JETS™
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INSTRUCTION MANUAL

ISSUED 25 SEPTEMBER 2014 VERIFIED BY LMGK

Jets™ 310123 / 433782
A.M.S. Global Inc.
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LEANER AND CLEANER SANITARY SOLUTIONS

Order Specification

Order no.	Article	Description	QTY
433782	VU20CVOD	Vacuum Unit Ultima C200 VOD	1
433782	02U016035	Vacuumarator Tank Kit	1
433782	02U016033	Damper for Ultima 200 series"	2
433782	036232910	Lock nut w/flange	4
433782	036305010	Screw, M6x25	4
433782	034512531	Union with clamping ring	1
433782	034512541	Elbow with clamping ring	1
433782	048010107	JETS ULTIMA C200 230-240/50	1
433782	121315128	VTS Controller VOD 110-240VAC	1
433782	032318571	Vacuum Transmitter	1
433782	013101302	Adapter	1
433782	121200401	Connector w/cable 2m	1
433782	034233040	Pipe Clamp, ø50mm - 1/2"	1
433782	034307100	Compensator Ø50mm	1
433782	034512901	Rubber Sleeve Ø50/Ø60	1
433782	034506900	Hose Clip 50-70mm	2
433782			
433782	TO659PO-CFD	Toilet JETS 59M CFD Wall	4
433782	034512901	Rubber Sleeve Ø50/Ø60	4
433782	034506900	Hose Clip 50-70mm	4
433782	034512584	Pipe Bend, ø50mm 90dg	4
433782	037609312	Coaming	4

Table of Contents

(Note: example image - delivery may vary per product selection)

Jets™ Vacuum Unit is designed as a complete solution for vacuum evacuation of waste water in a sanitary system.

- The lightweight pump effectively creates vacuum and macerates waste water to a fine pulp.
- Compact multiphase pump design with a small footprint.
- The principle of operation is vacuum on demand (VOD™).

Warranty

All products of the company are sold and all services of the company are offered subject to Jets Vacuum AS General Sales Conditions detailing warranty and terms and conditions of sale, copies of which will be furnished upon request. The information provided herein is for guidance only; it does not constitute a guarantee of the performance or specification of any individual product or component.

Technical Data

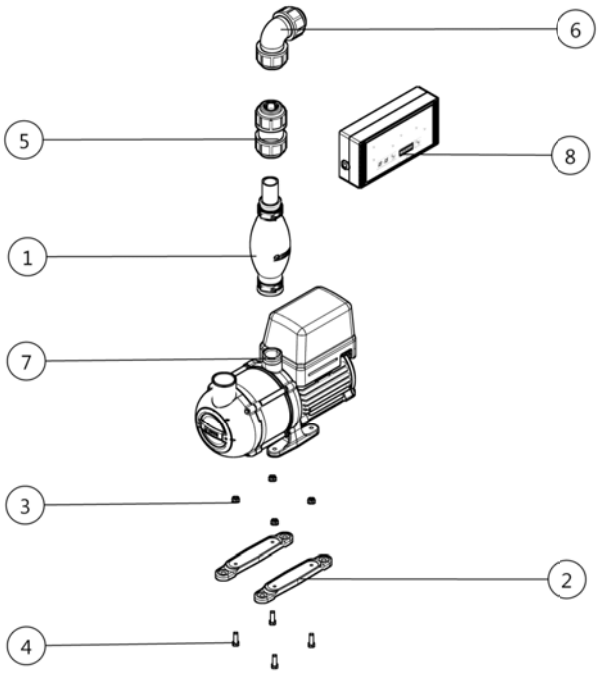
Type .....VOD™ (Vacuum on Demand)
Pump Type.....Multiphase
Capacity.....9.5 m³/h ACMH at 500 mbar (50% vacuum) 50 Hz
Weight.....Approx. 20.7 kg (dependent on selection)
Connection Inlet.....Ø 50 mm
Connection Outlet.....Ø 32 mm
Conformity..... Efficiency class IE1 in accordance with exceptions given in IEC60034-30

Operating Data

Frequency.....50 Hz
Voltage.....230-240V

Patents and Trademarks

Disclaimer



Options

Optional functions compatible with this product.

VOD: Vacuum on Demand

Components

Construction Characteristics

1. Vacuumarator Tank Kit.....02U016035*
2. Damper for Ultima 200 series".....02U016033*
3. Lock nut w/flange.....036232910*
4. Screw, M6x25.....036305010*
5. Union with clamping ring.....034512531*
6. Elbow with clamping ring.....034512541*
7. Vacuumarator™.....See options listed above
8. Control System.....Product Selection

** Component/s avaliable as replacement parts.*

Vacuum on Demand (VOD™)

VOD™ is a design that eliminates the need for piping to be under constant vacuum. Activating the system starts the pump and the build up of vacuum in the pipes sucks waste water into the Vacuumarator ™ pump, in sequence, pumping the content under pressure to a tank, sewer or other outlet type.

The VOD™ principle is an effective and environmentally friendly solution.

System Design

The Vacuum Unit is designed to transport waste water from a source, such as a toilet or grey water tank, to an outlet, such as a tank or mains sewer. Unlike conventional gravity systems, the vacuum unit uses air rather than water to transport waste. The waste water is drawn into the piping by the very air needed to transport it. This greatly reduces water consumption when compared to a standard gravity system.

The pump creates vacuum (negative pressure) in the pipe lines using vacuum on demand principles. Controller activation and deactivation of the unit, transfers waste water to the pump. The pump then grinds the sewage using an integrated macerator, and pumps it to a sewerage system of choice.

The pressure side (outlet side) of the vacuum pump operates under normal atmospheric pressure, separate from the suction (vacuum) side.

One advantage of vacuum pumping is that waste water can be pumped at an incline from the source to the tank, sewer or other outlet type. Water consumption is also greatly reduced.

The pumps lightweight design and small footprint make it ideal for a range of installation solutions including dwellings, cabins, small industrial applications and mobile solutions.

Jets™ Control Systems

A variety of control options are available depending on installation size and site conditions.

The control system receives and activates signals in a VOD-system. It receives an activation signal (i.e. from a push button, level sensor etc.), which triggers the start/stop of the pump and the transportation of waste water through the unit.

Mode of Operation

The Ultima pump's main function is to create vacuum in a piping system. It has been designed for connection to any kind of sewage treatment plant, collecting tank or virtually any other processing or storage unit. The pump is a lightweight multiphase pump, designed with an in built macerator. The single-shaft design is unique in it's renowned simplicity. The principle of operation is a helical rotor running in a cylindrical housing, which together with two end plates, forms the pump body.

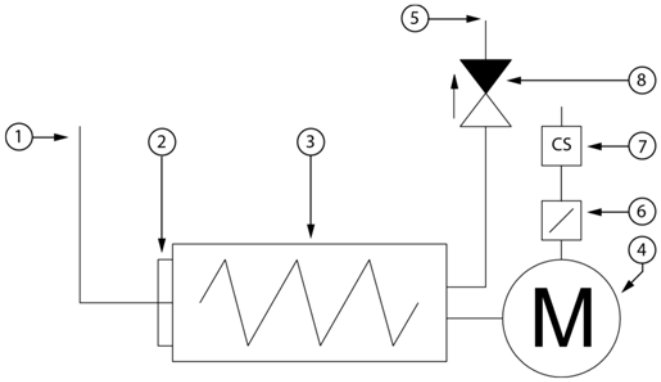
When the Ultima pump is in operation, a liquid ring is created around the rotor. The thickness of the liquid ring is governed by the size of the opening in the end plate on the pressure side. This opening is arranged so that the created liquid ring touches the rotor hub on one side and the rotor tips on the other. This arrangement creates a series of progressive crescent shaped cavities traveling from the suction to the pressure side. Air and waste water is pulled into those cavities and transported through the Ultima pump.

Waste water is macerated by the in built macerator before it enters the pump body. The macerator consists of one rotating knife fixed to the shaft and one stationary knife fixed to the suction chamber.

Function and Principle - Jets™ Vacuum Unit

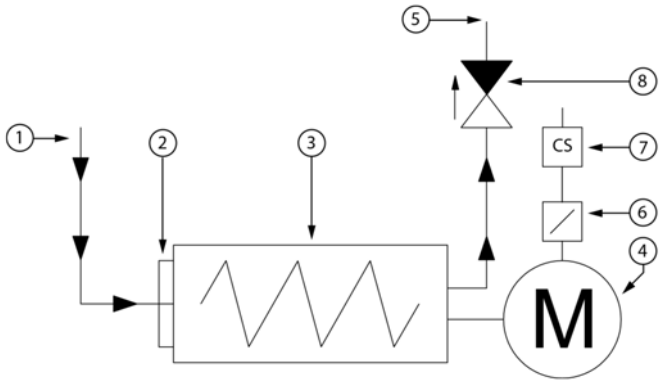
Explanation of the Vacuum Unit's Function

① Inlet
② Macerator
③ Helical Screw
④ Motor
⑤ Outlet
⑥ Motor Controller
⑦ Control System
⑧ NR Valve



Normal Position - Unit Inactive

- Control System ⑦ - INACTIVE
- NR Valve ⑧ - CLOSED
- Motor Controller ⑥ - INACTIVE
- Motor ④ - INACTIVE
- Helical Screw ③ - INACTIVE
  Macerator ② - INACTIVE



Running Conditions - Activated Sequence

1. Control System ⑦ - RECEIVES/SENDS START SIGNAL
2. Motor Controler ⑥- RECEIVES/SENDS START SIGNAL
3. Motor ④ - ACTIVATED
4. Helical Screw ③ - ACTIVATED
   Macerator ② - ACTIVATED
5. Inlet ① - FLOWS
6. NR Valve ⑧ - OPENS
7. Outlet ⑤ - FLOWS

Running Conditions - Deactivated Sequence

1. Control System ⑦ - SENDS STOP SIGNAL
2. Motor Controller ⑥ - SENDS STOP SIGNAL
3. Motor ④ - DEACTIVATED
4. Helical Screw ③ - STOPS
   Macerator ② - STOPS
5. Inlet ① - FLOW STOPS
6. NR Valve ⑧ - CLOSES
7. Outlet ⑤ - FLOW STOPS

Important Health and Safety Information

Installation, operation and maintenance must be carried out in strict accordance with this guide and with all applicable regulations. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets Vacuum AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets Vacuum AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets Vacuum AS (citing the safety reference number) for further clarification.

For further information about the included warnings or any other safety concerns please contact Jets Vacuum AS.

Safety Warning Symbols


Warns of risk of electrical shock which may cause significant physical injury or equipment damage.


General information to all users.


Symbol denotes required personal protective equipment is required.


Warns of biological materials that carry a significant health risk.


CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or equipment damage.


WARNING: Indicates a potentially hazardous situation which, if not avoided could result in death or serious injury or equipment damage.


Symbol denotes required personal protective equipment is required.


Symbol denotes required personal protective equipment is required.


DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury or equipment damage.


NOTICE: Indicates important information, which if not followed, may cause damage to equipment.

Important Health and Safety Warnings


1.4 Warning
Safety equipment (PPE) necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.


1.10 Warning
Failure to properly lift and support equipment can result in serious physical injury and/ or equipment damage.


2.6 Notice
Place the equipment in an area that is easily accessible for maintenance.


3.1 Warning
All wiring should be performed by a licensed or certified electrician.


3.5 Warning
Ensure that the line voltage and frequency of electrical current supply agrees with the equipment specifications


3.10 Warning
For equipment fitted with a frequency converter: In European CE compliant installations and in other installations where EMC emissions must be minimized, make a 360° high frequency grounding of cable entries in order to suppress electromagnetic disturbances


3.15 Warning
For equipment fitted with a frequency converter: Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that the following is observed.


