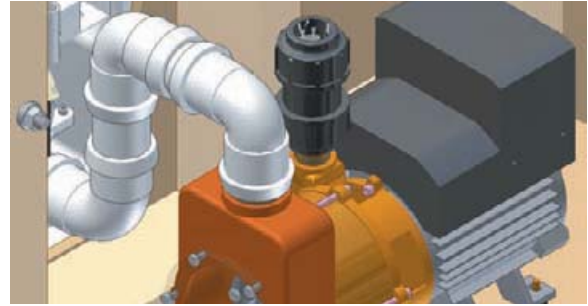
See chapter "Additional toilets, extended piping on vacuum side" for piping.

For connection of drain:



Fill Vacuumator with water.

2

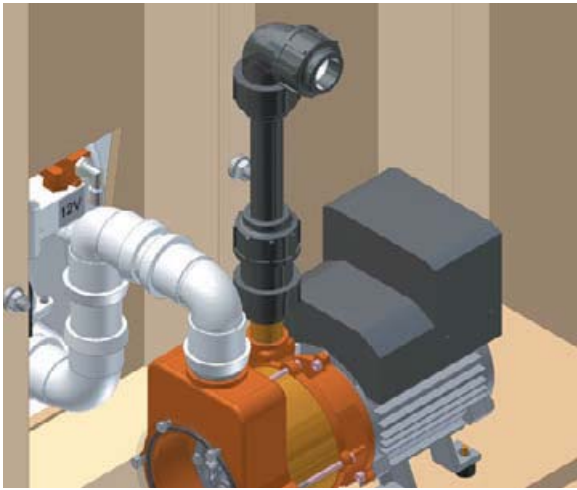


If the drain pipe from the Vacuumator is to go upwards, a 32mm diameter straight clamp ring connector will be required. See chapter on clamp ring assembly.

Installation of Vacuumator

Alternative drain:

1



Install a straight 20 cm muff (Ø32 mm) vertically from the Vacuumator leading to a Ø32 mm elbowed compression joint. This ensures that Vacuumator is never empty of water.

3



If pipe vertical lift is to exceed 2 metres from the Vacuumator, a non-return valve will be required. This must be fitted directly onto the 32mm sleeve on the Vacuumator.

NB! High-pressure pipes must be used at the outlet of the Vacuumator!

Installation of clamp ring assembly

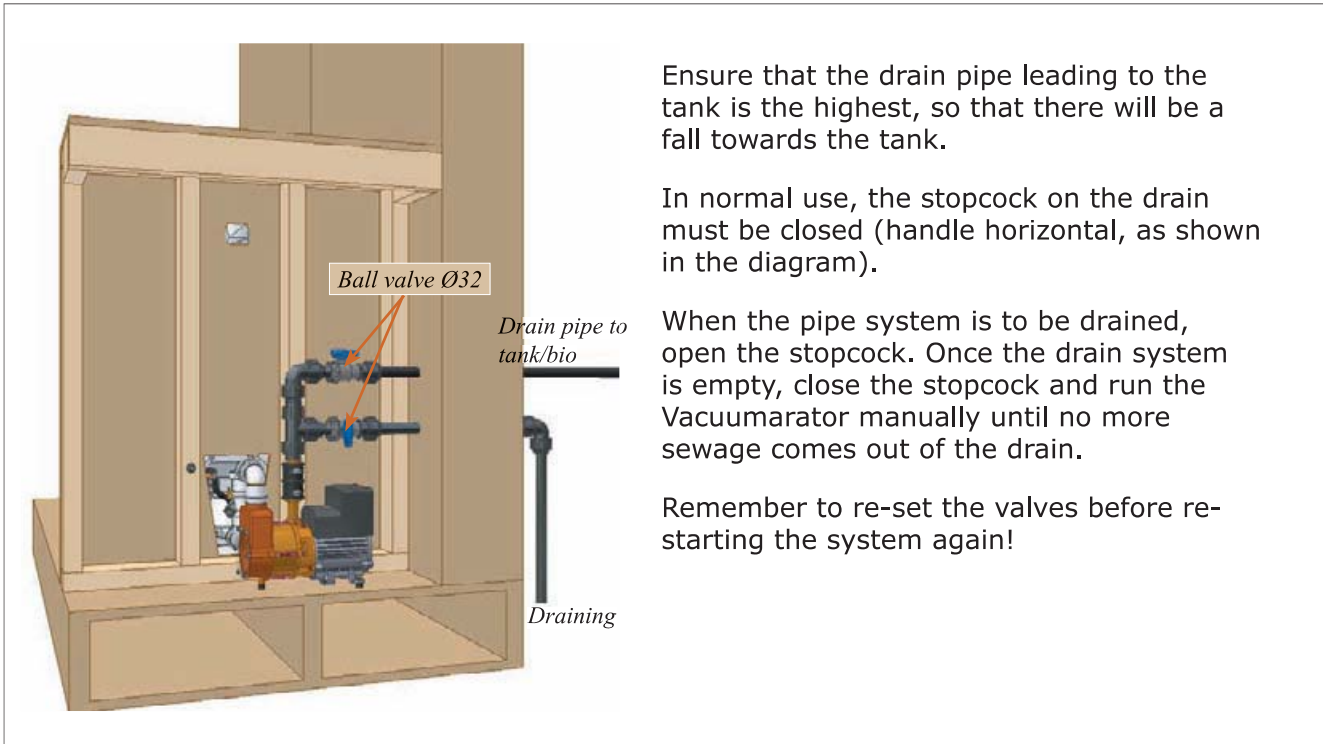


Place the O-ring on the end of the pipe and the clamp ring immediately above. Press the body into the pipe with the O-ring, clamp ring and collar in place. Screw the collar tightly into place.

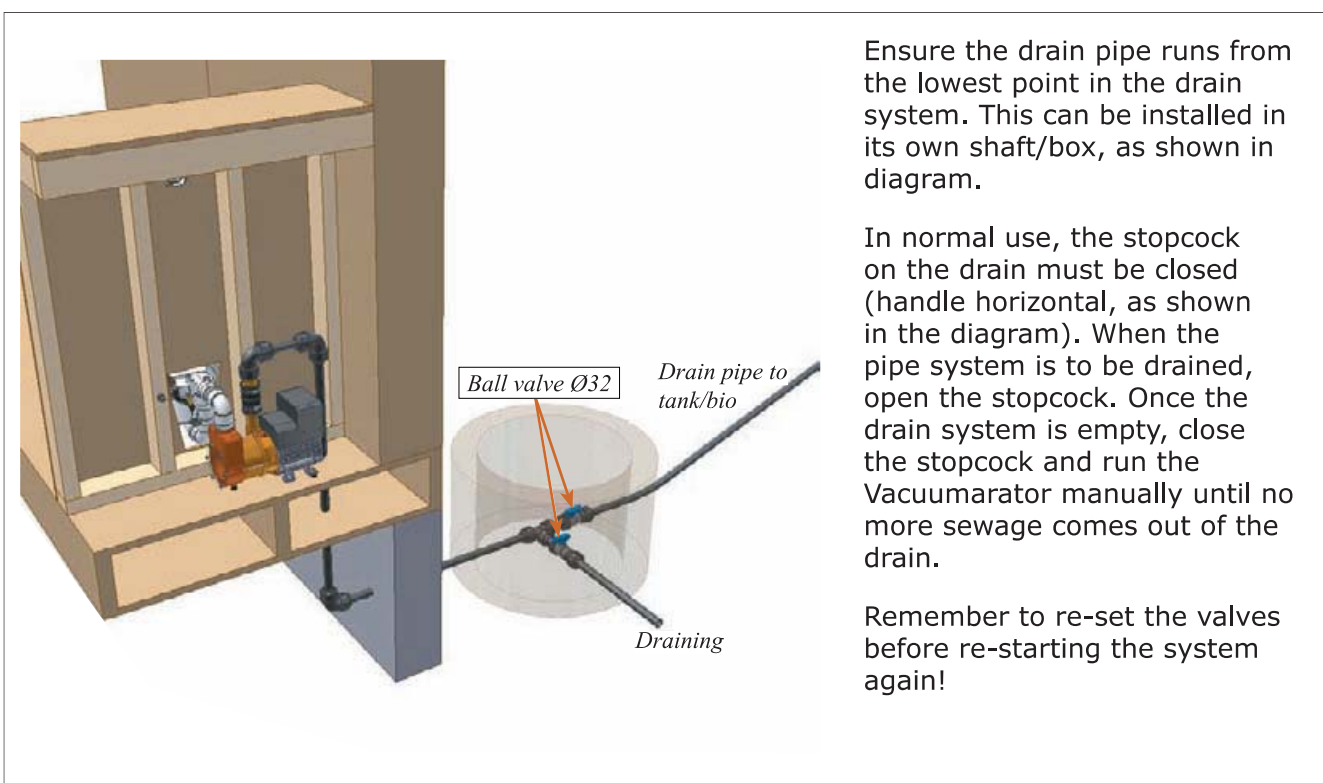
Alternatives for raised-level tank

Where a collecting- or composting tank is positioned on a higher level than the Vacuumator, a non-return valve must always be fitted to the Vacuumator drain pipe. Contact your supplier for recommendation of valve type. For maintenance of the non-return valve, an overflow valve must be fitted to facilitate draining the pipe system of sewage before performing maintenance.

Alternative 1: Drain pipe directly through wall.



Alternative 2: Drain pipe through floor.



Installation of activator button



Before the switch can be connected, remove the button from the cover. Insert a screwdriver between the cover and the button and lever the button off. Remove the button, collar, cover and casing. The wire terminal screws are concealed under the rubber cover over the switch.

Connecting

Connect the red wire to L and the blue wire to til Δ on the switch. Ensure all connections are screwed tightly.

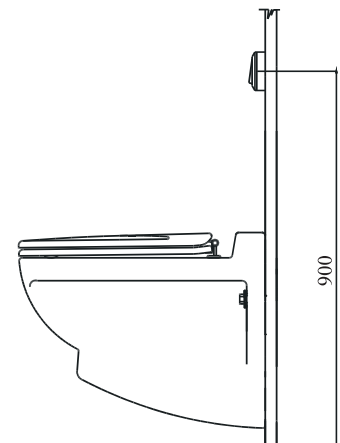
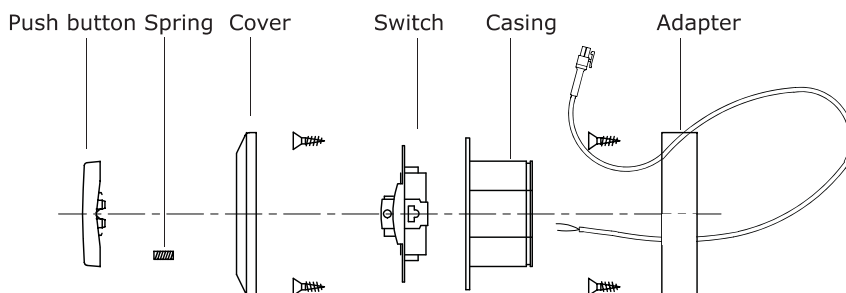
Installation

Mark the position of the button (Height must be the same for both toilet models). Cut a hole in the wall 55mm x 55mm (w x h) and insert the casing. Press the switch into place and secure it to the wall. Press the cover into place. Insert the spring in the push button and press into place on the switch. Note that the arrow symbol on the inside of the push button must point to the spring and downwards.

Press the push button into place.

The activator button is supplied with an adapter that facilitates installation on the surface of a wall, without having to drill holes.

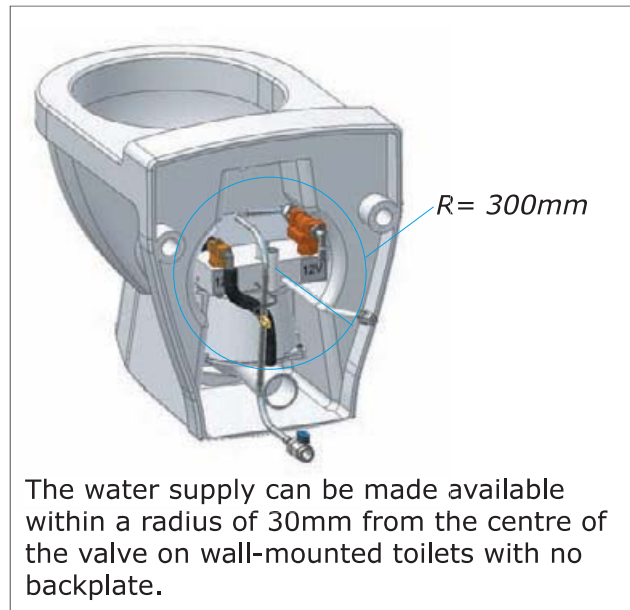
Single activator button:



Water connection, both models

Water pressure:

The water supply must be connected to the back of the wall on which the toilet is mounted. Connect the water supply to the hose connected to the toilet valve. The connector is a 1/2" BSP standard connector. Water pressure must be min. 1.8 kp.