3.17 Warning
Do not work on the control cables when power is applied to the frequency converter or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the frequency converter even when the main power on the frequency converter is switched off.


3.19 Notice
When reconnecting the motor cable, always check that the phase order is correct.


3.21 Warning
Do not use plugs or connectors that are damaged.


3.28 Warning
Never work on the equipment when power is applied.


1.5 Personal Protective Equipment - Goggles
Wear safety glasses with side shields at all times when working with equipment.


2.1 Warning
The safety of the equipment is guaranteed only if it is used in compliance with the instructions provided by the supplier. The limits indicated must never be exceeded in any given situation.


2.11 Warning
Beware of sharp surfaces.


3.2 Warning
Never work on the equipment when mains power is applied.
For equipment fitted with a frequency converter: After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the equipment.


3.6 Warning
Risk of electric shock. Never connect the green (or green and yellow) wire to a live terminal.


3.14 Warning
For equipment fitted with a frequency converter: A motor with frequency converter supply may energize even if the motor is at standstill.


3.16 Notice
Voltage between frequency converter input phases U1, V1 and W1 and the frame is close to 0 V


3.18 Notice
Do not make any insulation or voltage withstand tests on the frequency converter or frequency converter modules.


3.20 Warning
The terminals on the equipment are at a dangerously high voltage when the input power is on, regardless of whether the motor is running or not.


3.27 Warning
Never work on the equipment when mains power is applied.
For equipment fitted with a frequency converter: After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the equipment. Before undertaking any electrical service, the main circuit breaker should be de-energized and labeled "out of service".


7.1 Warning
To reduce the risk of electrical shock, the pump should be plugged directly into a properly installed and grounded 3-prong grounding type receptacle. The green (or green and yellow) conductor in the cord is the grounding wire. The motor must be securely and adequately grounded for protection against shock.

7.2 Warning
Do not touch an operating motor. Do not work on the equipment when the rotor is in operation. Before installation and maintenance work on equipment, stop the motor. Be aware of rotating parts of the motor.

7.3 Danger
Keep fingers and foreign objects away from ventilation and other openings. Do not insert any objects into the motor.

7.4 Warning
Never place objects on top of the vacuum system. Restricting the vacuum system ventilation openings can cause overheating.

7.5 Warning
Never operate the vacuum system with the cover removed.

7.6 Warning
Never install, use or service any component of this device in an atmosphere with potentially flammable or explosive vapors.

7.7 Danger
Do not handle the pump or pump motor with wet hands when standing on a wet or damp surface or when standing in water. Fatal electric shock may occur.

7.8 Warning
Pump motor is equipped with an automatic resetting thermal protector and may restart unexpectedly. Protector tripping is an indication of motor overloading because of operating pump at low heads (low discharge restriction), excessively high or low voltage, inadequate wiring, incorrect motor connections or defective motor or pump.

7.9 Warning
Operation of any pumping system with a blocked suction and discharge must be avoided in all cases. Operation, even for a brief period under these conditions, can cause superheating of enclosed pump and result in a violent explosion. All necessary measures must be taken by the end user to ensure this condition is avoided.

7.10 Notice
DO NOT obstruct the openings and slits provided for ventilation and heat dispersal.

7.11 Warning
Do not run the pump dry. Running the pump without sufficient water will result in damage to equipment. Ensure that a sufficient water level is maintained.

7.12 Warning
A pump is a pressure vessel. Any pressure vessel can explode, rupture, or discharge its contents if sufficiently over pressurized causing death, personal injury, property damage, and/or damage to the environment. All necessary measures must be taken to ensure over pressurization does not occur.

7.15 Warning
Reverse operation will cause extenxsive damage to the pump.

9.2 Danger
Disease Hazards: Effluent is a common mode of transmission for parasitic organisms. Some of these may be pathogenic, meaning that they may have the capability of causing serious communicable disease. Good personal hygiene, use of disinfectant soap and avoidance of hand to mouth transfer are necessary for all working in contact with the equipment. Skin abrasions, punctures or wounds of any other nature require immediate and proper medical attention.

12.2 Notice
Additional and replacement parts should only be obtained from the manufacturer or distributor

12.5 Notice
Use this equipment only in the manner intended by Jets Vacuum AS. If you have questions after reading these instructions contact Jets Vacuum AS directly.

12.6 Notice
DO NOT use the Jets™ sanitary system if any component is damaged or missing.

Delivery, Receipt of Goods and Transportation

Goods to be protected against shock, dust, humidity and moisture. Suitable adequately dimensioned transporting equipment is to be used. Note that the equipment may contain components that are easily damaged as a result of inappropriate handling. Jets Vacuum AS is not responsible for or liable for delivery delays resulting from occurrences outside of Jets Vacuum AS' immediate control. On receipt of goods, check for visual damage. Any damage detected after dispatch should be reported immediately to Jets Vacuum AS. Damages and/or discrepancies must be reported in writing no later than eight (8) days after receipt of goods. Commissioning must be postponed until the equipment has been inspected. Do not dispose of damaged items. Your direct supplier will advise you of the procedure to follow.

Storage

The Vacuumarator™ has been designed to operate at peak performance under the following climatic conditions: Site to be a dry environment between 0°C and +45°C at altitudes ≤3000m above sea level. Operation above this altitude will result in de-rated values. Operation in temperatures above 45°C will result in reduced pump capacity. Use in environments below 0°C requires use of antifreeze. The site location is to be low vibration (Vrms ≤0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free, free from moisture, free from condensation and have an average relative humidity of maximum 95%.

Installation to End Use

The Vacuumarator™ pump has been designed to operate at peak performance under the following climatic conditions: Site to be a dry environment between +0°C and +45°C at altitudes ≤3000m above sea level. Operation above this altitude will result in de-rated values. Operation in temperatures above 45°C will result in reduced pump capacity. Use in environments below 0°C requires use of antifreeze. The site location is to be low vibration (Vrms ≤0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free, free from moisture, free from condensation and have an average relative humidity of maximum 95%.

Installation

Lifting Instructions

1.10 Warning
Failure to properly lift and support equipment can result in serious physical injury and/or equipment damage.

When lifting any equipment, the following information is to be considered.

- Total weight.
- Center of gravity.
- Maximum outside dimensions.

For specific considerations, refer to the technical data for any of the supplied components.

Installation Site Considerations

1. Information required to determine floor spaces/installation space requirements can be determined from the dimensions drawings. Consider pipe installations and other installations such as mounting of the controller.
2. The location of the installation should have sufficient clearance around the pump to allow for ventillation and heat dispersal.
3. Installation must comply with all local, state and federal safety codes and practices.
4. Select a mounting plate/surface that is sturdy and will minimize vibration.
5. Components are to be installed in a location where they can be accessed for routine service and maintenance.
6. The control system is to be placed in a location where settings may be adjusted.
7. Check ambient conditions. If outside of limitations, insulate or ventillate as necessary.

Pipes and Plumbing

Information and recommendations regarding pipe connections and plumbing is available in Jets™ piping guide. Contact a Jets™ approved supplier for further information specific to your installation type.

All local, state and federal piping and plumbing regulations are to be observed. All pipe work should be carried out by a qualified and experienced plumber.

Tools

It is suggested that the following tools (not included in the delivery) be available during installation.

- Spanner
- Saw for cutting pipe lengths
- Phillips head screwdriver
- Knife
- 4 screws for mounting the controller (not included).

Outlet Pipe Connection

On the pressure side (outlet) of the pump, the outlet pipe must lift vertically (direct pipe) to a minimum height of 32cm (total height from the pump outlet). The maximum lifting height is 200cm.

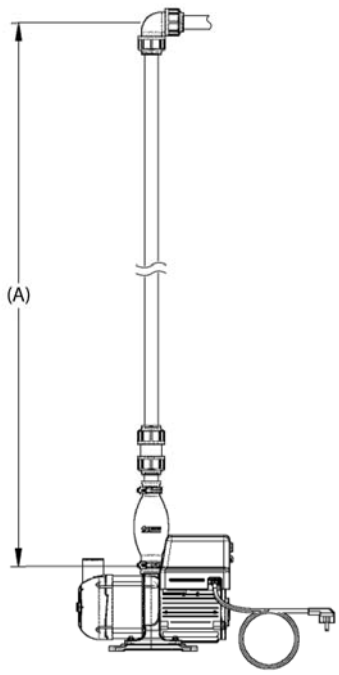
For lifting capacity over and above the maximum lifting height, contact your local Jets™ supplier.

If there is an incline in the pipe connection from the outlet, a stop valve is recommended to prevent backflow during service and maintenance on the pump. Refer to Jets™ Piping Guide for details.

Non-Return Valve

The unit is delivered with a Vacuumarator Tank Kit. This kit acts as a non-return valve, providing the unit with a greater lifting capacity.

Lifting Height - Outlet Pipe Connections



(A) Maximum 200cm

If there is an incline in the pipe connection from the outlet, a stop valve is recommended to prevent backflow during service and maintenance on the pump.

Refer to Jets™ Piping Guide for piping details and recommendations.

Installation Details

General installation information follows. Product related installation details are provided in the technical data for the following components. Please refer to their individual technical documentation for product specific installation details.

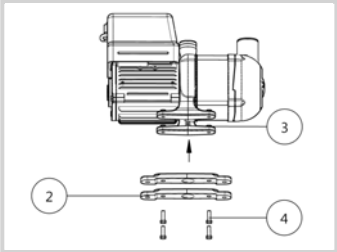
- Pump
- Control System
- Vacuumarator Tank Kit

Prior to Installation

Read and understand all documentation prior to starting installation. Ensure that all safety precautions have been taken in line with this document. Note that product installation information and details is located in the products technical data sheet.

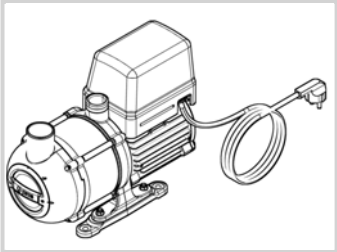
Installation Steps

NOTE! The following drawings are for illustration purposes only and may vary from the products included in the delivery. Please refer to the technical information provided for each component in the delivery for specific installation details.



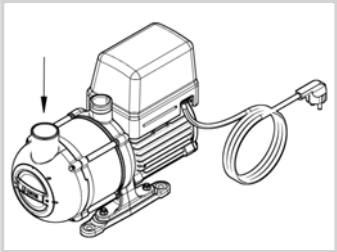
1

Position a Lock nut w/flange on each of the four screw holes on the pumps feet. Attach the Mounting Bracket ② using the screws provided (Screw, M6x25).



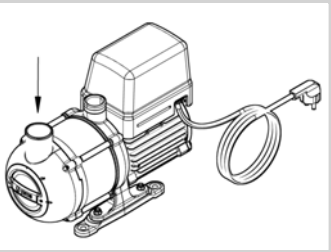
2

Place the pump in position on a sturdy level surface.



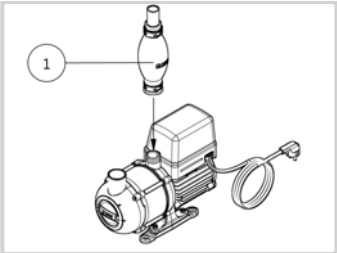
3

Fill the pump (through the inlet) with water.