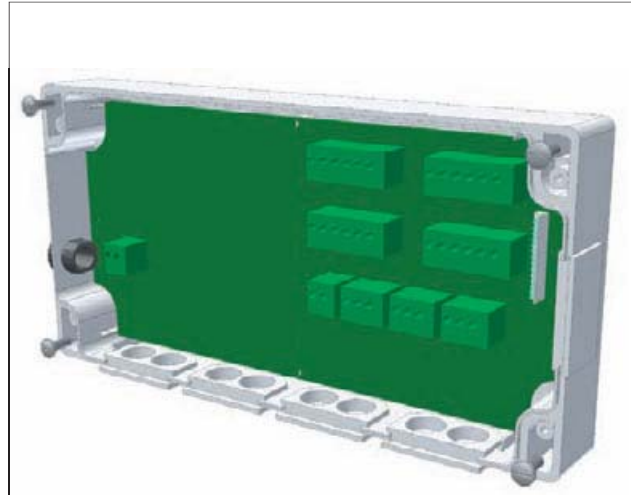
Installation of VTS controller

VTS controller

The VTS controller controls toilet discharging, start/stop of Vacuumator etc. The diagram here shows the VTS controller for 230V systems. All VTS controllers are supplied pre-programmed and configured for 1 toilet connected. (See chapter on setting controller.) Distance to the Vacuumator must be max. 2m. Otherwise the panel can be positioned anywhere as long as it is easily accessible for programming. Usually, it is installed in the Vacuumator box.



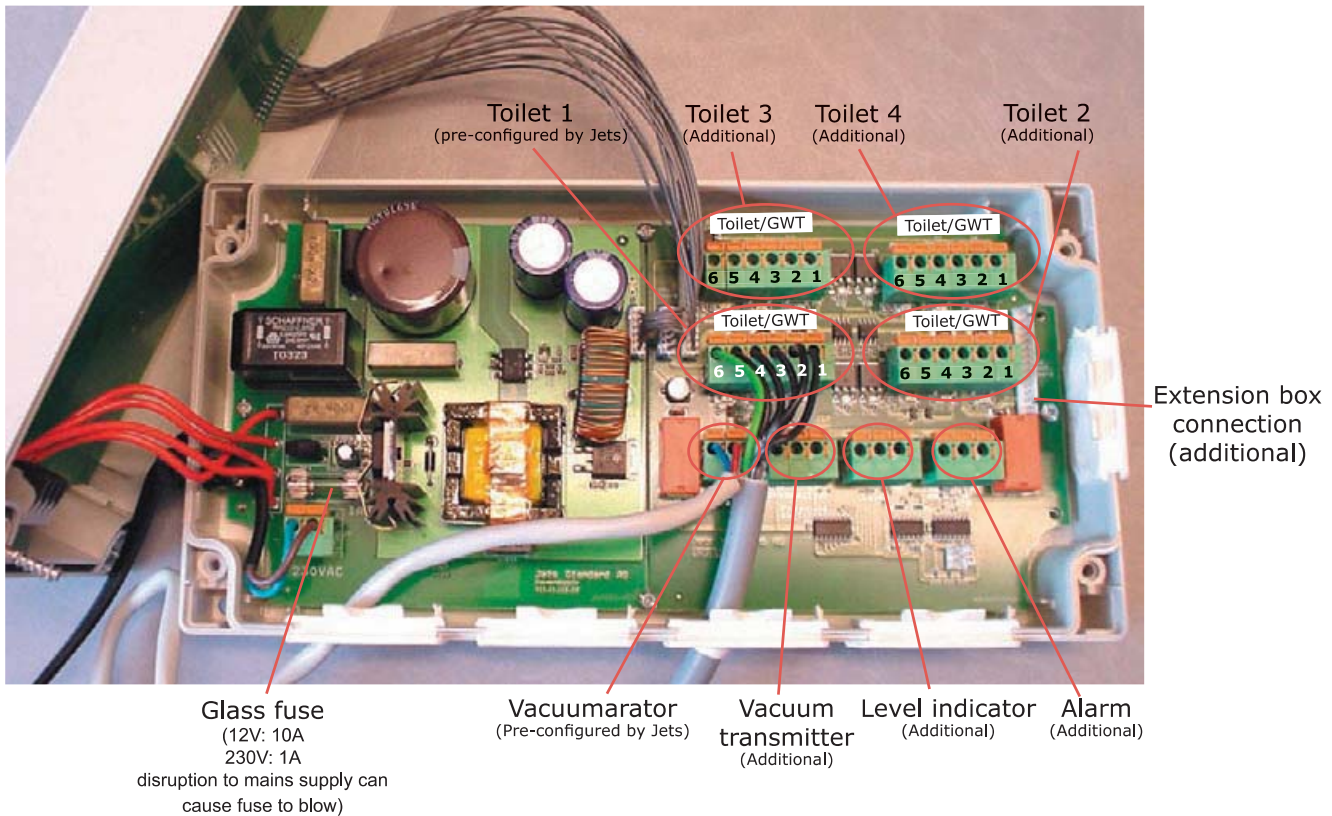
Use a screwdriver to remove the two small strips on the top of the panel to gain access to the four lock screws. Remove these.



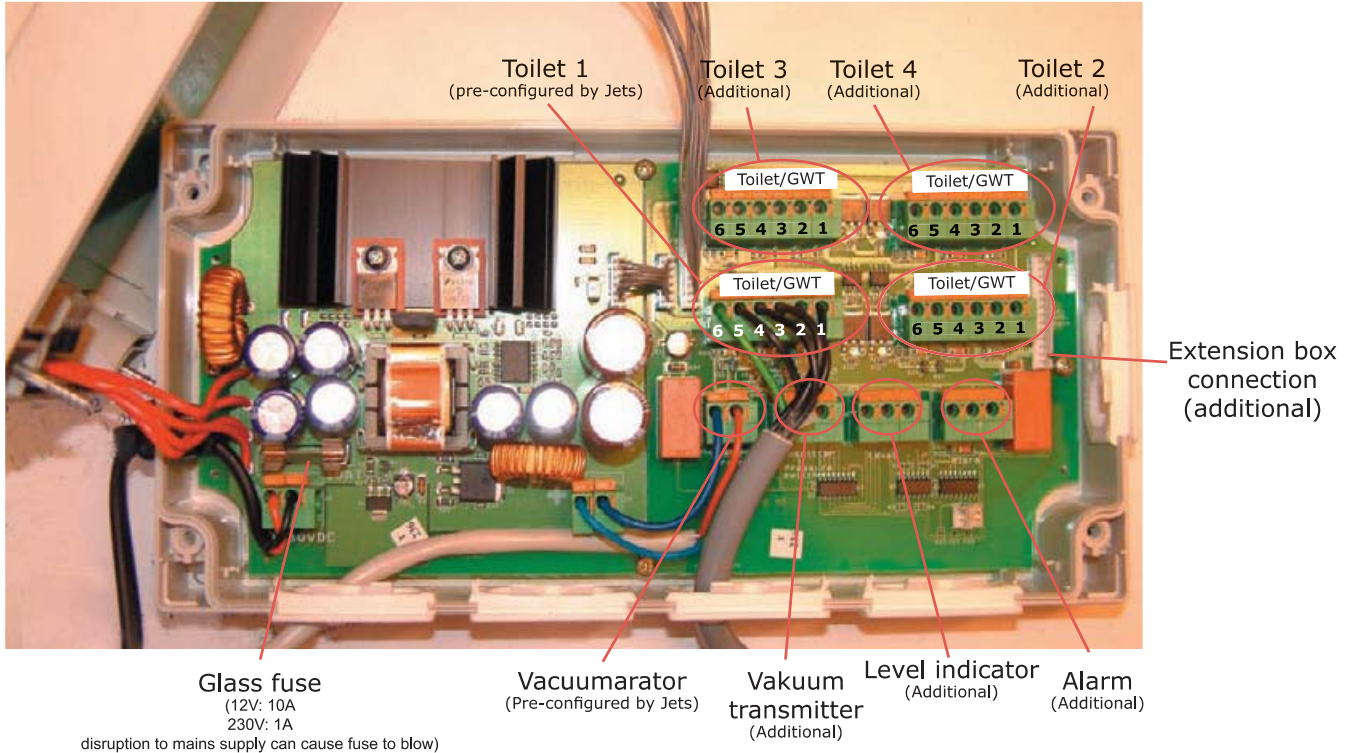
Lift off the lid to access the holes in the bottom of the panel. Screw the panel securely to the wall, replace the lid and tighten the screws.

Electrical connections

VTS controller, 230V



VTS-Controller, 12V:

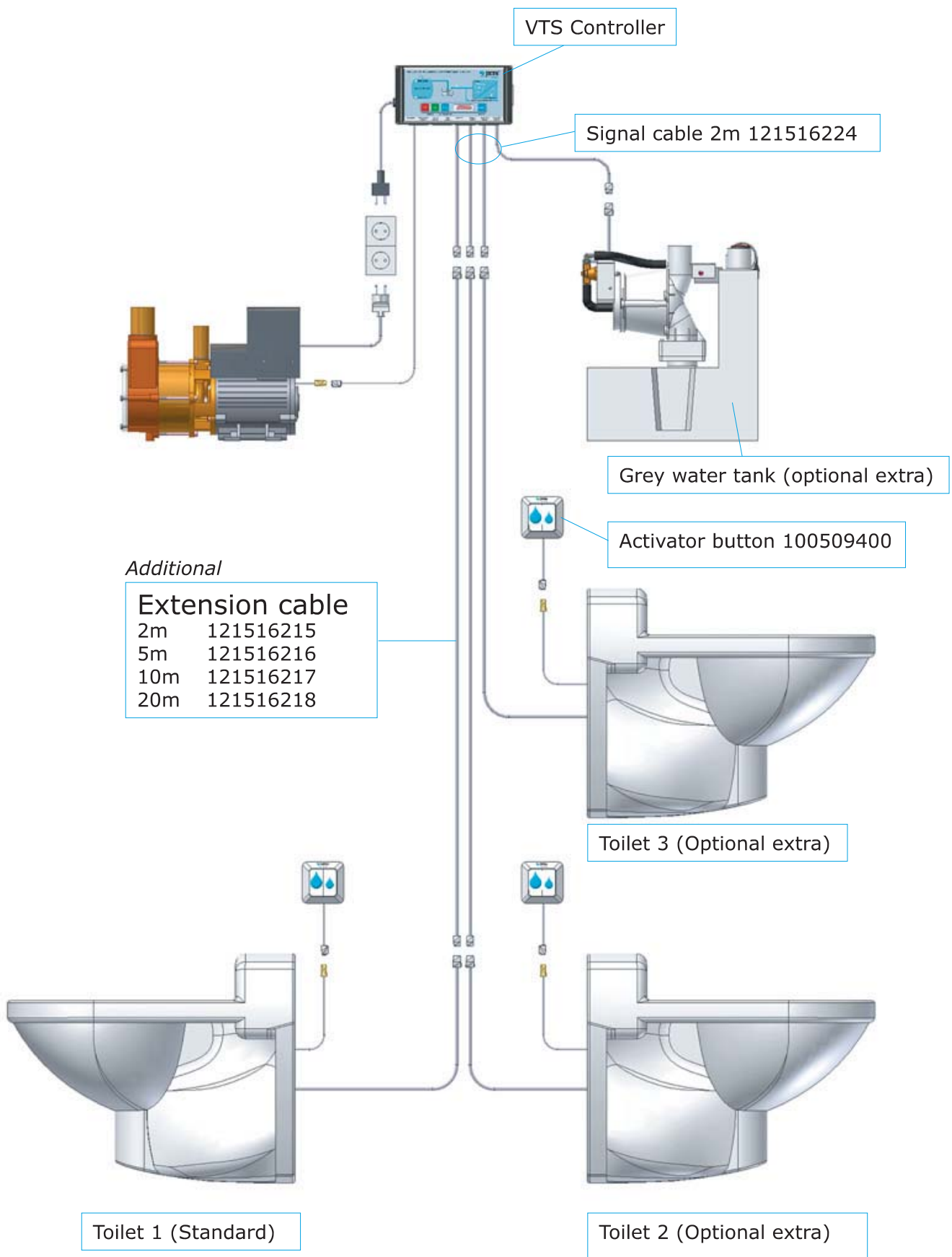


To connect wires: Press the orange plastic clips in one-by-one using a screwdriver, and hold them in whilst inserting wires. When released, the wires will be gripped securely.