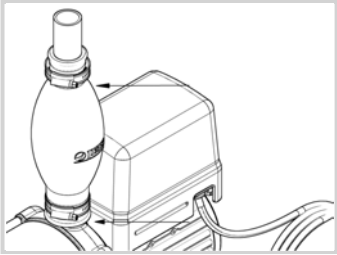
4

Connect the inlet pipe to the pump (Ø50 mm pipe connection).



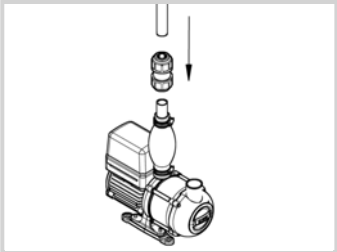
5

Press the Vacuumarator Tank Kit ① onto the pump outlet.



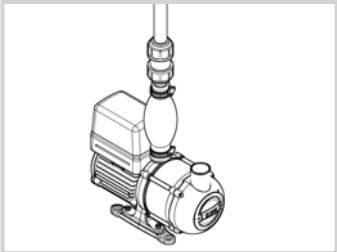
6

Secure the hose clamps.



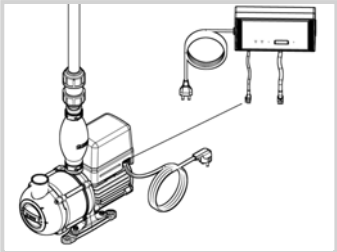
7

Insert the outlet piping into the Vacuumarator Tank Kit.



8

The outlet pipe from the pump is under pressure during operation. Secure the connection.



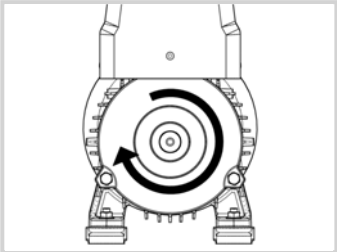
9

Install the control system as per the instructions provided in the product's technical information.

Check and make any adjustments to the settings if required.

10

Connect the pump to the control system. Refer to your control systems technical information for details.



11

Ensure that the pump rotates in the correct direction as per the arrow on the serial number label. For further information refer to the pumps technical information.

12

System Startup Procedures

On completion of the installation, the following startup procedures should be carried out to ensure that the system has been properly connected and that all components are functioning as intended.

1. Carry out a system test for the control system.
2. Carry out the startup procedure for the pump.

Service and Maintenance

See service and maintenance recommendations for the following components. The information is located in the products technical information.

- Pump
- Controller

Spare Parts and Accessories

Available spare parts are indicated in the component list for the pump. Spare parts and accessories can be ordered via your local Jets Vacuum AS supplier. For multi-pump installations, a complete recommendation for spare parts is available. Contact your Jets Vacuum AS supplier for details.

- Disassembly of components may void the warranty.
- Refer to the technical data sheets for specific product information. Refer to the products troubleshooting information for general maintenance.
- It is recommended that service and maintenance routines be carried out in accordance with the information in this document.
- Note that spare parts may be available for sub-assembly products. See the individual product data sheets for spare part listings.

Service and Maintenance Assistance

Jets Vacuum AS provides all customers with 24 hour worldwide technical assistance. For urgent matters, please contact Jets Vacuum AS Service Department at +47 70 03 91 00. For other matters, please contact your nearest authorized supplier.

When making enquiries, please have the following information available.

- Order Number
- Pump model number.
- Pump serial number (the serial number identification is located on the label applied to the pump).
- Part number, description, quantity (see the product component list for details).

Disassembly Instructions

Prior to carrying out disassembly/assembly of the equipment, ensure that all safety information has been read and understood.

Turn the power switch off and disconnect the power plug before starting any maintenance.

Refer to the installation instructions and carry out the procedure in reverse.

Disassembly and assembly information for vacuum unit components is located in the products technical information.

Jets™ Ultima Pump creates vacuum and macerates waste water to a fine pulp. The compact and efficient multiphase design compliments its reliable function, optimizing transport of waste.

Features:

- The pump has been designed for direct connection to a wide variety of sources.
- The pump's outlet can be connected to gravity piping, a holding tank, an effluent treatment plant or other outlet types.
- Compact multiphase pump design with a small footprint.
- Unique installation flexibility, due to clever design and weight savings.

Warranty

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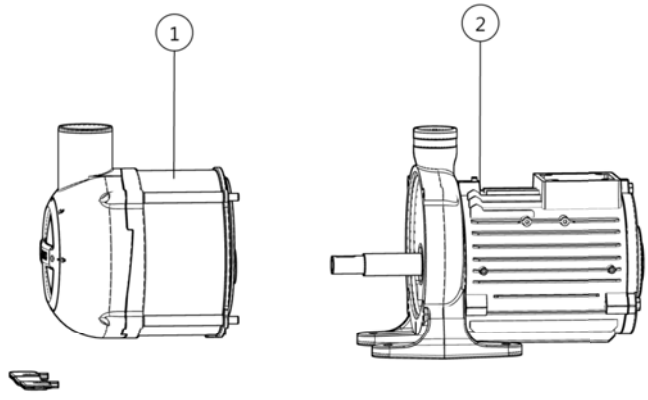


Technical Data

CE

Pump Type	Multiphase
Capacity	9.5 m³/n ACMH at 500 mbar (50% vacuum) 50 Hz
Outside Dimensions	382 x 161 x 216 mm (LxWxH)
Weight	13.9 kg
Generic Material	PP
Connection Inlet	Ø 50 mm
Connection Outlet	Ø 40 mm
Protection Class	IP 55
Insulation Class	F
Duty	S1-100%
Ambient Temperature	45 °C
Ambient Temperature Range	Min ÷20 °C - Max +45 °C
Humidity	Class F / 95%
Conformity	Efficiency class IE1 in accordance with exceptions given in IEC60034-30

Operating Data

Frequency	50 // 60 Hz
Voltage	Y N/A /Δ220-240 // Y N/A /Δ250-275 V
Nominal Current	N/A /4.5 // N/A /4.5 A
Speed	C-CW 2860 // 3440 rpm
Power Output	1.1 // 1.3 kW
Power Factor	0.87 // 0.86 cos ϕ
Efficiency	70.2 // 73%
Starting Current d.o.l.	610 // 630 %

Patents and Trademarks

Disclaimer

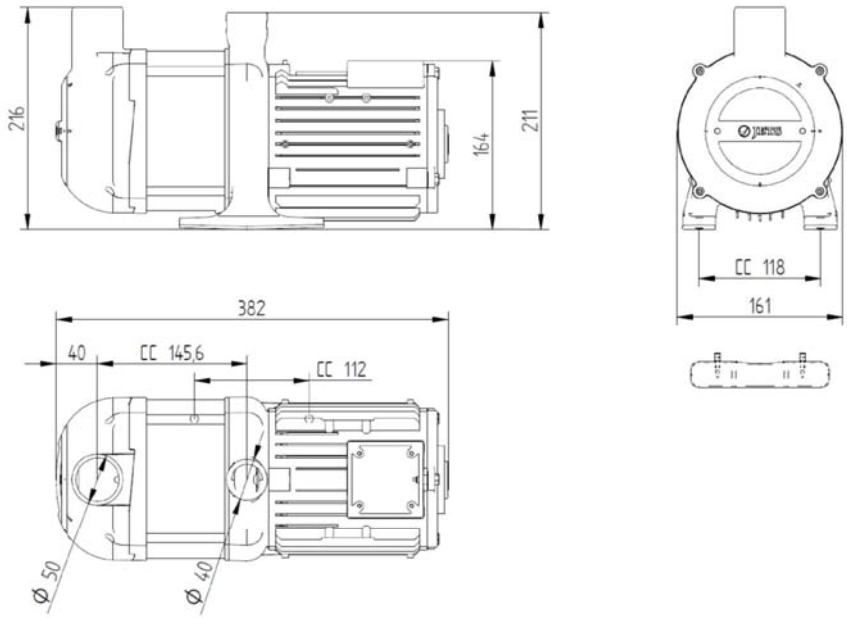
Components

Construction Characteristics

1	JETS Ultima C200 Vacuumarator	02U016000
2	Motor	031231800*

** Component/s avaliable as replacement parts.*

Technical Dimensions



Mode of Operation

The Ultima pump's main function is to create vacuum in a piping system. It has been designed for connection to any kind of sewage treatment plant, collecting tank or virtually any other processing or storage unit. The pump is a lightweight multiphase pump, designed with an in built macerator. The single-shaft design is unique in it's renowned simplicity. The principle of operation is a helical rotor running in a cylindrical housing, which together with two end plates, forms the pump body.

When the Ultima pump is in operation, a liquid ring is created around the rotor. The thickness of the liquid ring is governed by the size of the opening in the end plate on the pressure side. This opening is arranged so that the created liquid ring touches the rotor hub on one side and the rotor tips on the other. This arrangement creates a series of progressive crescent shaped cavities traveling from the suction to the pressure side. Air and waste water is pulled into those cavities and transported through the Ultima pump.

Waste water is macerated by the in built macerator before it enters the pump body. The macerator consists of one rotating knife fixed to the shaft and one stationary knife fixed to the suction chamber.

Design Advantages

The pump is purpose-built to withstand the rigors of extensive continuous use, and made from the highest quality materials. The versatile and compact design allows installation in tight spaces.

Multiphase pumps can accommodate all fluid stream properties up to 100 percent liquid and air, and all combinations in between. The flow stream can also contain abrasives such as dirt or particles. The multiphase pump is designed to operate under changing/fluctuating process conditions, changing process fluid composition, temperature variations, high and low operating pressures and exposure to abrasive/erosive media. Multiphase pumping also helps eliminate emissions of greenhouse gases.

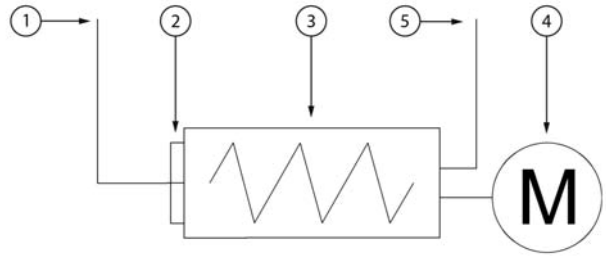
The monoblock design with motor, screw and macerator on the same shaft provides a safe and simple construction and with few moving parts, ensures operational stability. In-line design allows easy installation and a flexible pipe layout. Sewage is collected, macerated and discharged in a single-pass operation. No recirculation means no foaming and lower energy consumption. Continuous flow instead of recirculation enhances any downstream treatment process. The temperature of the sewage stays low, providing better treatment efficiency. The Vacuumarator™ pump is a highly self-contained unit independent of a separate water supply.

Precision engineering ensures perfect fit of all pump components. The result is a pump that works effectively with a lengthy life span.

Function and Principle - Jets™ Ultima Pump

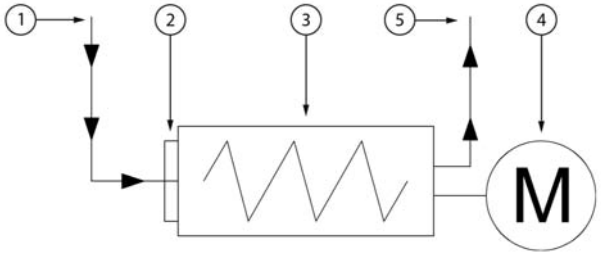
Explanation of the Ultima Pump's Function

① Inlet
② Macerator
③ Helical Screw
④ Motor
⑤ Outlet



Normal Position - Pump Inactive

- Motor ④ - INACTIVE
- Helical Screw ③ - INACTIVE
  Macerator ② - INACTIVE



Running Conditions - Activated Sequence

1. Motor ④ - ACTIVATED
2. Helical Screw ③ - ACTIVATED
   Macerator ② - ACTIVATED
3. Inlet ① - FLOWS
4. Outlet ⑤ - FLOWS

Running Conditions - Deactivation Sequence

1. Motor ④ - DEACTIVATED
2. Helical Screw ③ - DEACTIVATED
   Macerator ② - DEACTIVATED
3. Inlet ① - FLOW STOPS
   Outlet ⑤ - FLOW STOPS

Description

Macerator: The macerator grinds waste to a fine pulp.

Helical Screw: The helical screw uses liquid to create a seal facilitating vacuum in the pump housing.

Motor: Supplies power to support pump function.

Inlet: Flow inlet from the source into the pump.

Outlet: Flow outlet from the pump to the pipe connection/discharge.

Important Health and Safety Information

Installation, operation and maintenance must be carried out in strict accordance with this guide and with all applicable regulations. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets Vacuum AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets Vacuum AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets Vacuum AS (citing the safety reference number) for further clarification.

For further information about the included warnings or any other safety concerns please contact Jets Vacuum AS.

Safety Warning Symbols


WARNING: Indicates a potentially hazardous situation which, if not avoided could result in death or serious injury or equipment damage.


Symbol denotes required personal protective equipment is required.


Warns of biological materials that carry a significant health risk.


NOTICE: Indicates important information, which if not followed, may cause damage to equipment.


Symbol denotes required personal protective equipment is required.


Symbol denotes required personal protective equipment is required.


DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury or equipment damage.

Important Health and Safety Warnings


1.4 Warning
Safety equipment (PPE) necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.


1.10 Warning
Failure to properly lift and support equipment can result in serious physical injury and/ or equipment damage.


2.6 Notice
Place the equipment in an area that is easily accessible for maintenance.


3.1 Warning
All wiring should be performed by a licensed or certified electrician.


3.6 Warning
Risk of electric shock. Never connect the green (or green and yellow) wire to a live terminal.


3.28 Warning
Never work on the equipment when power is applied.


7.2 Warning
Do not touch an operating motor. Do not work on the equipment when the rotor is in operation. Before installation and maintenance work on equipment, stop the motor. Be aware of rotating parts of the motor.


7.4 Warning
Never place objects on top of the vacuum system. Restricting the vacuum system ventilation openings can cause overheating.


7.6 Warning
Never install, use or service any component of this device in an atmosphere with potentially flammable or explosive vapors.


7.8 Warning
Pump motor is equipped with an automatic resetting thermal protector and may restart unexpectedly. Protector tripping is an indication of motor overloading because of operating pump at low heads (low discharge restriction), excessively high or low voltage, inadequate wiring, incorrect motor connections or defective motor or pump.


7.10 Notice
DO NOT obstruct the openings and slits provided for ventilation and heat dispersal.


7.15 Warning
Reverse operation will cause extenxsive damage to the pump.


1.5 Personal Protective Equipment - Goggles
Wear safety glasses with side shields at all times when working with equipment.


2.1 Warning
The safety of the equipment is guaranteed only if it is used in compliance with the instructions provided by the supplier. The limits indicated must never be exceeded in any given situation.


2.11 Warning
Beware of sharp surfaces.


3.5 Warning
Ensure that the line voltage and frequency of electrical current supply agrees with the equipment specifications


3.21 Warning
Do not use plugs or connectors that are damaged.


7.1 Warning
To reduce the risk of electrical shock, the pump should be plugged directly into a properly installed and grounded 3-prong grounding type receptacle. The green (or green and yellow) conductor in the cord is the grounding wire. The motor must be securely and adequately grounded for protection against shock.


7.3 Danger
Keep fingers and foreign objects away from ventilation and other openings. Do not insert any objects into the motor.


7.5 Warning
Never operate the vacuum system with the cover removed.


7.7 Danger
Do not handle the pump or pump motor with wet hands when standing on a wet or damp surface or when standing in water. Fatal electric shock may occur.


7.9 Warning
Operation of any pumping system with a blocked suction and discharge must be avoided in all cases. Operation, even for a brief period under these conditions, can cause superheating of enclosed pump and result in a violent explosion. All necessary measures must be taken by the end user to ensure this condition is avoided.


7.11 Warning
Do not run the pump dry. Running the pump without sufficient water will result in damage to equipment. Ensure that a sufficient water level is maintained.


9.2 Danger
Disease Hazards: Effluent is a common mode of transmission for parasitic organisms. Some of these may be pathogenic, meaning that they may have the capability of causing serious communicable disease. Good personal hygiene, use of disinfectant soap and avoidance of hand to mouth transfer are necessary for all working in contact with the equipment. Skin abrasions, punctures or wounds of any other nature require immediate and proper medical attention.

12.2 Notice
Additional and replacement parts should only be obtained from the manufacturer or distributor

12.5 Notice
Use this equipment only in the manner intended by Jets Vacuum AS. If you have questions after reading these instructions contact Jets Vacuum AS directly.

12.6 Notice
DO NOT use the Jets™ sanitary system if any component is damaged or missing.

Delivery, Receipt of Goods and Transportation

Goods to be protected against shock, dust, humidity and moisture. Suitable adequately dimensioned transporting equipment is to be used. Note that the equipment may contain components that are easily damaged as a result of inappropriate handling. Jets Vacuum AS is not responsible for or liable for delivery delays resulting from occurrences outside of Jets Vacuum AS' immediate control. On receipt of goods, check for visual damage. Any damage detected after dispatch should be reported immediately to Jets Vacuum AS. Damages and/or discrepancies must be reported in writing no later than eight (8) days after receipt of goods. Commissioning must be postponed until the equipment has been inspected. Do not dispose of damaged items. Your direct supplier will advise you of the procedure to follow.

Storage

Unless otherwise specified, goods are to be stored in a dry environment between -30°C and +40°C prior to installation. The storage location must be dust free, low humidity (≤95%) and be free from moisture. Keep clear of foreign objects.

Installation to End Use

The Vacuumarator™ pump has been designed to operate at peak performance under the following climatic conditions: Site to be a dry environment between +0°C and +45°C at altitudes ≤3000m above sea level. Operation above this altitude will result in de-rated values. Operation in temperatures above 45°C will result in reduced pump capacity. Use in environments below 0°C requires use of antifreeze. The site location is to be low vibration (Vrms ≤0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free, free from moisture, free from condensation and have an average relative humidity of maximum 95%.

Installation

The pump is designed for operation with a motor controller or equal control device. Refer to Jets™ range of motor controllers designed for this application.

Lifting Instructions

1.10 Warning
Failure to properly lift and support equipment can result in serious physical injury and/or equipment damage.

The pump is always to be lifted, moved and transported in a horizontal position. Prior to moving the pump, ensure that the following information has been considered.

- Total weight.
- Center of gravity.
- Maximum outside dimensions.

Drain the pump of all liquid. Rinse and plug any openings to prevent spillage.

Installation Site Considerations

1. Information required to determine floor spaces/installation space requirements can be determined from dimension drawings. Consider pipe installations and other installations, such as mounting plates.
2. The location of the installation should have sufficient clearance around the pump to allow ventillation and heat dispersal.
3. Installation must comply with all local, state and federal safety codes and practices.
4. Select a mounting plate/surface, which will minimize vibration and/or torsion of the baseplate. A solid and sturdy base is necessary.
5. It is recommended that the pump be installed at the same level or lower than the lowest waste water source in the system.

Installation

1. To avoid foreign matter entering the pump, do not remove the protective covering on the pumps inlet/outlet until pipes are to be connected.
2. Flush the piping system and/or any connections to the pump to ensure that all particles have been removed prior to connection.
3. Check any piping to be connected for leakage prior to connection.
4. Ensure that all safety information has been read and precautions have been taken.
5. Using a 4mm hexagon key, manually rotate the shaft by turning the hex screw on the motor end of the pump. Thoroughly check and ensure that all moving parts rotate freely without obstruction.
6. Check that the pump direction is correct in relation to connecting pipes. Ensure that the pump inlet is aligned with the inlet pipe and the pump outlet is aligned with the outlet pipe.
7. Securely connect the inlet pipe.
8. Securely connect the outlet pipe.
9. Ensure that the pump is placed on a flat surface and that all four foundation flanges are in contact with the surface.
10. Secure the pump to the base plate/in position at the installation site.

Electrical Installation

Prior to connecting and electrical wiring, ensure that all electrical safety warnings have been read and understood. Take the necessary precautions to prevent accident, injury or damage to equipment.

3.32 Warning
This product must be grounded. The equipment must be connected to a grounded mains socket-outlet. The plug must be plugged into an outlet that is properly installed and in accordance with local regulations. If you do not have access to a properly grounded outlet, contact a qualified electrician to install one.

3.1 Warning
All wiring should be performed by a licensed or certified electrician.

3.28 Warning
Never work on the equipment when power is applied.

Electrical Connection:

1. It is recommended that the pump be protected against overload by means of a circuit breaker and/or fuse. Circuit breakers and fuses are to be sized in accordance with the load amperage.
2. When connecting the pump, be sure to ground the motor.
3. Ensure that all local, state and electrical codes are observed.
4. Check that the rotation direction of the shaft is correct in relation to the rotation direction on the serial number label. Note that incorrect rotation may result in damage to the pump.

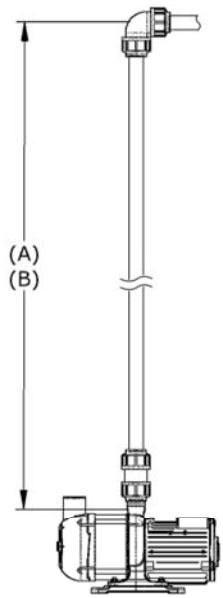
Electrical Connections

U – Red
V – Orange
W – Black

20 – Grey
E2 – Grey

3.1 Warning
All wiring should be performed by a licensed or certified electrician.

Lifting Height - Outlet Pipe Connections



(A) Minimum 32cm
(B) Maximum 100cm

On the pressure side (outlet) of the pump the outlet pipe must lift vertically to a minimum height of 32cm (total height from the pump outlet.

Lifting height of over 1 meter (with a direct pipe) requires the installation of a non-return valve.

If there is an incline in the pipe connection from the outlet, a stop valve is recommended to prevent backflow during service and maintenance on the pump.

Refer to Jets™ Piping Guide for piping details and recommendations.

Startup Procedures

Following installation, the following standard startup procedures are to be carried out to ensure pump function.

7.11 Warning
Do not run the pump dry. Running the pump without sufficient water will result in damage to equipment. Ensure that a sufficient water level is maintained.

Startup:

1. Ensure that the complete manual has been read and understood.
2. Ensure that all obstructions have been removed.
3. Carry out a visual inspection of the pump, ensuring no damage has occurred under installation.
4. Check that all safety guards/precautions are in place.
5. Ensure that the inlet and outlet pipes are securely attached.
6. Ensure that the electrical connections are correct as per the information provided on the motor name plate.
7. Using a 4mm hexagon key, manually rotate the shaft by turning the hex screw on the motor end of the pump. Check the rotation direction is in accordance with the serial number label (i.e. clockwise when observing the rotation from the motor end of the pump). Thoroughly check and ensure that all moving parts rotate freely without obstruction.
8. Fill water into the pump.
9. Turn on the power supply to the pump.
10. Turn on the switch on the pump's motor controller.
11. Check that the pump builds/generates vacuum.
12. If unusual vibration and/or noise is experienced, turn the pump off immediately. Refer to the troubleshooting guidelines.
13. If abnormal operation is experienced, turn the pump off immediately. Refer to the troubleshooting guidelines.