An extension box for 5-10 toilets/grey water tanks can be connected as shown in the diagram above.

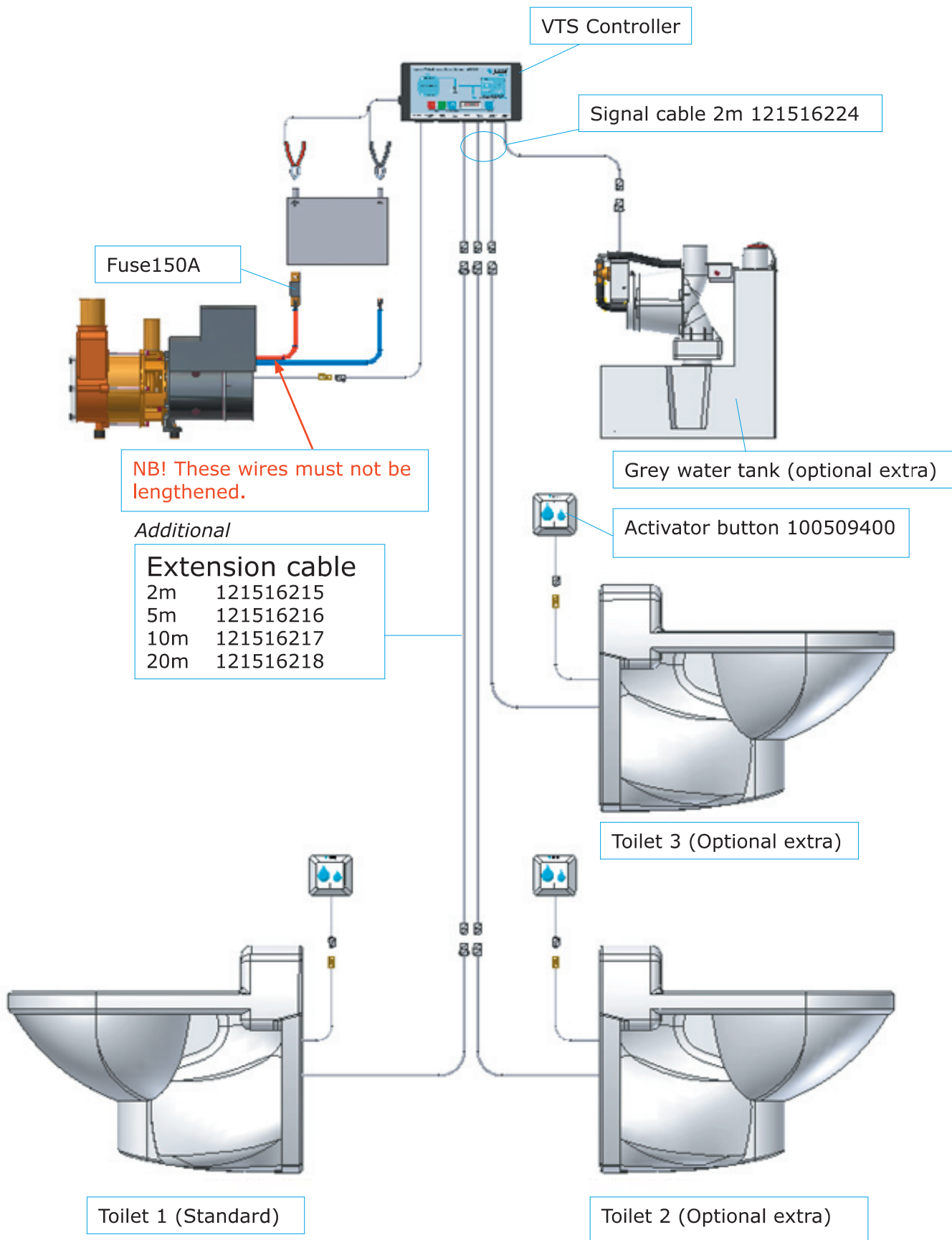
Electrical connections

Electrical connections for VTS controller, AC 230V



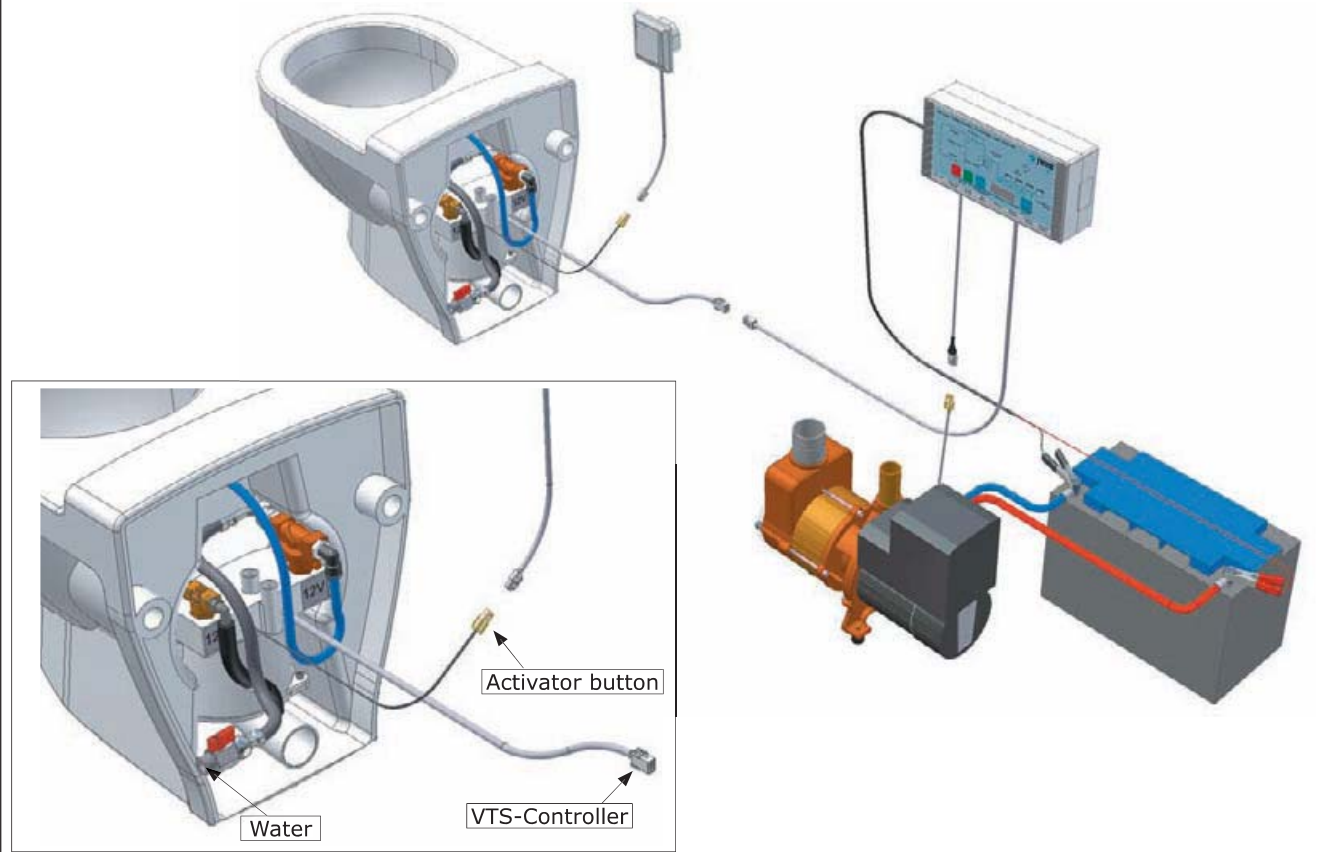
Electrical connections

Electrical connections for VTS controller, DC 12V

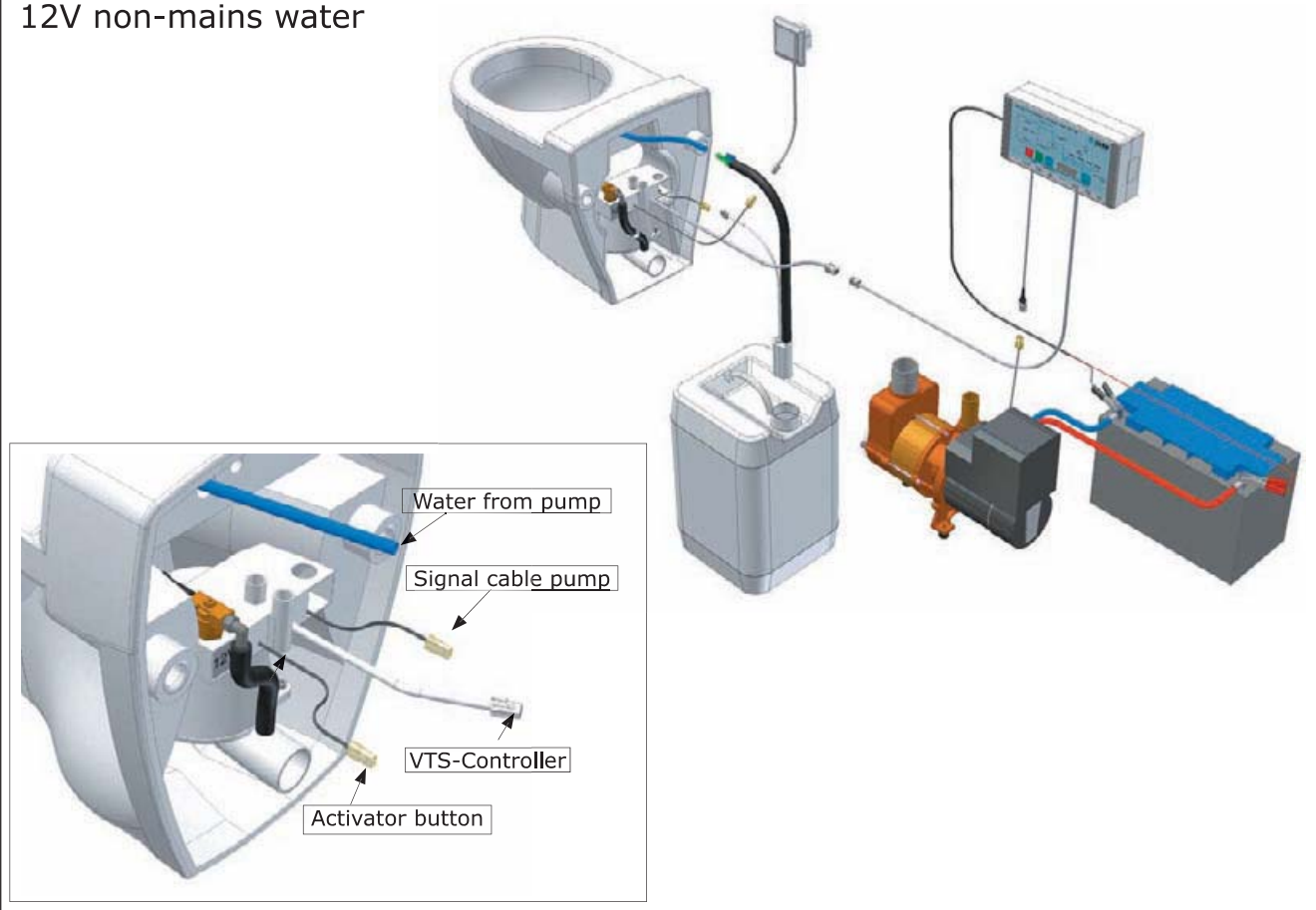


Connecting water and electricity

12V mains water

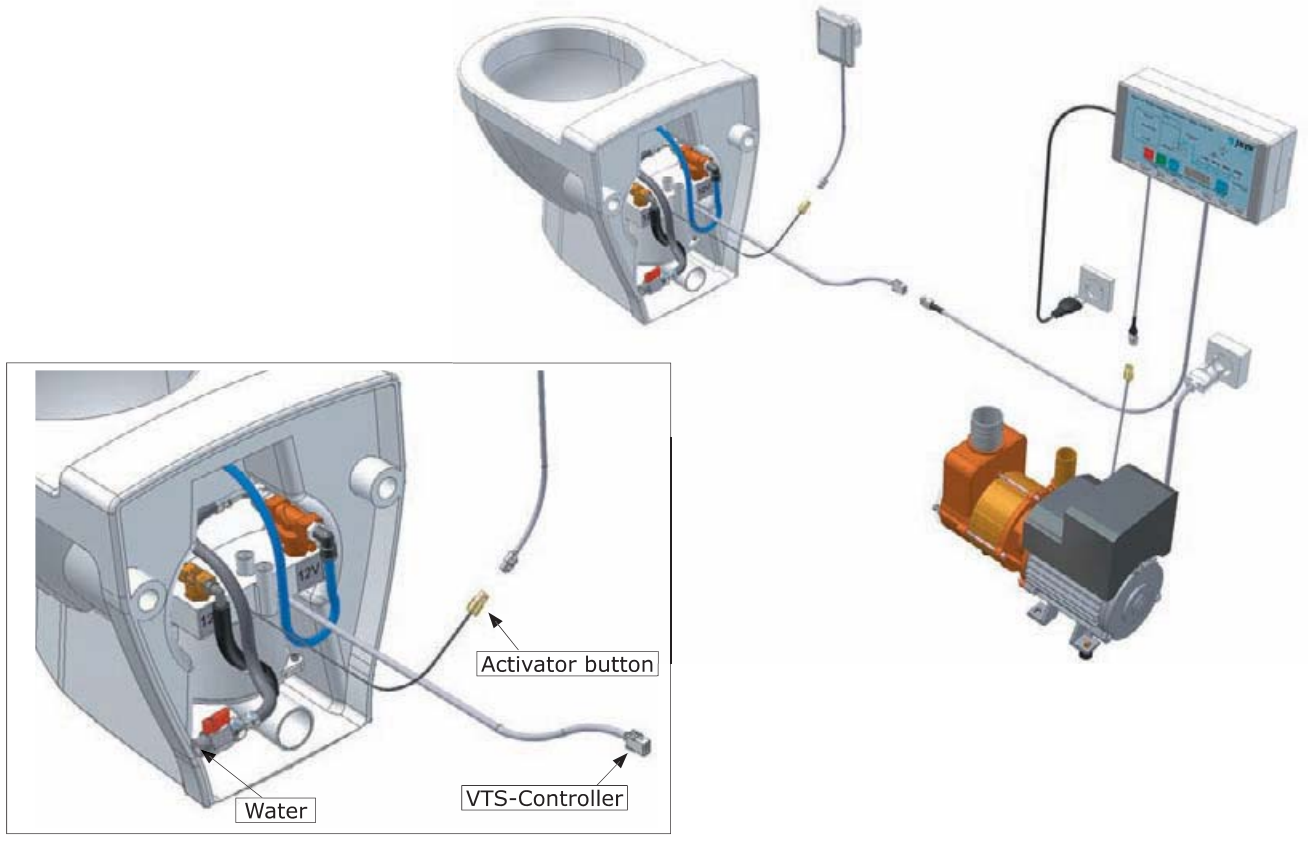


12V non-mains water

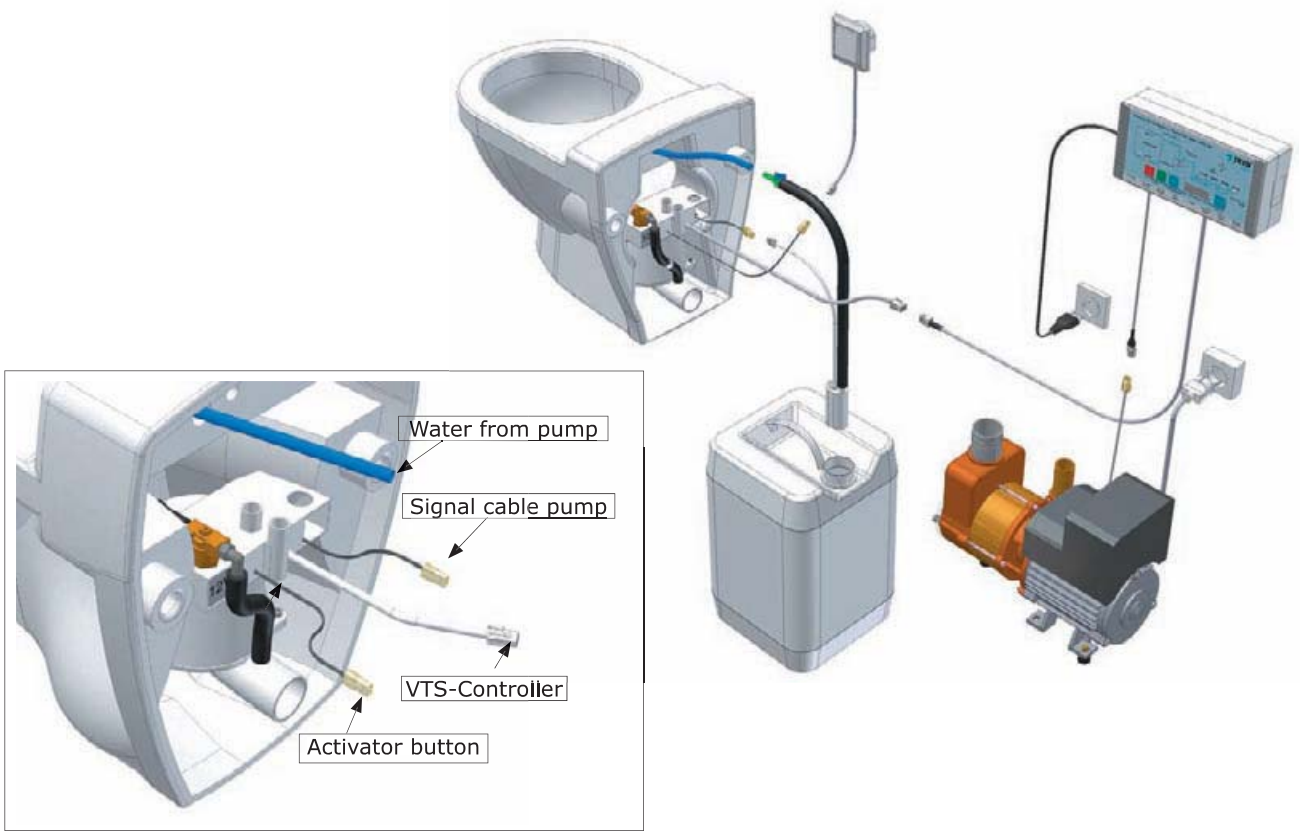


Connecting water and electricity

230V mains water



230V non-mains water



Calculation of 12V battery requirement

Energy requirement for a 24 hour period is measured in Watt hours (Wh).
 Jets Vacuumator® 10NT has a 900W motor which runs for 5 seconds per flush.

Energy consumption per flush:
 900W : 3600secs x 5secs = 1.25Wh

Daily energy consumption per person:
 1.25Wh x 6 = 7.5Wh
 (The average person goes to the toilet 6 times in 24 hours).

Total daily energy consumption:
 7.5Wh x number of persons
 The amount of electrical voltage in a battery is expressed in ampere hours (Ah), used in our calculation. We have to convert daily energy requirements from Watt hours (Wh) to ampere hours (Ah):
 7.5Wh: 12V = 0.625Ah. This is the daily voltage requirement per person.
 By multiplying daily voltage requirements

by the number of persons and days, we can arrive at the voltage requirement for a given period.

Weekend, 4 persons: $0,625Ah \times 3 \times 4 = 7,5Ah$
 Week, 4 persons: $0,625Ah \times 7 \times 4 = 17,5Ah$
 Formula for any period: $0,625Ah \times _ \times _ = ____Ah$

To establish whether there is sufficient capacity in an existing battery bank, the output of all equipment connected to it is totalled.

Maximum 70% use of battery capacity is recommended. A 125Ah battery therefore has approx. 85Ah available for use.

Example:

Antall	Product	Effect (W)	Time in use (h)	Energy requirement (Wh)
2	Reading lights	10W	7h	140Wh
1	Light armature (2 x 8W)	16W	1h	16Wh
4	Bedside lamps (spot)	10W	1h	40Wh
1	Colour TV	40W	2h	80Wh
1	Water pump	40W	30min	20Wh
1	Jets Vacuum toilet(4 pers)	900W	2 min (5 sec, 6 flushes, 4 pers)	30Wh
Daily energy requirement:				326Wh

Battery requirement:

Daily use:
 326Wh : 12V = 27Ah

Weekend:
 27Ah x 3days = 81Ah
 81Ah : 85Ah = 0,95 ≈ 1 battery á 125Ah

One week:
 27Ah x 7days = 189Ah
 189Ah : 85Ah = 2,22 ≈ 3 battery á 125Ah

Calculation for solar cell panel:

A solar cell panel has to charge the batteries up for the next operation. It can inform you how much electricity you have used when you leave a holiday home. The question is how long it will be until your next visit and at what time of year.

Jets Standard AS recommends you consult the manufacturers of such products to find the best solution.

Installation of collection tank

Jets in a closed system is a solution for the local collection of sewage with periodic discharging to an external sewage mains network. The drain in such instances goes to a well-ventilated tank positioned either behind the toilet, or underground. The entire system of pipes and tank is closed; nothing can come in to or get out of the system. The size of the tank can vary, but the standard volume is 900

litres.

The size of the tank depends on the frequency of emptying and how often the toilet is used. An average person goes to the toilet 6 times in a 24 hour period. With consumption per flush of 0.5 litres and 3 persons in the house, a standard tank will hold around 50 days consumption. A tank of 3,000 litres will only need emptying after 150 days of use.

Tank size	Toilet uses	Length	Diameter	Total height	Weight
900ltr	900	1240mm	1100mm	1195mm	53kg
3000ltr	3000	2150mm	1600mm	1665mm	120kg
6000ltr	6000	3580mm	1600mm	1665mm	240kg

The drain from the Vacuumator goes to a vented sealed tank emptied when required by a slurry tanker. The tank can be installed at the back of the toilet or underground. Install the air vent as shown on the diagram. The extension pipe for the vent can be cut to length depending on how far above the tank it is to rise. The pipe can also be extended.



The drain pipe from the Vacuumator must be connected to the collecting tank as shown on the diagram.

If a flexible drain pipe is used, it must be positioned on the tank spigot and secured with a hose clip.

Drain pipes must be secured using a 32mm clamp ring connector.

If an outdoor or underground tank and the drain pipe to it cannot be protected from frost, we recommend installation of a heating cable on the pipe.

Jets supplies tanks in three different sizes:

- 900 litre
- 1300 litre
- 3,000 litre
- 6,000 litre

The distance between the Vacuumator (10NT) and the tank can be up to 30 metres.

Max. vertical lift: 2 metres. For a Vacuumator 15MB, the tank distance can be increased to max. 100 metres and vertical lift to max. 5 metres. For longer distances or higher vertical lifts, please contact your supplier.

Press the seal into place on the tank.