Startup Testing

1. Leak test the pump by filling the pump with water and checking for leaks. Any indication of leaking should be fixed using approved methods by a qualified person. See the products service and maintenance information for details. If no leak is found the pump is deemed acceptable.
2. Test the amperage to ensure that results are within the given readings on the motor name plate.

Shutting Down the Pump

3.28 Warning
Never work on the equipment when power is applied.

When taking a pump out of service, the following must be observed.

1. Run freshwater through the pump before shutting down the pump in order to reduce the risk of transmission of parasitic organisms.
2. Disconnect power to the pump.
3. Ensure the proper personal protective equipment (PPE) is worn.
4. Ensure that protective equipment/gloves/goggles are used to prevent contact with hazardous wastes.
5. Drain the pump of any liquid. If necessary, rinse with a neutral liquid.
6. Disconnect the pump inlet connection from the inlet pipe.
7. Disconnect the pump outlet connection from the outlet pipe.
8. Unscrew the pump from the baseplate/unscrew any installed vibration dampers.
9. If it is necessary to move/transport the pump, follow the lifting instruction guidelines.

Draining the Pump

A suitably dimensioned container is required.

1. Position the container under the pumps suction chamber.
2. Using the assembling tool provided, unscrew the pumps inspection glass.
3. Carefully drain any liquid into the container.

In Case of Breakdown

In the event of pump breakdown or loss of liquid, turn off the motor controllers on/off switch to stop the pump. Disconnect the power supply to the pump. Contact the responsible person in charge of pump operation. When handling the pump in the case of emergency, ensure that all safety precautions are taken and that service personnel are aware of the risks of transmission of parasitic organisms from effluent. Once resolved, follow start up procedures as outlined in this document.

Service and Maintenance

Intended Use

The pump is intended for pumping effluent and/or other liquids (100% or combinations of air and liquid with content including other particles such as dirt). To maintain the expected operational lifetime, the following should be observed.

1. Do not pump liquids containing cleaners that create foam.
2. Minimize pumping of liquids containing caustic cleaners (such as drain cleaner) or bleach.
3. Minimize pumping of abrasive, chlorine or corrosive cleaners.

Mild soap or biological cleaners are recommended. See Jets Vacuum AS product range for suitable cleaning solutions.

Scale Build Up

Pumps used for pumping effluent are subject to scale build up. Regular follow up during maintenance intervals is recommended based on pump usage. Scale build up, if left untreated, may affect the long term running condition of the pump and may lead to low vacuum.

To treat scale buildup, it is necessary to flush a suitable descale solution through the pump. For scale build up, we recommend use of Jets Vacuum AS descale products. Contact your Jets Vacuum AS supplier for information.

Out of Use - Not in Regular Use

If the pump is to stand unused over longer periods, the following precautions are to be taken.

1. Disconnect the power.
2. Drain the pump of liquid. See instructions under "Shutting Down the Pump".
3. Flush the pump with a neutral liquid.
4. Wipe out the interior of the pump with a soft dry cloth.

2.11 Warning
Beware of sharp surfaces.

5. Fill the pump with rust inhibitor that is compatible with all pump components. Rotate the shaft by hand to preserve all internal surfaces. Drain the excess liquid from the pump.
6. Plug/seal the inlet and outlet and any other openings that allow atmosphere into the pump.
7. Protect the exterior surfaces with an anti-rust material such as grease, oil etc.
8. Cover the pump with plastic or a similar protective material.
9. Rotate the shaft at regular intervals (approx. every 3 months) to prevent seizing.
10. Ensure that the pump is stored in a location where it will not be damaged. See storage information in this document.
11. The pump must be stored in a dry location free from moisture and vibration.

Frost and Freezing Conditions

For locations/installations where frost/freezing may occur, frost protection measures must be taken. For further information contact Jets Vacuum AS or your nearest supplier for a copy of technical information regarding frost protection measures.

The following procedures are to be observed when the pump is to be subjected to frost/freezing conditions.

1. IN USE: Liquid fed into the inlet pipe is to be dosed with appropriate quantities of a suitable antifreeze solution.
2. STORAGE: Drain the pump of liquid. See instructions under "Shutting Down the Pump".

CAUTION: Never use automotive antifreeze (ethylene glycol) in the toilet system.

NOTE: Failure to adequately protect the pump from damages may result in void of your warranty coverage.

NOTE: Jets Vacuum AS reserves the right to deny any warranty claim submitted if the claim is caused by frost/freezing damage.

Spare Parts and Accessories

Available spare parts are indicated in the component list for the pump. Spare parts and accessories can be ordered via your local Jets Vacuum AS supplier. For multi-pump installations, a complete recommendation for spare parts is available. Contact your Jets Vacuum AS supplier for details.

- Disassembly of components may void the warranty.
- Refer to the technical data sheets for specific product information. Refer to the products troubleshooting information for general maintenance.
- It is recommended that service and maintenance routines be carried out in accordance with the information in this document.
- Note that spare parts may be available for sub-assembly products. See the individual product data sheets for spare part listings.

Cleaning/Flushing the Pump

Fresh water supply may be connected to the suction chamber on the pump to flush and clean, when necessary, and to fill the pump with water after service.

Service and Maintenance Assistance

Jets Vacuum AS provides all customers with 24 hour worldwide technical assistance. For urgent matters, please contact Jets Vacuum AS Service Department at +47 70 03 91 00. For other matters, please contact your nearest authorized supplier.

When making enquiries, please have the following information available.

- Order Number
- Pump model number.
- Pump serial number (the serial number identification is located on the label applied to the pump).
- Part number, description, quantity (see the product component list for details).

Assembly Instructions

- All parts must be clean.
- Use soapy water when assembling the shaft seals.
- Always use new O-rings. Carefully ensure that all O-rings are in the correct position.
- Before tightening the bolts, the pump should be placed on a flat surface.
- Tighten bolts in a cross formation
- Lubricant is not to be used during assembly of the pump
- Control check all parts for wear and tear or damage and clean/replace parts as necessary
- Ensure that Loctite® or an equal type and quality locking compound is applied at the points indicated in the assembly procedure.
-  2.11 Warning
  Beware of sharp surfaces.

Locking Compound

The use of a thread locking compound (liquid anaerobic adhesive) such as Loctite® is recommended at marked assembly points. Loctite® may be exchanged for any suitable equal type and quality locking compound. This recommendation is made to increase the reliability of threaded assemblies.

Using a suitable thread locking compound:

- Reduces movement due to vibration and thermal expansion.
- Seals against corrosion and leakage.
- Acts as a thread lubricant.
- Reduces the need for on-torque adjustment.

Scheduled Maintenance

Interval	Action	Note
Weekly.	Carry out a visual inspection of the unit.	Remove any foreign matter that may interfere with function/ operation of the Vacuumarator™ pump.
Once per year (annually).	Check the Vacuumarator™ pump for scale build-up.	Carry out descaling of the Vacuumarator™ pump.
2 years or 6000 hours, whichever occurs first.	Change the bearings on the electrical motor.	
	Inspect and, if necessary, replace the shaft seal, Vacuumarator™ and electrical motor.	

Troubleshooting

Problem	Cause	Action
The pump does not start.	The macerator has become clogged.	Remove the blockage from the macerator.
	Power connection failure.	Disconnect the power supply. Clean and dry the connection and reconnect the power supply.
		Check for a tripped fuse and replace/reconnect if necessary.
Low Vacuum.	Lack of liquid to the Vacuumarator™ pump.	Check that the water supply to the Vacuumarator™ pump is sufficient during operation and correct if insufficient.
	Leakage in the vacuum pipes.	Check for leakage in the pipes and repair.
	The macerator has become clogged.	Remove the blockage.
	The pipes are clogged.	Remove the blockage from the pipes.
	Build up of urine scale in the pipes and/or pump.	Carry out descaling of the Vacuumarator™ pump.
	Foaming in the pump (may occur with too much soap or incorrect antifreeze).	Remove the foam by running freshwater through the pump.
Water is leaking from the Vacuumarator™ pump.	Defective shaft seals.	Check and replace the shaft seals.
Frequent start and stop of the Vacuumarator™ pump.	Leakage in the vacuum pipes.	Check for leakage in the pipes and repair.
Overload of the electric motor.	The motor protection relay has tripped.	Investigate the cause for the overload and repair.

Technical Data

Outside Dimensions.....84 x 84 x 231 mm (LxWxH)
Weight.....0.23 kg
Generic Material.....EPDM
Connection Inlet.....Ø 40 mm
Connection Outlet.....Ø 32 mm

Patents and Trademarks

Disclaimer

Warranty

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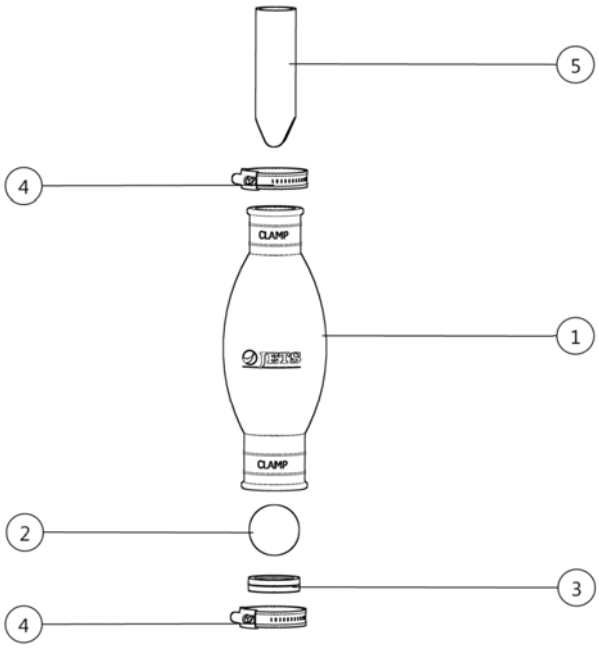

Components

Construction Characteristics

1 Vacuumarator Tank 0,6L.....012150160
2 Ball.....035317025
3 Sealing Ring.....037260702
4 Hose Clip 30-45mm.....034233900
5 Pipe Outlet, ø32mm.....034399225

Only available for sale as a complete item.

Lock nut w/flange

Product No. 036232910

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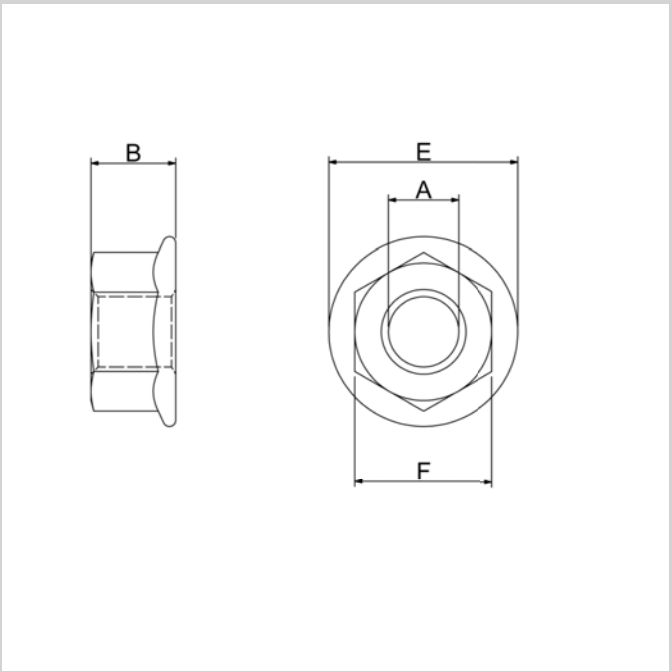

Technical Data

Type M6

Weight.....0.003 kg

Material Type.....A4

Nut.....A : 6M
B : 9.1mm
F : 10mm
E : 13.5mm

Standard.....DIN6923

Patents and Trademarks

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Jets™ Ultima Pump creates vacuum and macerates waste water to a fine pulp. The compact and efficient multiphase design compliments its reliable function, optimizing transport of waste.