Press the pipe into place in the seal



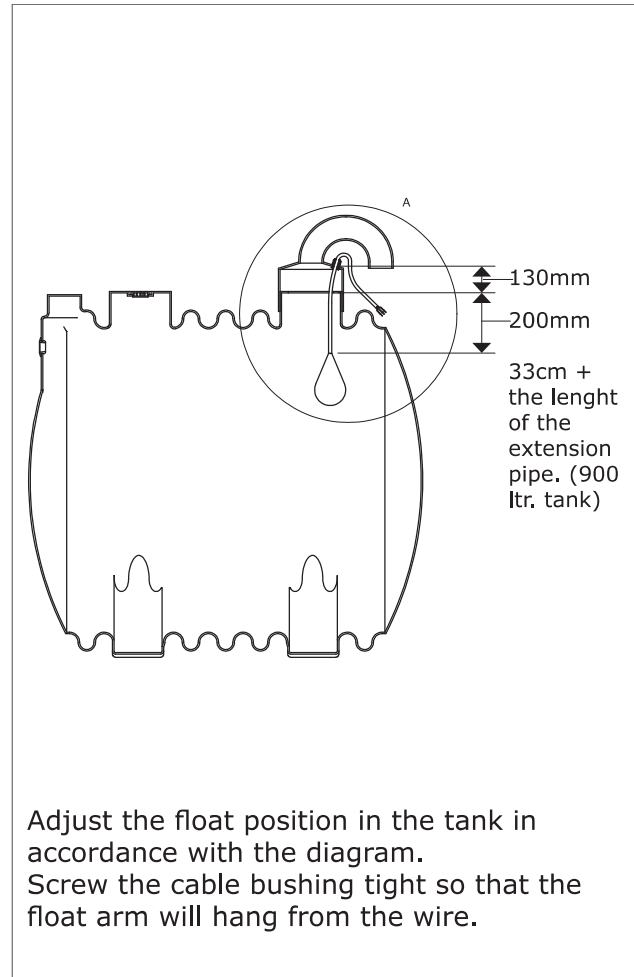
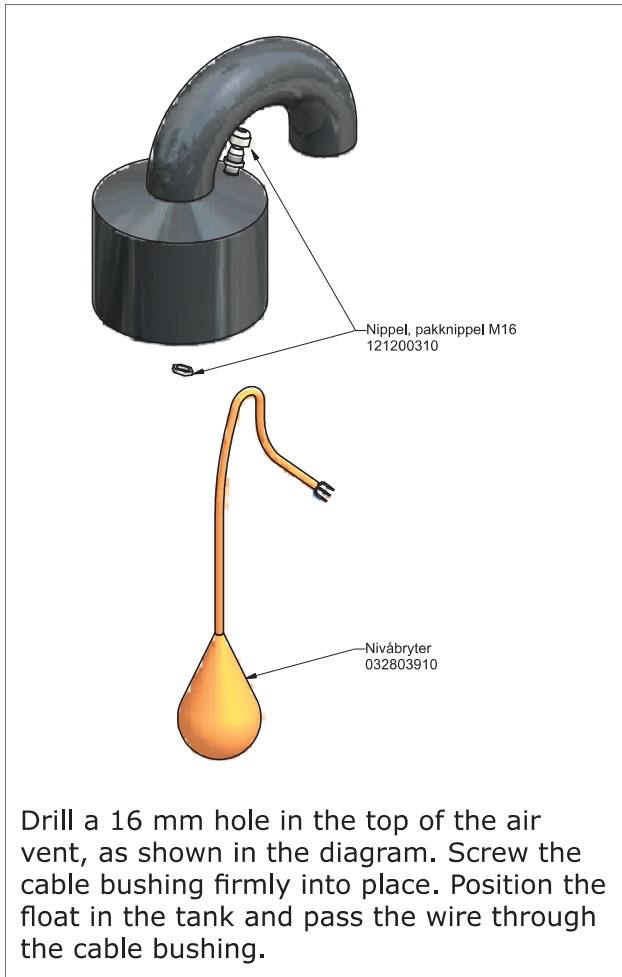
Level measurement in tank

Optional extra

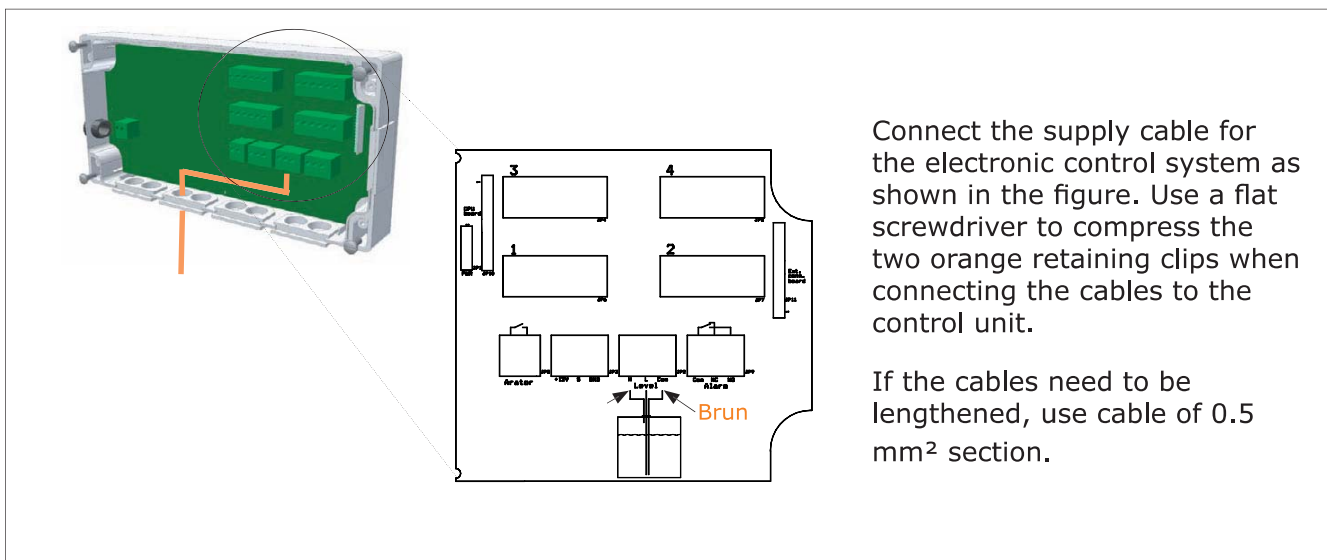
A level indicator in the collecting tank can be used to determine when the tank is full. It is a good alternative to the use of a dip stick. As the tank fills up, the float rises and sends an electronic signal to the controller.

Every time the activator button is subsequently activated, an audible signal will sound, as a reminder that the tank needs emptying.

After 50 flushes the system will be shut down and the toilet cannot be used before the tank is emptied.



Connecting the level switch



Installation of composting tank

Jets Biotank for composting is the ideal environment-friendly solution. Because the sewage has already been shredded to a fine consistency, the composting process has already had a kick-start.

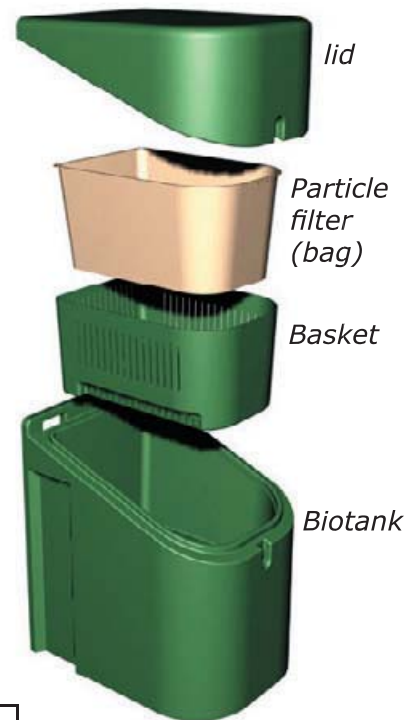
The Jets Standard composting tank is specially designed for efficient composting. It is fully insulated and can be heated using a heating cable (optional extra).

The composting tank can be positioned wherever suitable (See section "Installation of collecting tank" on distances).

If desired, it can be located in an outbuilding, under the floor, underground, by an outside wall etc.

Every time the toilet is used, the shredded sewage is automatically pumped through a particle filter into the composting tank. Waste water will filter down to the chamber in the base of the tank. This can be used as fertiliser, or discharged to the external mains sewers.

When the basket is full (or before, to reduce the weight to be lifted), it can be lifted out and put aside for further composting. Place a new particle filter in the composting tank, which is now ready for use once more. Extra baskets for further composting can be ordered. Two composting tanks can be simply connected to increase capacity.



Toilet flushes	Width (w)	Length (l)	Height (h)	Weight
1200-1500	556mm	730mm	815mm	28kg

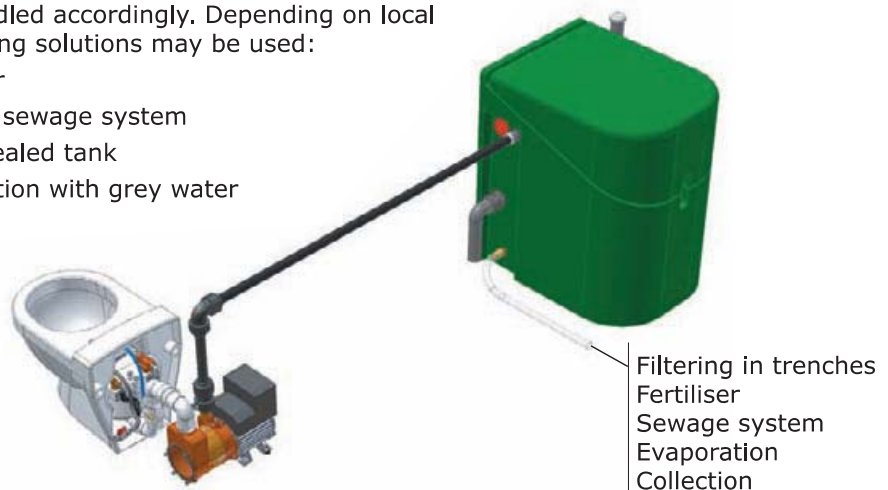
Excess liquid

The toilet uses only 0.5 litres of water per flush. The liquid volume collected in the tank is therefore reduced to approximately 10% of the discharge from a traditional toilet system.

The liquid is sewage and must be handled accordingly. Depending on local conditions and regulations, the following solutions may be used:

- Collection in cans for use as fertiliser
- Collection in cans for disposal in the sewage system
- Collection in cans for disposal in a sealed tank
- Ground filtering, possibly in conjunction with grey water
- Evaporation

If a stop tap is installed, the discharge of excess liquid can be controlled.



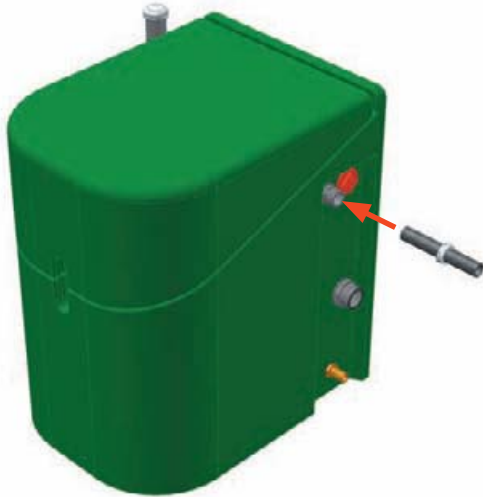
Place the tank on a firm, level surface in such a way that waste water can be drained off.

Install the air vent as shown on the diagram. If the composting tank is to be sited indoors, the air vent should be extended through the roof to avoid odours.

NB! All tank connections are on both sides of the tank. Ensure the blind plugs are inserted in the connections not in use!

Installation of composting tank

1



Connect the drain pipe from the Vacuumator using the enclosed nozzle as shown in the diagram. Alternatively, the end of the drain pipe can be inserted direct into the composting tank. The pipe should extend approx. 3cm into the tank.

2



Attach the air vent/overflow pipe. If the tank is located indoors, do not attach this pipe to avoid odours. Leave the plug in the tank.

3



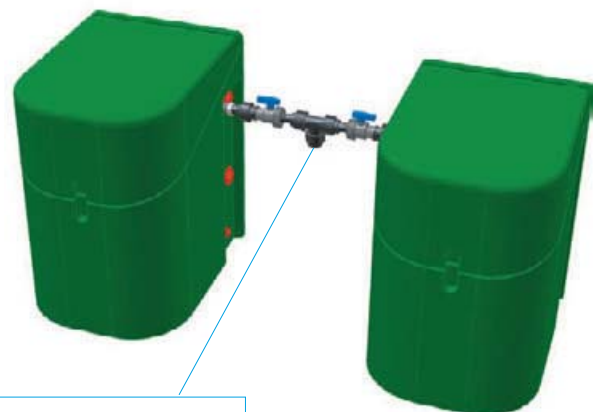
Position the shaped-to-fit bag in the plastic container, and place it in the tank. Press the enclosed white pipe bend into place, as shown in the diagram. NB! It is important that this is attached as shown, with the spout pointing downwards at an angle. This ensures correct distribution of the sewage in the composting tank.

4



Connect waste water cock to the lowest drain point. Run the hose to a collecting tank that can be emptied when required.

Installing two composting tanks to the vacuum system will reduce the frequency of emptying significantly. Install and connect the tanks as shown in the diagram. Connect the drain pipe from the Vacuumator. Close the cock to one composting tank and open the other. When the first tank is full, switch the cocks over and allow the second tank to fill. Once the second tank is full, the first can be emptied. Depending on use, the contents will be more or less composted.



From Vacuumator

Frost protection for composting tank

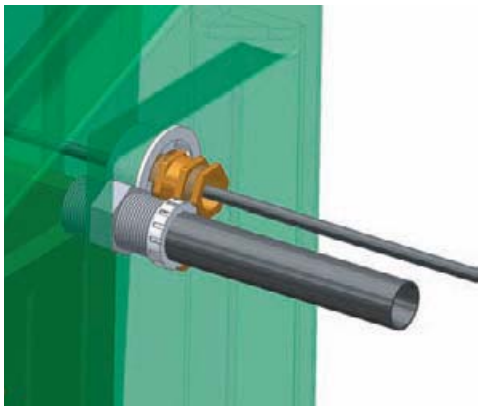
Optional extra

Alternative A: Frost protection for pipe and composting tank

If an outdoor or underground tank and the drain pipe to it cannot be protected from frost, we recommend installation of a heating cable on the pipe and in the composting tank.



A rubber seal with a round hole is fitted into the enclosed cable bushing. Replace this with the enclosed seal with an oval hole.



Attach the cable bushing to the composting tank as shown in the diagram.

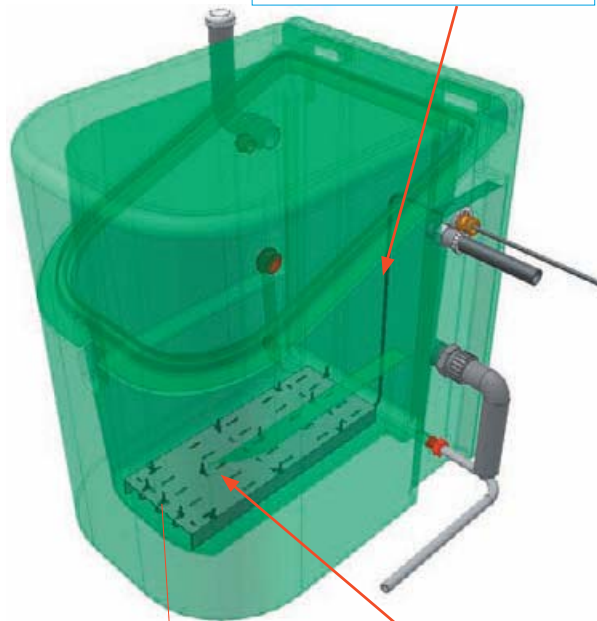
Remove the outer pipe, the inner pipe, heating cable/insulating aluminium foil and centring slot on the last two metres of the heating cable. Only the heating cable should project into the tank. Pass the cable through the bushing and secure to the cable rail using the enclosed plastic strips, as shown in the diagram. Screw the lock screw tightly on the cable bushing to ensure a good seal.

Alternative B: Frost protection of composting tank only

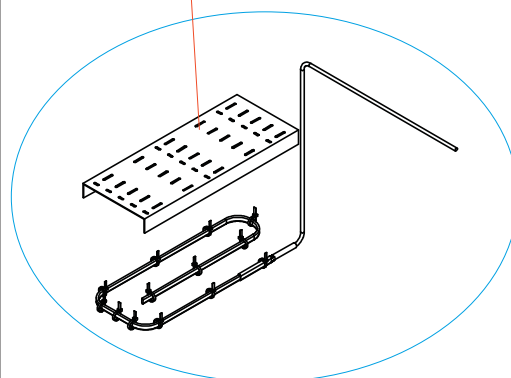
To protect the tank from frost and increase internal condensation, a heating cable can be installed. The self-regulating heating cable is supplied with 5 or 10 m long extension. Secure the heating cable to the cable rail as shown in the diagram. Pass the cable through the cable bushing. Screw the lock screw tightly on the cable bushing to ensure a good seal.

Connect the cable to the mains via an on/off switch (to be installed by an authorised electrician).

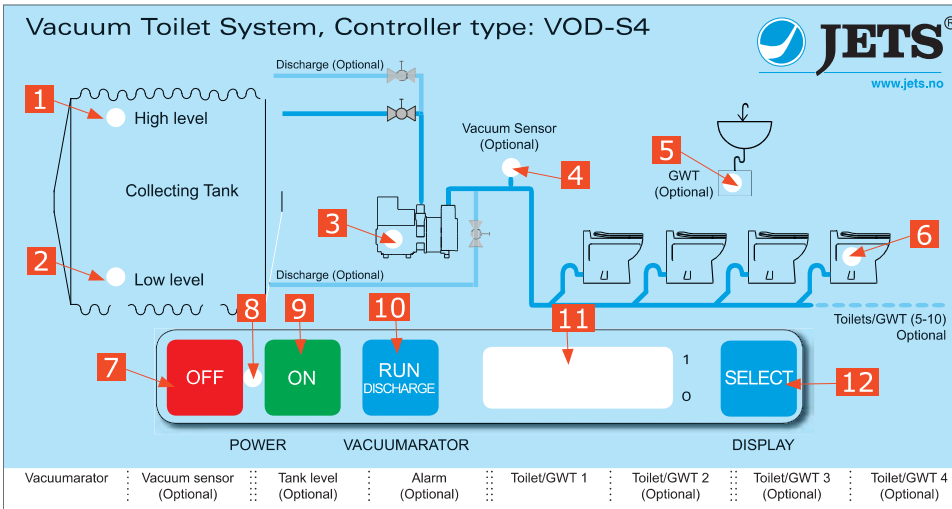
*Extension cable alt. A/
Heating cable alt. B*



*Heating cable mounted
on cable rail*



Electronic control



1. Indicator, high level
2. Indicator, low level
3. Indicator, Vacuumator
4. Indicator, vacuum level (VOD2)
5. Indicator, grey water tank
6. Indicator, vacuum toilet
7. Off button
8. Indicator, voltage
9. On button
10. Manual operation of Vacuumator
11. Display
12. Display select


The electronic controller ensures the discharge process in the Jets vacuum system takes place completely automatically.


If the default settings can be used, the system is ready for immediate use.


Default setting is based on:

- a. 1 toilet
- b. Vacuumator installed with standard pipe pack (no extension).

Use and operation:



To activate the controller unit, press 
 All indicator lights will light up for 3 secs., jets will appear in the display and the alarm will sound. vod1 will appear for 2 seconds.
 After 5 secs., the display will automatically deactivate.
 The system is now ready for use.

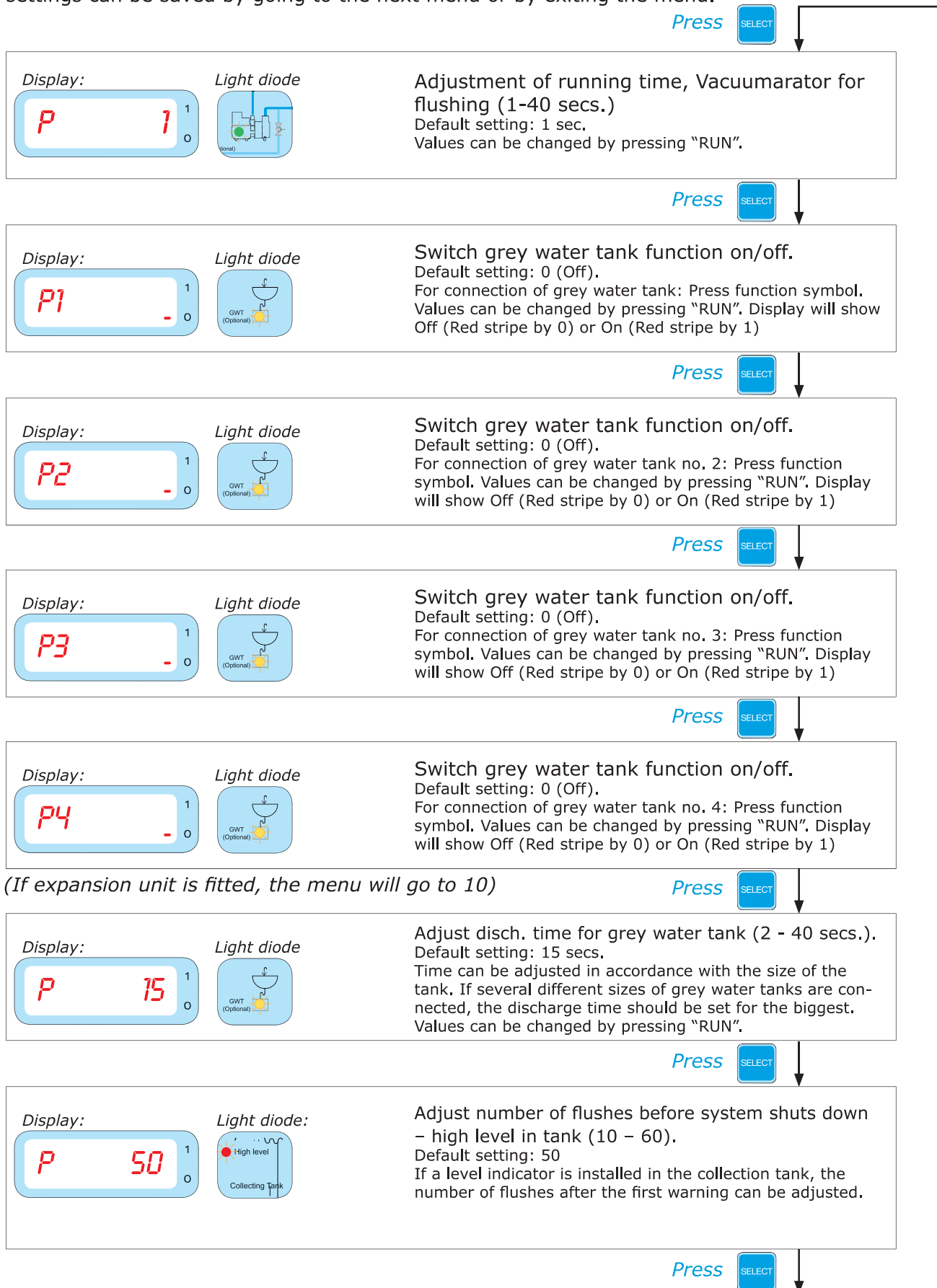
To deactivate the controller unit, press 
 This should be done when leaving the house and for maintenance/repair/installation.

To run the Vacuumator manually, press 
 (This may be necessary if extended flushing of the toilet is required). Run the Vacuumator for 15 seconds more than normal whilst activating the activator button. This button can be activated for troubleshooting, to check the connection between the controller and the Vacuumator.

Electronic control

Settings menu:


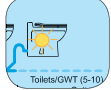
Press  and  simultaneously to activate or deactivate the menu. New settings can be saved by going to the next menu or by exiting the menu.




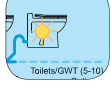

Electronic control

History:

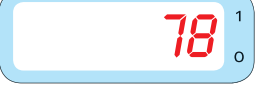

To display information on performance, press 

Display:  **Light diodes:**  The value in the display will show the number of normal flushes. The example on the shows that the activator button has been activated 300 times for normal flushing.


Trykk 

Display:  **Light diodes:**   The value in the display will show the number of half flushes. The example on the shows that the activator button has been activated 400 times for half flushing.

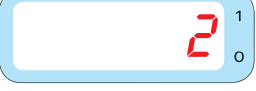
Trykk 

Display:  **Light diodes:**  The value in the display shows the number of discharges from the grey water tank. The example on the left shows that it has been discharged 78 times.
NB! This menu will only display when the grey water tank has been selected in the settings menu.

Trykk 

Display:  The value in the display shows the number of minutes the Vacuumator has run. The example on the left shows that the Vacuumator has run for 8 minutes.

Trykk 

Display:  The value in the display shows the number of collection tank max. level warnings. NB! This value will only change if the level indicator in the tank is installed. The example on the left shows that there have been 2 warnings in the system.

Trykk 

The history menu will automatically switch off after 1 min.