- The pump has been designed for direct connection to a wide variety of sources.
- The pump's outlet can be connected to gravity piping, a holding tank, an effluent treatment plant or other outlet types.
- Compact multiphase pump design with a small footprint.
- Unique installation flexibility, due to clever design and weight savings.

Warranty

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Technical Data

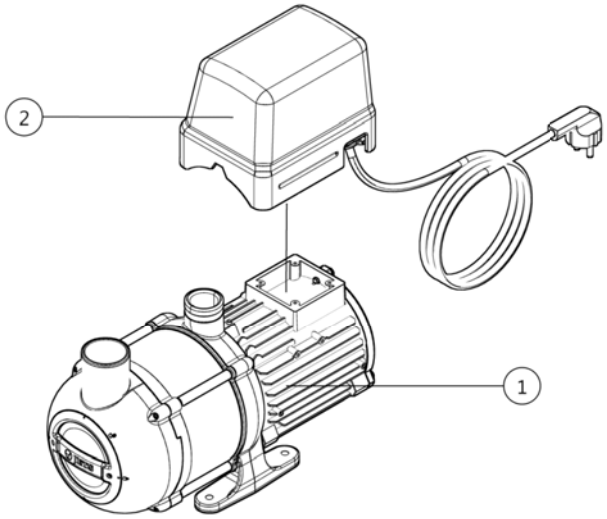
Pump Type	Multiphase
Capacity	9.5 m³/h ACMH at 500 mbar (50% vacuum) 50 Hz
Outside Dimensions	380 x 161 x 275 mm (LxWxH)
Weight	15.3 kg
Generic Material	PP
Connection Inlet	Ø 50 mm
Connection Outlet	Ø 40 mm
Conformity	Efficiency class IE1 in accordance with exceptions given in IEC60034-30
Connection - In	Input 1(2)/N/PE AC 230/240V 9.0A 50-60Hz
Recommended Circuit Breaker	C16 A
Earth Leakage Current	>3.5 mA to PE

Operating Data

Frequency	50 Hz
Voltage	230-240V
Speed	C-CW 2850 rpm

Patents and Trademarks

Disclaimer



Components

Construction Characteristics

1	JETS Ultima C200 AC	02U016001*
2	Motor Controller	031151350*

** Component/s avaliable as replacement parts.*

Technical Dimensions

Mode of Operation

The Ultima pump's main function is to create vacuum in a piping system. It has been designed for connection to any kind of sewage treatment plant, collecting tank or virtually any other processing or storage unit. The pump is a lightweight multiphase pump, designed with an in built macerator. The single-shaft design is unique in it's renowned simplicity. The principle of operation is a helical rotor running in a cylindrical housing, which together with two end plates, forms the pump body.

When the Ultima pump is in operation, a liquid ring is created around the rotor. The thickness of the liquid ring is governed by the size of the opening in the end plate on the pressure side. This opening is arranged so that the created liquid ring touches the rotor hub on one side and the rotor tips on the other. This arrangement creates a series of progressive crescent shaped cavities traveling from the suction to the pressure side. Air and waste water is pulled into those cavities and transported through the Ultima pump.

Waste water is macerated by the in built macerator before it enters the pump body. The macerator consists of one rotating knife fixed to the shaft and one stationary knife fixed to the suction chamber.

Design Advantages

The pump is purpose-built to withstand the rigors of extensive continuous use, and made from the highest quality materials. The versatile and compact design allows installation in tight spaces.

Multiphase pumps can accommodate all fluid stream properties up to 100 percent liquid and air, and all combinations in between. The flow stream can also contain abrasives such as dirt or particles. The multiphase pump is designed to operate under changing/fluctuating process conditions, changing process fluid composition, temperature variations, high and low operating pressures and exposure to abrasive/erosive media. Multiphase pumping also helps eliminate emissions of greenhouse gases.

The monoblock design with motor, screw and macerator on the same shaft provides a safe and simple construction and with few moving parts, ensures operational stability. In-line design allows easy installation and a flexible pipe layout. Sewage is collected, macerated and discharged in a single-pass operation. No recirculation means no foaming and lower energy consumption. Continuous flow instead of recirculation enhances any downstream treatment process. The temperature of the sewage stays low, providing better treatment efficiency. The Vacuumarator™ pump is a highly self-contained unit independent of a separate water supply.

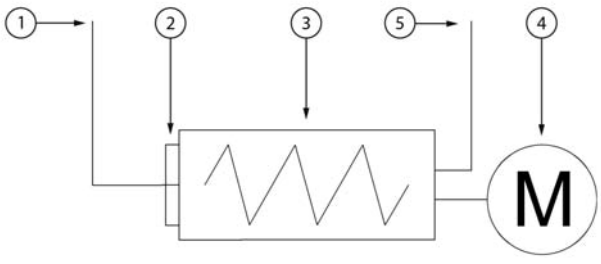
Precision engineering ensures perfect fit of all pump components. The result is a pump that works effectively with a lengthy life span.

The motor controller mounted on the pump is designed to control the speed and operation of the motor. The controller converts alternating current (AC) of one frequency to alternating current of another frequency, making the pump suitable for standard household power connections. This ensures energy efficient operation and simplifies the installation of the pump for the owner.

Function and Principle - Jets™ Ultima Pump

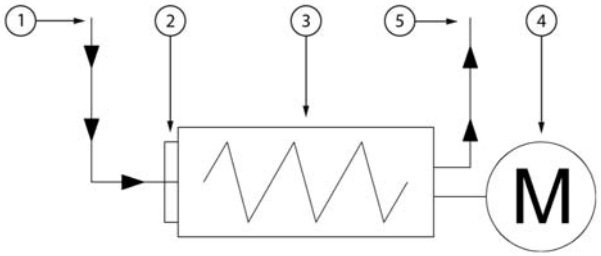
Explanation of the Ultima Pump's Function

① Inlet
② Macerator
③ Helical Screw
④ Motor
⑤ Outlet



Normal Position - Pump Inactive

- Motor ④ - INACTIVE
- Helical Screw ③ - INACTIVE
  Macerator ② - INACTIVE



Running Conditions - Activated Sequence

1. Motor ④ - ACTIVATED
2. Helical Screw ③ - ACTIVATED
   Macerator ② - ACTIVATED
3. Inlet ① - FLOWS
4. Outlet ⑤ - FLOWS

Running Conditions - Deactivation Sequence

1. Motor ④ - DEACTIVATED
2. Helical Screw ③ - DEACTIVATED
   Macerator ② - DEACTIVATED
3. Inlet ① - FLOW STOPS
   Outlet ⑤ - FLOW STOPS

Description

Macerator: The macerator grinds waste to a fine pulp.

Helical Screw: The helical screw uses liquid to create a seal facilitating vacuum in the pump housing.

Motor: Supplies power to support pump function.

Inlet: Flow inlet from the source into the pump.

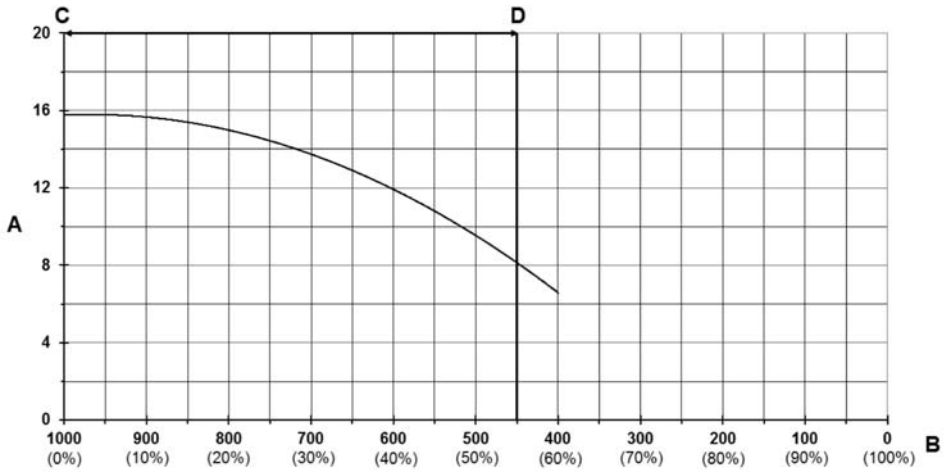
Outlet: Flow outlet from the pump to the pipe connection/discharge.

Capacity and Power Consumption Curves

Capacity curves represent performance under ideal conditions. The test method is modelled on the standard throughput method, as described in ISO21360-1.

For further information and test parameters, please refer to the Standard Performance Test.

Capacity 50 Hz

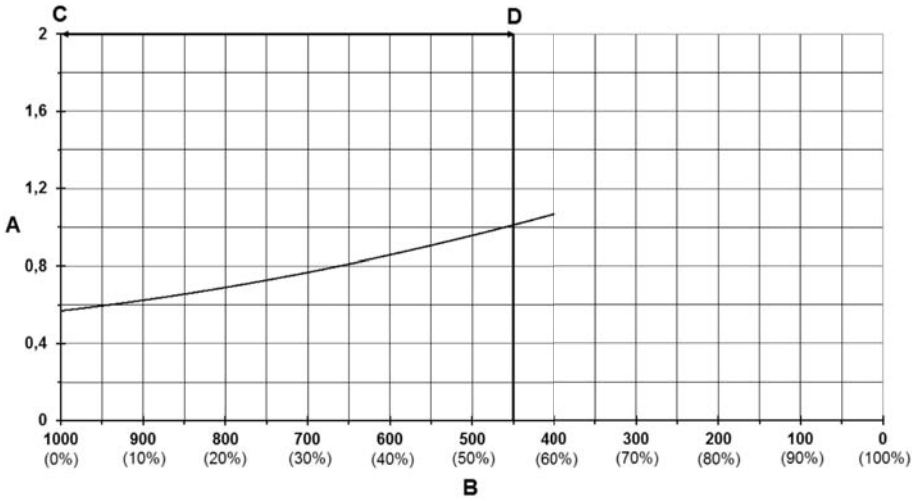


(A) Vertical axis [m3/h]
Actual cubic meters per hour

(B) Horizontal axis [mbar]
Absolute pressure
(Relative % below atmospheric pressure)

(C) - (D) Interval
Normal workload

Power Consumption 50 Hz



(A) Vertical axis [kW]
Power consumption

(B) Horizontal axis [mbar]
Absolute pressure
(Relative % below atmospheric pressure)

(C) - (D) Interval
Normal workload

Important Health and Safety Information

Installation, operation and maintenance must be carried out in strict accordance with this guide and with all applicable regulations. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets Vacuum AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets Vacuum AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets Vacuum AS (citing the safety reference number) for further clarification.

For further information about the included warnings or any other safety concerns please contact Jets Vacuum AS.