Maintenance

Maintenance/operation

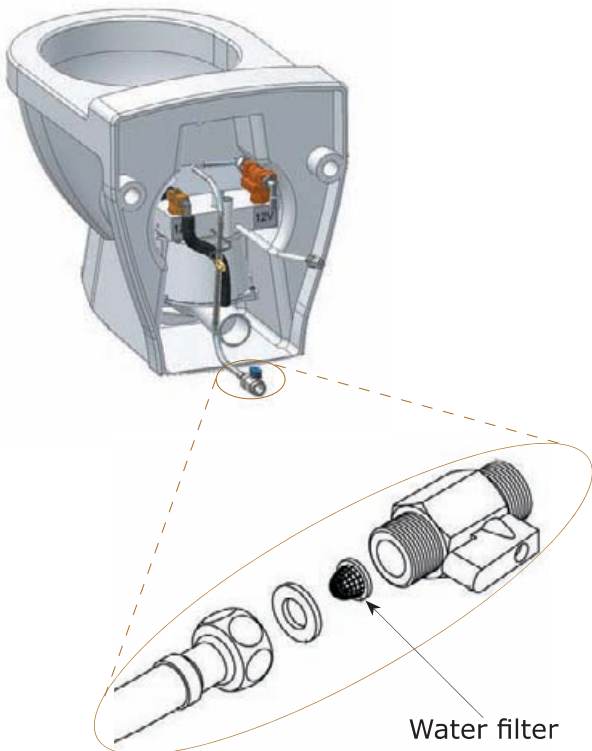


The system does not require any special maintenance routines. The toilet can be used in the same way as a traditional toilet. Do not put items in the toilet bowl that can block or damage the system, such as screws, coins, sani-

tary towels, nappies, heavy insoluble paper etc. No special cleaning agents are needed to clean the toilet.

Cleaning of water valve

Clean the filter in the water feed valve regularly. How often will depend on the quality of the water. Check the filter for damage to ensure efficient flushing.



Blocking of Vacuumator

To remove cloths, nappies etc that may have become stuck in the Vacuumator: Disconnect the electricity supply from the Vacuumator. Disconnect both pipes from the Vacuumator and lift it out. Place the Vacuumator in a bowl or take it outdoors when loosening the six screws that hold the Plexiglas in place. Ensure the electrical connections on the Vacuumator do not get wet. Remove the object that is causing the blockage (it will probably be lodged in the suction chamber) and replace the Plexiglas lid, screwing it firmly into place. Remember to fill the Vacuumator up with water before replacing it!

The electronics will ensure nothing is damaged if the Vacuumator is blocked.

If the Vacuumator stops because of a blockage, fault code OC1 will be displayed on the electronic motor control unit.

The electronic motor control unit is located under the black cover on the Vacuumator.

After completing the operation, it may be necessary to reset the electronic motor control by pressing the reset button.

Maintenance

Changing the filter bag

How often the filter bag may need changing depends on several aspects. After intense use over a short period, the paper mass in the sewage will retain a lot of moisture and the filter bag will quickly become full. It will take some time for the liquids to run off and the mass to settle.

It is therefore a good idea to empty the basket before it becomes full to avoid it becoming too heavy for one person. The bag will dissolve after a few weeks. It is therefore important to ensure the bag is securely positioned within the basket to avoid it being torn and thus lose its filter function.



Frost protection

As a general rule, we recommend frost protection using heating cables if 230 V electrical supply is available, and failing that with isopropanol.

It may also be advisable to leave a heater switched on in the toilet room and in the room where the Vacuumator is housed if an electrical supply is available.

When you leave the cottage if a cold spell is expected, you should:

A. With water and electricity supply:
Switch on heating cables. Turn off the water supply and press the flushing knob. Pour a mixture of isopropanol and water into the toilet bowl (the correct proportions are given in the table on the next page). Press the release button. Repeat this 2-5 times, depending on the length of pipe between the Vacuumator and the tank.

B. With electricity supply but no water supply:
Switch on heating cables. Remove the water pump from the water container and press the release button. Pour a mixture of isopropanol and water into the toilet bowl (the correct proportions are given in the table on the next page). Press the release button. Repeat this 2-5 times, depending on the length of pipe between the Vacuumator and the tank. When using in winter, it is advisable to add the same isopropanol mixture to the water container.

A. With water supply but no electricity supply:
Turn off the water supply and press the release button. Pour a mixture of isopropanol and water into the toilet bowl (the correct proportions are given in the table on the next page). Press the release button. Repeat this 2-5 times, depending on the length of pipe between the Vacuumator and the tank. When using in winter, it is advisable to add isopropanol mixture to the toilet bowl on each use.

B. With no water or electricity supply:
Remove the water pump from the water container and press the release button. Pour a mixture of isopropanol and water into the toilet bowl (the correct proportions are given in the table on the next page). Press the release button. Repeat this 2-5 times, depending on the length of pipe between the Vacuumator and the tank. When using in winter, it is advisable to add the same isopropanol mixture to the water container.

Note that ordinary antifreeze and windscreen-washer fluid can inhibit the decomposition process in a bio tank.

Use of isopropanol

Use of Isopropanol for frost protection

If frost protection of the toilet system by means of heating is not possible, isopropanol may be used.

In cabins with installed water piping, the water supply to the toilets should be shut off before leaving the cabin during winter.

Toilet bowl to be emptied of all liquid..

A mixture of isopropanol and water according to the below table to be poured into the toilet bowl, then press the toilet release button.

Repeat this procedure 4 or 5 times.

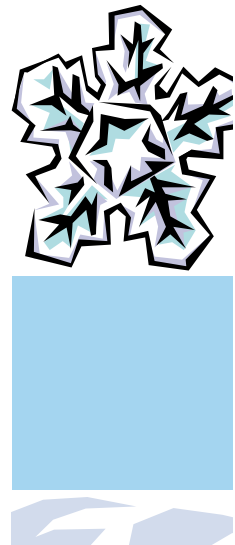
The frost protection mixture will then remain in the complete toilet system.

If water is not installed in the cabin, the contents of the water tank should be replaced with a mixture of isopropanol and water, according to the below table, during period of cold weather.

Isopropanol is supplied by Jets Standard.

Rate of mixture isopropanol/water:

Lowest temperature	Parts of Isopropanol	Parts of water
-5° Celcius	1,5	8,5
-10° Celcius	2,5	7,5
-15° Celcius	3,5	6,5
-20° Celcius	4,5	5,5
-25° Celcius	6,5	3,5
-30° Celcius	8,0	2,0
-35° Celcius	8,5	1,5
-40° Celcius	8,5	1,5
-45° Celcius	9,0	1,0



Troubleshooting

Problem	Cause	Remedy
Controller inactive	<ul style="list-style-type: none"> No electricity Internal fuses defective Disruption to power supply (power failure, voltage surge etc.) Defective controller 	<ul style="list-style-type: none"> Check plug and socket Change the fuse Switch unit off, wait 10 mins., switch on again Replace the controller
Controller trips out when Vacuumator starts (power from battery)	<ul style="list-style-type: none"> Not enough current in battery 	<ul style="list-style-type: none"> Charge battery
No reaction after activation of activator button	<ul style="list-style-type: none"> Defective button Break in cable between button and controller 	<ul style="list-style-type: none"> Replace button Check cable and connection
Vacuumator will not start	<ul style="list-style-type: none"> No electricity No current from battery Break in cable between Vacuumator and controller Vacuumator tripped out due to voltage surge (error code: OC1 or OL on Vacuumator motor control) Vacuumator tripped out due to overheating (error code: OH1 on Vacuumator motor control) Rotor/knife stuck due to foreign object Vacuumator frozen solid 	<ul style="list-style-type: none"> Check cable, plug and socket Check cable and fuse Check cable and connection Reset electronic motor control (press RESET) Reset electronic motor control (press RESET) Remove foreign object Thaw out carefully
Vacuumator runs but produces no vacuum	<ul style="list-style-type: none"> Not enough fluid in Vacuumator Blocked outlet 	<ul style="list-style-type: none"> Top up with water Check pipes between Vacuumator and tank/drain
Vacuumator runs unevenly	<ul style="list-style-type: none"> Foreign object in the Vacuumator 	<ul style="list-style-type: none"> Force the Vacuumator to run by pressing the release button for 20-40 seconds. If necessary, open the Vacuumator to remove the obstruction.
Toilet bowl fails to empty, but fills with water	<ul style="list-style-type: none"> Drain blocked by foreign objects Drain pipe frozen No vacuum Defective air/vacuum solenoid Defective air/vacuum solenoid coil Defective toilet return valve Blocked air vent in tank Membrane or membrane control needs resetting Leaky lifting membrane 	<ul style="list-style-type: none"> Remove foreign objects Thaw out Check Vacuumator Replace solenoid (or contact supplier) Replace coil (or contact supplier) Replace return valve (or contact supplier) Remove blockage Contact supplier Contact supplier
Toilet bowl fails to empty, but fails to fill with water	<ul style="list-style-type: none"> No water pressure Blocked water supply filter Defective water solenoid Defective water solenoid coil Water pump not running Water pump blocked by foreign objects 	<ul style="list-style-type: none"> Check water supply Clean filter Replace solenoid (or contact supplier) Replace coil (or contact supplier) Check cable and connection Remove foreign objects
Flushing will not stop	<ul style="list-style-type: none"> Defective water solenoid Foreign objects in solenoid Leak through solenoid 	<ul style="list-style-type: none"> Replace solenoid Remove foreign objects Replace solenoid gasket
Toilet bowl water empties	<ul style="list-style-type: none"> No water lock Vacuum in drain pipe 	<ul style="list-style-type: none"> Check pipe installation conforms to pipe guide Check pipe installation conforms to pipe guide
Air bubbles in toilet bowl	<ul style="list-style-type: none"> Return valve not closing Return seepage in pipes 	<ul style="list-style-type: none"> Clean or replace valve ball Check pipe installation conforms to pipe guide

Technical data

JETS 50 FLOOR MODEL



External dim.: 382 x 535 x 465 (w x l x h)
Material: Porcelain
Total weight: 22.3 kg

JETS 59 WALL MODEL



External dim.: 365 x 535 x 425 (w x l x h)
Material: Porselen
Total weight: 20,2 kg

GREY WATER TANK



External dim. 363 x 200 x 405 (l x w x h)
Material: PEH
Total weight 3,6 kg
Capacity: 12 litres

JETS VACUUMARATOR® 10NT DC



External dim.: 163 x 361 x 294 (b x w x h)
Material: bronze and stainless steel
Total weight: 18 kg
Capacity: 100 flushes per hour
Voltage: 12V
Effect: 0,9kW

JETS VACUUMARATOR® 10NT AC



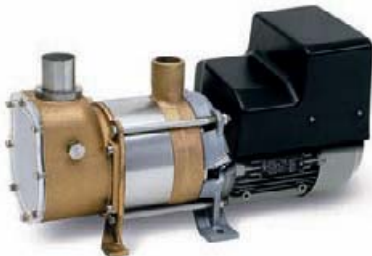
External dim.: 163 x 365 x 292 (b x w x h)
Material: bronze and stainless steel
Total weight: 18 kg
Capacity: 100 flushes per hour
Voltage: 230V
Effect: 0,75kW

JETS VACUUMARATOR® 15M DC



External dim.: 214 x 564 x 263 (b x w x h)
Material: bronze and stainless steel
Total weight: 34 kg
Capacity: 150 flushes per hour
Voltage: 12V
Effect: 1,1kW

JETS VACUUMARATOR® 15MB AC



External dim.: 214 x 564 x 263 (b x w x h)
Material: bronze and stainless steel
Total weight: 34 kg
Capacity: 150 flushes per hour
Voltage: 230V
Effect: 1,5kW

COLLECTION TANK



External dim.:
900 litres (53 kg) - 1125 toilet uses:
 1100 x 1240 x 1195 mm (w x l x h) ø1100mm
1300 litres (65 kg) - 1625 toilet uses:
 1300 x 1330 x 1445 mm (w x l x h) ø1300mm
3000 litres (120 kg) - 3750 toilet uses:
 1600 x 2150 x 1665 mm (w x l x h) ø1600mm
6000 litres (240 kg) - 7500 toilet uses:
 1600 x 3580 x 1665 mm (w x l x h) ø1600mm
Material: PEH

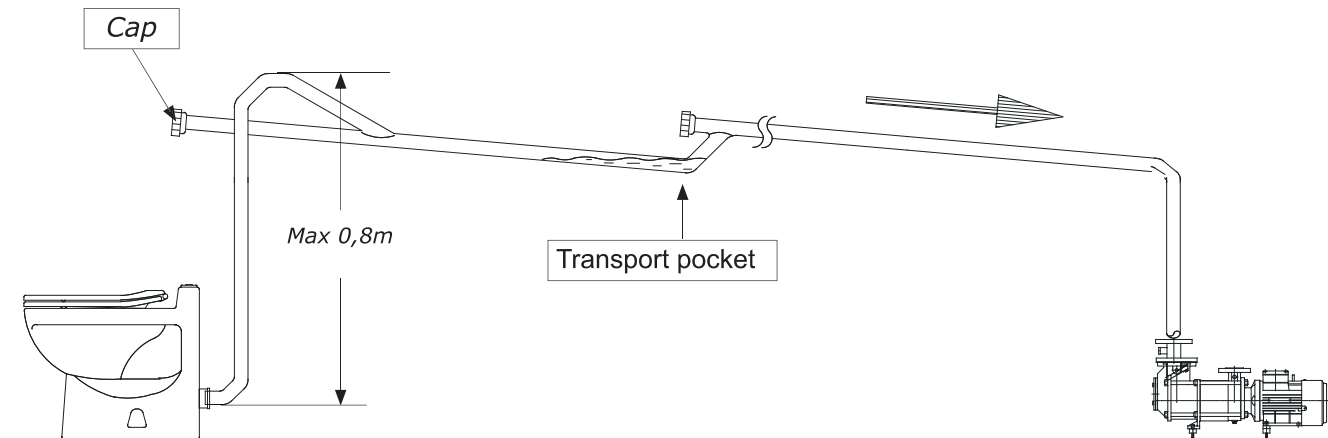
BIOTANK



External dim.: 556 x 730 x 815mm (w x l x h)
Material: PEH
Weight: 35 kg
Capacity: 300 man days

Additional toilets, extended piping on vacuum side

This information is only relevant for systems with several toilets/grey water tanks connected, and/or those where the Vacuumator is located more than 3 metres from the toilet



The basic principle in a vacuum system is the use of pressure differentiation to transport sewage from toilets, urinals and grey water installations. In a modern vacuum system, the vacuum is generated in the pipes. When the toilet is flushed, approx. 60 litres of air is sucked into the pipes, along with approx. 0.5 litres of water. The water and the sewage form a plug, which is transported en masse, due to the difference between the air pressure in front of- and behind it.