Safety Warning Symbols


Warns of risk of electrical shock which may cause significant physical injury or equipment damage.


General information to all users.


Symbol denotes required personal protective equipment is required.


Warns of biological materials that carry a significant health risk.


CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or equipment damage.


WARNING: Indicates a potentially hazardous situation which, if not avoided could result in death or serious injury or equipment damage.


Symbol denotes required personal protective equipment is required.


Symbol denotes required personal protective equipment is required.


DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury or equipment damage.


NOTICE: Indicates important information, which if not followed, may cause damage to equipment.

Important Health and Safety Warnings

1.4 Warning
Safety equipment (PPE) necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.

1.10 Warning
Failure to properly lift and support equipment can result in serious physical injury and/ or equipment damage.

2.6 Notice
Place the equipment in an area that is easily accessible for maintenance.

3.1 Warning
All wiring should be performed by a licensed or certified electrician.

3.5 Warning
Ensure that the line voltage and frequency of electrical current supply agrees with the equipment specifications

3.10 Warning
For equipment fitted with a frequency converter: In European CE compliant installations and in other installations where EMC emissions must be minimized, make a 360° high frequency grounding of cable entries in order to suppress electromagnetic disturbances

3.15 Warning
For equipment fitted with a frequency converter: Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that the following is observed.

3.17 Warning
Do not work on the control cables when power is applied to the frequency converter or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the frequency converter even when the main power on the frequency converter is switched off.

3.19 Notice
When reconnecting the motor cable, always check that the phase order is correct.

3.21 Warning
Do not use plugs or connectors that are damaged.

3.28 Warning
Never work on the equipment when power is applied.

1.5 Personal Protective Equipment - Goggles
Wear safety glasses with side shields at all times when working with equipment.

2.1 Warning
The safety of the equipment is guaranteed only if it is used in compliance with the instructions provided by the supplier. The limits indicated must never be exceeded in any given situation.

2.11 Warning
Beware of sharp surfaces.

3.2 Warning
Never work on the equipment when mains power is applied.
For equipment fitted with a frequency converter: After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the equipment.

3.6 Warning
Risk of electric shock. Never connect the green (or green and yellow) wire to a live terminal.

3.14 Warning
For equipment fitted with a frequency converter: A motor with frequency converter supply may energize even if the motor is at standstill.

3.16 Notice
Voltage between frequency converter input phases U1, V1 and W1 and the frame is close to 0 V

3.18 Notice
Do not make any insulation or voltage withstand tests on the frequency converter or frequency converter modules.

3.20 Warning
The terminals on the equipment are at a dangerously high voltage when the input power is on, regardless of whether the motor is running or not.

3.27 Warning
Never work on the equipment when mains power is applied.
For equipment fitted with a frequency converter: After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the equipment. Before undertaking any electrical service, the main circuit breaker should be de-energized and labeled "out of service".

3.32 Warning
This product must be grounded. The equipment must be connected to a grounded mains socket-outlet. The plug must be plugged into an outlet that is properly installed and in accordance with local regulations. If you do not have access to a properly grounded outlet, contact a qualified electrician to install one.

7.1 Warning
To reduce the risk of electrical shock, the pump should be plugged directly into a properly installed and grounded 3-prong grounding type receptacle. The green (or green and yellow) conductor in the cord is the grounding wire. The motor must be securely and adequately grounded for protection against shock.

7.2 Warning
Do not touch an operating motor. Do not work on the equipment when the rotor is in operation. Before installation and maintenance work on equipment, stop the motor. Be aware of rotating parts of the motor.

7.3 Danger
Keep fingers and foreign objects away from ventilation and other openings. Do not insert any objects into the motor.

7.4 Warning
Never place objects on top of the vacuum system. Restricting the vacuum system ventilation openings can cause overheating.

7.5 Warning
Never operate the vacuum system with the cover removed.

7.6 Warning
Never install, use or service any component of this device in an atmosphere with potentially flammable or explosive vapors.

7.7 Danger
Do not handle the pump or pump motor with wet hands when standing on a wet or damp surface or when standing in water. Fatal electric shock may occur.

7.8 Warning
Pump motor is equipped with an automatic resetting thermal protector and may restart unexpectedly. Protector tripping is an indication of motor overloading because of operating pump at low heads (low discharge restriction), excessively high or low voltage, inadequate wiring, incorrect motor connections or defective motor or pump.

7.9 Warning
Operation of any pumping system with a blocked suction and discharge must be avoided in all cases. Operation, even for a brief period under these conditions, can cause superheating of enclosed pump and result in a violent explosion. All necessary measures must be taken by the end user to ensure this condition is avoided.

7.10 Notice
DO NOT obstruct the openings and slits provided for ventilation and heat dispersal.

7.11 Warning
Do not run the pump dry. Running the pump without sufficient water will result in damage to equipment. Ensure that a sufficient water level is maintained.

7.12 Warning
A pump is a pressure vessel. Any pressure vessel can explode, rupture, or discharge its contents if sufficiently over pressurized causing death, personal injury, property damage, and/or damage to the environment. All necessary measures must be taken to ensure over pressurization does not occur.

7.15 Warning
Reverse operation will cause extenxsive damage to the pump.

9.2 Danger
Disease Hazards: Effluent is a common mode of transmission for parasitic organisms. Some of these may be pathogenic, meaning that they may have the capability of causing serious communicable disease. Good personal hygiene, use of disinfectant soap and avoidance of hand to mouth transfer are necessary for all working in contact with the equipment. Skin abrasions, punctures or wounds of any other nature require immediate and proper medical attention.

12.2 Notice
Additional and replacement parts should only be obtained from the manufacturer or distributor

12.5 Notice
Use this equipment only in the manner intended by Jets Vacuum AS. If you have questions after reading these instructions contact Jets Vacuum AS directly.

12.6 Notice
DO NOT use the Jets™ sanitary system if any component is damaged or missing.

Delivery, Receipt of Goods and Transportation

Goods to be protected against shock, dust, humidity and moisture. Suitable adequately dimensioned transporting equipment is to be used. Note that the equipment may contain components that are easily damaged as a result of inappropriate handling. Jets Vacuum AS is not responsible for or liable for delivery delays resulting from occurrences outside of Jets Vacuum AS' immediate control. On receipt of goods, check for visual damage. Any damage detected after dispatch should be reported immediately to Jets Vacuum AS. Damages and/or discrepancies must be reported in writing no later than eight (8) days after receipt of goods. Commissioning must be postponed until the equipment has been inspected. Do not dispose of damaged items. Your direct supplier will advise you of the procedure to follow.

Storage

Unless otherwise specified, goods are to be stored in a dry environment between -30°C and +40°C prior to installation. The storage location must be dust free, low humidity (≤95%) and be free from moisture. Keep clear of foreign objects.

Installation to End Use

The Vacuumarator™ pump has been designed to operate at peak performance under the following climatic conditions: Site to be a dry environment between +0°C and +45°C at altitudes ≤3000m above sea level. Operation above this altitude will result in de-rated values. Operation in temperatures above 45°C will result in reduced pump capacity. Use in environments below 0°C requires use of antifreeze. The site location is to be low vibration (Vrms ≤0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free, free from moisture, free from condensation and have an average relative humidity of maximum 95%.

Installation

Lifting Instructions

1.10 Warning
Failure to properly lift and support equipment can result in serious physical injury and/or equipment damage.

The pump is always to be lifted, moved and transported in a horizontal position. Prior to moving the pump, ensure that the following information has been considered.

- Total weight.
- Center of gravity.
- Maximum outside dimensions.

Drain the pump of all liquid. Rinse and plug any openings to prevent spillage.

Installation Site Considerations

1. Information required to determine floor spaces/installation space requirements can be determined from dimension drawings. Consider pipe installations and other installations, such as mounting plates.
2. The location of the installation should have sufficient clearance around the pump to allow ventillation and heat dispersal.
3. Installation must comply with all local, state and federal safety codes and practices.
4. Select a mounting plate/surface, which will minimize vibration and/or torsion of the baseplate. A solid and sturdy base is necessary.
5. It is recommended that the pump be installed at the same level or lower than the lowest waste water source in the system.

Installation

1. To avoid foreign matter entering the pump, do not remove the protective covering on the pumps inlet/outlet until pipes are to be connected.
2. Flush the piping system and/or any connections to the pump to ensure that all particles have been removed prior to connection.
3. Check any piping to be connected for leakage prior to connection.
4. Ensure that all safety information has been read and precautions have been taken.
5. Using a 4mm hexagon key, manually rotate the shaft by turning the hex screw on the motor end of the pump. Thoroughly check and ensure that all moving parts rotate freely without obstruction.
6. Check that the pump direction is correct in relation to connecting pipes. Ensure that the pump inlet is aligned with the inlet pipe and the pump outlet is aligned with the outlet pipe.
7. Securely connect the inlet pipe.
8. Securely connect the outlet pipe.
9. Ensure that the pump is placed on a flat surface and that all four foundation flanges are in contact with the surface.
10. Secure the pump to the base plate/in position at the installation site.

Electrical Installation

Prior to connecting and electrical wiring, ensure that all electrical safety warnings have been read and understood. Take the necessary precautions to prevent accident, injury or damage to equipment.

3.32 Warning
This product must be grounded. The equipment must be connected to a grounded mains socket-outlet. The plug must be plugged into an outlet that is properly installed and in accordance with local regulations. If you do not have access to a properly grounded outlet, contact a qualified electrician to install one.

3.1 Warning
All wiring should be performed by a licensed or certified electrician.

3.28 Warning
Never work on the equipment when power is applied.

Electrical Connection:

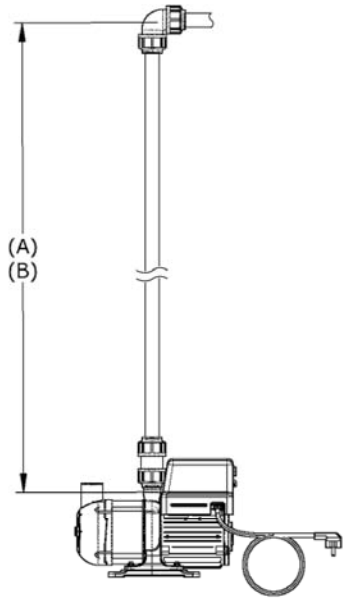
1. It is recommended that the pump be protected against overload by means of a circuit breaker and/or fuse. Circuit breakers and fuses are to be sized in accordance with the load amperage.
2. When connecting the pump, be sure to ground the motor.
3. Ensure that all local, state and electrical codes are observed.
4. Check that the rotation direction of the shaft is correct in relation to the rotation direction on the serial number label. Note that incorrect rotation may result in damage to the pump.

For electrical connection information for the Motor Controller, refer to the Motor Controllers technical information.

Outlet Pipe Connection

If there is an incline in the pipe connection from the outlet, a stop valve is recommended to prevent backflow during service and maintenance on the pump. Refer to Jets™ Piping Guide for details.

Lifting Height - Outlet Pipe Connections



(A) Minimum 32cm
(B) Maximum 100cm

On the pressure side (outlet) of the pump, the outlet pipe must lift vertically to a minimum height of 32cm (total height from the pump outlet.

Lifting height of over 1 meter (with a direct pipe) requires the installation of a non-return valve.

If there is an incline in the pipe connection from the outlet, a stop valve is recommended to prevent backflow during service and maintenance on the pump.

Refer to Jets™ Piping Guide for piping details and recommendations.

Startup Procedures

Following installation, the following standard startup procedures are to be carried out to ensure pump function.