During transport through the pipe system, the plug is influenced by gravity and will flatten out after a certain time. Consequently, a low point has to be built into the pipe system to create new plugs and rebuild the pressure difference.

NB! The examples here show pipes with an incline. Naturally, the same principles apply if they have a decline!



Pipe types

50mm pipes only are used on the vacuum side. We recommend PP pipes and components. If desired, PVC and PEH pipes can also be used. See chapter on installation/combinations.

Pipe bend

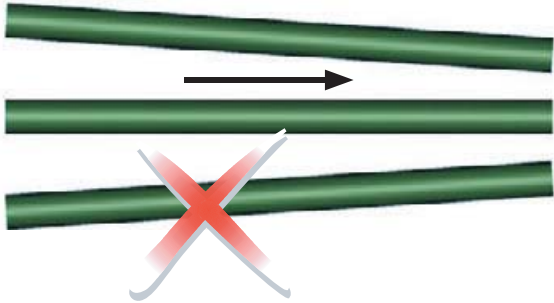


Ensure that only large radius pipes are used. Do not use 90° bends. Ensure that all pipes and connections have a smooth surface to avoid stoppages and blockages.

Additional toilets, extended piping on vacuum side

Horizontal pipes

Horizontal pipes must always be installed level or with a fall in the direction of transport, never at an upwards angle. There is always a risk of seepage backwards in horizontal pipes.



Transport pockets

To prevent backward seepage and ensure good sewage transport, transport pockets have to be formed.

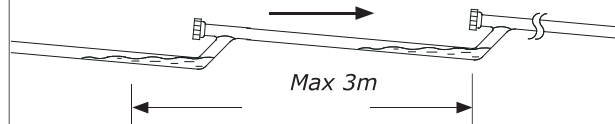
Transport pockets can be max. 3 metres apart.

Pipes must have a fall of:

1m between transport pockets: 6cm per m.

2m between transport pockets: 3cm per m.

3m between transport pockets: 2cm per m.

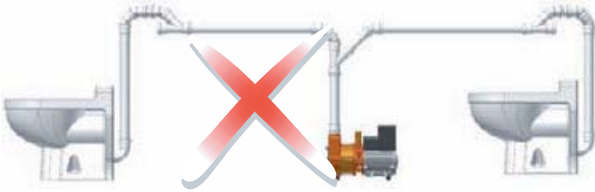


Several toilets on the same main drain

In an installation with two or more toilets connected to a main pipe as shown in the figure below, problems will arise.

When one toilet is flushed, the vacuum in the pipe system causes the sewage to be transported in the direction of the Vacuumator. However, there will also be a vacuum in the pipe leading to the other toilet, and some of the waste will therefore move towards the other toilet. This may result in dirty water in the toilet bowl.

This problem will arise when the pipes are located higher than the water surface in the toilet bowl.

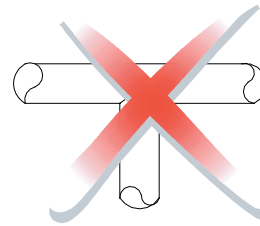


We therefore recommend that in this type of installation, the pipes from the different toilets be connected into the main pipe from the same side before entering the Vacuumator:



The pipe branches should be connected to the main pipe from the upper side, to prevent seepage back to the toilet bowl.

Branches

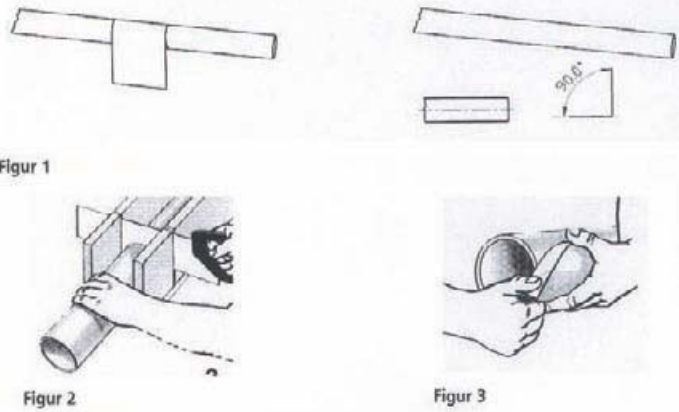


T-branches must not be used.

Additional toilets, extended piping on vacuum side

Cutting pipes:

Cut pipes at right angles using a fine toothed saw or special pipe cutting equipment. When cutting with saw or cutting equipment, we recommend using a mitre box or paper around the pipe. Pipe ends must be cleaned and smoothed-off using a knife, for instance. Chamfering is not necessary.



Installation:

Pipes and components are supplied with built-in seal rings, in accordance with NS-EN 681-1. If waste water contains oil residues or the pipes are laid in oil-contaminated soil, the standard rings should be replaced with oil-resistant seal rings.

PP cannot be glued because of its good resistance to chemicals and solvents.

PP can expand longitudinally by 0.1mm per metre pipe and °C. This thermal expansion is moderate due to the low thermal conductivity of the material.

Based on CEN recommendations for guidelines to expansion of indoor PP drain pipes, we recommend the following:

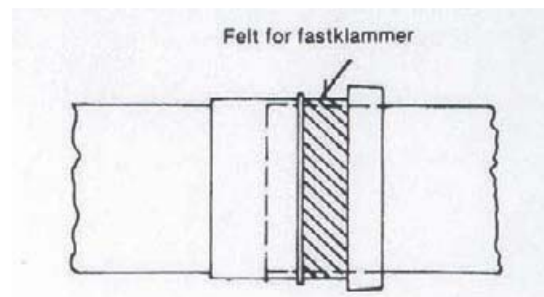
For cramp-mounted pipes up to 4m in length: 15mm expansion gap. The gap can

be reduced to 10mm if the pipe length is 2 metres or less.

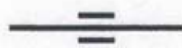
Cramp-mounted pipes are secured by cramp brackets at regular intervals to the building structure, whilst sliding cramps can be used to control the pipes under thermal movement as far as the expansion muff.

Cramp-mounting must always be used for pipes with muffs and for pipe components with a cramp point in the middle.

It is especially important that expansion muffs are cramped.



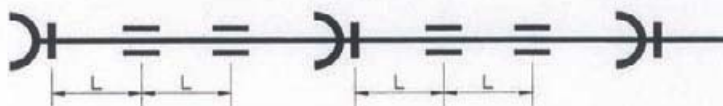
Cramp brackets



Sliding cramps

L = Max. cramp distance

Figur 5. Symboler for klammertyper



Figur 6. Klammringseksempel



Figur 7. Klammringseksempel med dobbelmuffer/allmuffesystem

Max. recommended cramp distance - L in m:

32mm:

Horizontal pipes: 0.5

Vertical pipes: 1.2

50mm:

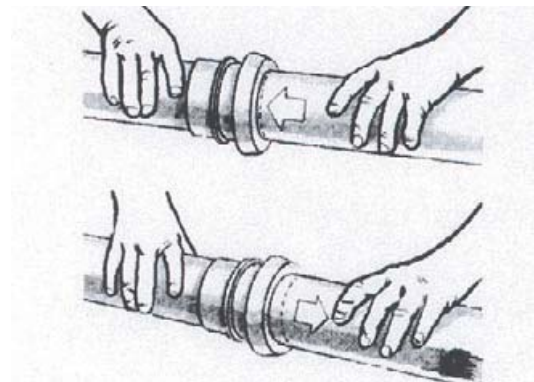
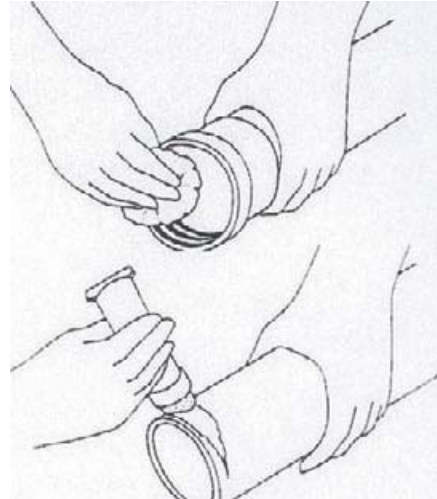
Horizontal pipes: 0.5

Vertical pipes: 1.5

Additional toilets, extended piping on vacuum side

Sleeve joint with seal ring:

- Clean the muff and pipe ends
- Apply a thin layer of lubricant to the pipe/pipe component ends, the seal ring or both places.
- Twist pipe gently whilst sliding the end into the bottom of the muff.
- Pull the pipe end back a little to create the recommended expansion gap in the muff.



Sales and delivery terms

Standard conditions

These sales and delivery terms apply unless otherwise agreed. In all other respects the current general conditions for the supply of machinery in the Nordic countries (current version NL 92) apply.

Ordering

An order is binding when the buyer has received a written order confirmation from Jets Standard AS.

Complaints

The buyer must examine the goods on delivery. Claims regarding any faults and deficiencies which ought to have been discovered on inspection must be submitted in writing within 8 days of receipt of the goods.

Payment

All prices are exclusive of value-added tax, and payment in the specified currency must take place within 30 days of the invoice date. In the event of delay in payment, interest will be charged at a rate of 1.2% per month or part of month.

Right of ownership / Vendor's fixed charge

Jets Standard AS retains the right of ownership of the purchased goods until the purchase amount, with any interest and charges, has been paid in full. Jets Standard AS is entitled to reclaim the purchased goods in the event of default on the part of the buyer.

Jets Standard AS products must not be resold as a part of the buyer's product before the goods have been paid for.

Delivery time

Delivery times will be specified in the confirmation of order. Jets Standard AS is not responsible for changes in delivery times resulting from circumstances over which the company does not have control.

Shipping / Transport

Products shall be shipped CIP (INCOTERMS 2000) to the receiving port and by the means of transport specified in the order confirmation.

Storage / Operational directions

The goods must be stored properly and in accordance with currently applicable directions and instructions issued by Jets Standard AS. The products must only be used in accordance with operational instructions and parameters issued by Jets Standard AS and must only be used for the purposes for which they are intended.

Installation / Start-up

The product should be put into operation within 6 months of delivery. If a longer period should elapse, Jets Standard AS shall be allowed to inspect the product before operation commences.

The customer shall advise Jets Standard AS two weeks before the planned start-up. Start-up of the installation shall be carried out by Jets Standard AS or by a fitter authorised by Jets Standard AS.

Warranty

All deliverables are guaranteed against manufacturing faults for a period of 12 months after start-up, but no longer than 18 months after delivery by Jets Standard AS. Written notification of faults which the customer requires to be corrected under the terms of the warranty shall be sent without delay to Jets Standard AS. In the event of failure to do so, the warranty liability will no longer apply.

Replacement parts will be supplied EXW Ha-reid and parts replaced under the guarantee terms shall be returned to Jets Standard AS.

Jets Standard AS is not liable for faults arising as a result of carelessness, abnormal use, overloading, inadequate inspection and maintenance, or other circumstances over which Jets Standard AS does not have control.