7.11 Warning
Do not run the pump dry. Running the pump without sufficient water will result in damage to equipment. Ensure that a sufficient water level is maintained.

Startup:

1. Ensure that the complete manual has been read and understood.
2. Ensure that all obstructions have been removed.
3. Carry out a visual inspection of the pump, ensuring no damage has occurred under installation.
4. Check that all safety guards/precautions are in place.
5. Ensure that the inlet and outlet pipes are securely attached.
6. Ensure that the electrical connections are correct as per the information provided on the motor name plate.
7. Using a 4mm hexagon key, manually rotate the shaft by turning the hex screw on the motor end of the pump. Check the rotation direction is in accordance with the serial number label (i.e. clockwise when observing the rotation from the motor end of the pump). Thoroughly check and ensure that all moving parts rotate freely without obstruction.
8. Fill water into the pump.
9. Turn on the power supply to the pump.
10. Turn on the switch on the pump's motor controller.
11. Check that the pump builds/generates vacuum.
12. If unusual vibration and/or noise is experienced, turn the pump off immediately. Refer to the troubleshooting guidelines.
13. If abnormal operation is experienced, turn the pump off immediately. Refer to the troubleshooting guidelines.

Startup Testing

1. Leak test the pump by filling the pump with water and checking for leaks. Any indication of leaking should be fixed using approved methods by a qualified person. See the products service and maintenance information for details. If no leak is found the pump is deemed acceptable.
2. Test the amperage to ensure that results are within the given readings on the motor name plate.

Shutting Down the Pump

3.28 Warning
Never work on the equipment when power is applied.

When taking a pump out of service, the following must be observed.

1. Run freshwater through the pump before shutting down the pump in order to reduce the risk of transmission of parasitic organisms.
2. Disconnect power to the pump.
3. Ensure the proper personal protective equipment (PPE) is worn.
4. Ensure that protective equipment/gloves/goggles are used to prevent contact with hazardous wastes.
5. Drain the pump of any liquid. If necessary, rinse with a neutral liquid.
6. Disconnect the pump inlet connection from the inlet pipe.
7. Disconnect the pump outlet connection from the outlet pipe.
8. Unscrew the pump from the baseplate/unscrew any installed vibration dampers.
9. If it is necessary to move/transport the pump, follow the lifting instruction guidelines.

Draining the Pump

A suitably dimensioned container is required.

1. Position the container under the pumps suction chamber.
2. Using the assembling tool provided, unscrew the pumps inspection glass.
3. Carefully drain any liquid into the container.

In Case of Breakdown

In the event of pump breakdown or loss of liquid, turn off the motor controllers on/off switch to stop the pump. Disconnect the power supply to the pump. Contact the responsible person in charge of pump operation. When handling the pump in the case of emergency, ensure that all safety precautions are taken and that service personnel are aware of the risks of transmission of parasitic organisms from effluent. Once resolved, follow start up procedures as outlined in this document.

Service and Maintenance

Intended Use

The pump is intended for pumping effluent and/or other liquids (100% or combinations of air and liquid with content including other particles such as dirt). To maintain the expected operational lifetime, the following should be observed.

1. Do not pump liquids containing cleaners that create foam.
2. Minimize pumping of liquids containing caustic cleaners (such as drain cleaner) or bleach.
3. Minimize pumping of abrasive, chlorine or corrosive cleaners.

Mild soap or biological cleaners are recommended. See Jets Vacuum AS product range for suitable cleaning solutions.

Scale Build Up

Pumps used for pumping effluent are subject to scale build up. Regular follow up during maintenance intervals is recommended based on pump usage. Scale build up, if left untreated, may affect the long term running condition of the pump and may lead to low vacuum.

To treat scale buildup, it is necessary to flush a suitable descale solution through the pump. For scale build up, we recommend use of Jets Vacuum AS descale products. Contact your Jets Vacuum AS supplier for information.

Out of Use - Not in Regular Use

If the pump is to stand unused over longer periods, the following precautions are to be taken.

1. Disconnect the power.
2. Drain the pump of liquid. See instructions under "Shutting Down the Pump".
3. Flush the pump with a neutral liquid.
4. Wipe out the interior of the pump with a soft dry cloth.

2.11 Warning
Beware of sharp surfaces.

5. Fill the pump with rust inhibitor that is compatible with all pump components. Rotate the shaft by hand to preserve all internal surfaces. Drain the excess liquid from the pump.
6. Plug/seal the inlet and outlet and any other openings that allow atmosphere into the pump.
7. Protect the exterior surfaces with an anti-rust material such as grease, oil etc.
8. Cover the pump with plastic or a similar protective material.
9. Rotate the shaft at regular intervals (approx. every 3 months) to prevent seizing.
10. Ensure that the pump is stored in a location where it will not be damaged. See storage information in this document.
11. The pump must be stored in a dry location free from moisture and vibration.

Frost and Freezing Conditions

For locations/installations where frost/freezing may occur, frost protection measures must be taken. For further information contact Jets Vacuum AS or your nearest supplier for a copy of technical information regarding frost protection measures.

The following procedures are to be observed when the pump is to be subjected to frost/freezing conditions.

1. IN USE: Liquid fed into the inlet pipe is to be dosed with appropriate quantities of a suitable antifreeze solution.
2. STORAGE: Drain the pump of liquid. See instructions under "Shutting Down the Pump".

CAUTION: Never use automotive antifreeze (ethylene glycol) in the toilet system.

NOTE: Failure to adequately protect the pump from damages may result in void of your warranty coverage.

NOTE: Jets Vacuum AS reserves the right to deny any warranty claim submitted if the claim is caused by frost/freezing damage.

Spare Parts and Accessories

Available spare parts are indicated in the component list for the pump. Spare parts and accessories can be ordered via your local Jets Vacuum AS supplier. For multi-pump installations, a complete recommendation for spare parts is available. Contact your Jets Vacuum AS supplier for details.

- Disassembly of components may void the warranty.
- Refer to the technical data sheets for specific product information. Refer to the products troubleshooting information for general maintenance.
- It is recommended that service and maintenance routines be carried out in accordance with the information in this document.
- Note that spare parts may be available for sub-assembly products. See the individual product data sheets for spare part listings.

Cleaning/Flushing the Pump

Fresh water supply may be connected to the suction chamber on the pump to flush and clean, when necessary, and to fill the pump with water after service.

Service and Maintenance Assistance

Jets Vacuum AS provides all customers with 24 hour worldwide technical assistance. For urgent matters, please contact Jets Vacuum AS Service Department at +47 70 03 91 00. For other matters, please contact your nearest authorized supplier.

When making enquiries, please have the following information available.

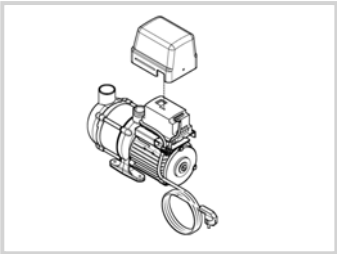
- Order Number
- Pump model number.
- Pump serial number (the serial number identification is located on the label applied to the pump).
- Part number, description, quantity (see the product component list for details).

Disassembly Instructions

Prior to carrying out disassembly/assembly of the equipment, ensure that all safety information has been read and understood.

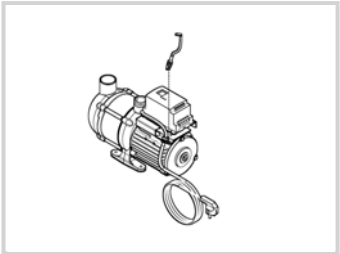
Turn the power switch off and disconnect the power plug before starting any maintenance.

Refer to the installation instructions and carry out the procedure in reverse.



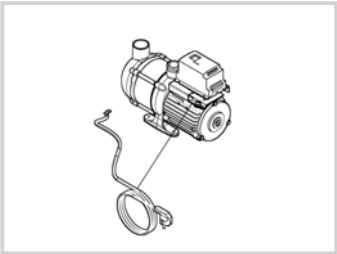
1

Lift and remove the cover from the motor controller.



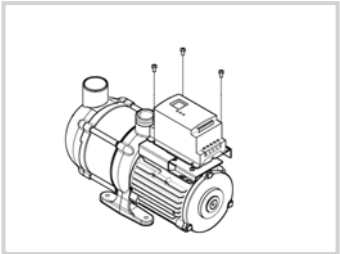
2

Remove the signal cable from the assembly.



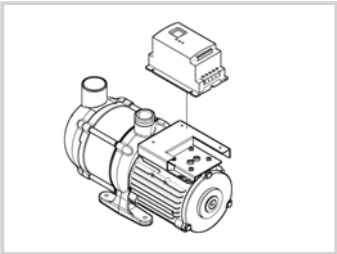
3

Remove the power cable from the assembly.



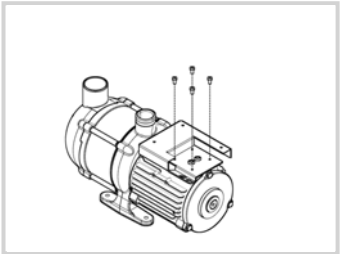
4

Unscrew the frequency converter from the bracket.



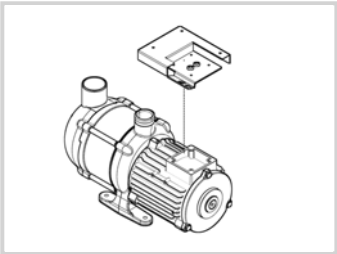
5

Lift and remove the frequency converter from the assembly.



6

Unscrew the screws on the bracket.



7

Remove the bracket from the pump.

Assembly Instructions

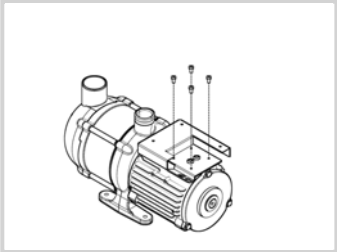
- All parts must be clean.
- Use soapy water when assembling the shaft seals.
- Always use new O-rings. Carefully ensure that all O-rings are in the correct position.
- Before tightening the bolts, the pump should be placed on a flat surface.
- Tighten bolts in a cross formation
- Lubricant is not to be used during assembly of the pump
- Control check all parts for wear and tear or damage and clean/replace parts as necessary
- Ensure that Loctite® or an equal type and quality locking compound is applied at the points indicated in the assembly procedure.
- 2.11 Warning
  Beware of sharp surfaces.

Locking Compound

The use of a thread locking compound (liquid anaerobic adhesive) such as Loctite® is recommended at marked assembly points. Loctite® may be exchanged for any suitable equal type and quality locking compound. This recommendation is made to increase the reliability of threaded assemblies.

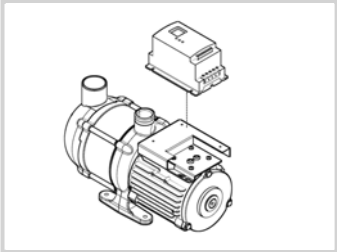
Using a suitable thread locking compound:

- Reduces movement due to vibration and thermal expansion.
- Seals against corrosion and leakage.
- Acts as a thread lubricant.
- Reduces the need for on-torque adjustment.



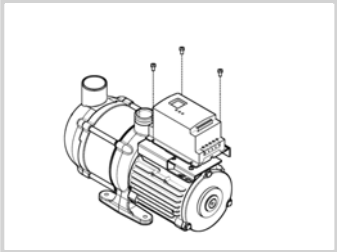
1

Screw the bracket onto the top of the pump motor.



2

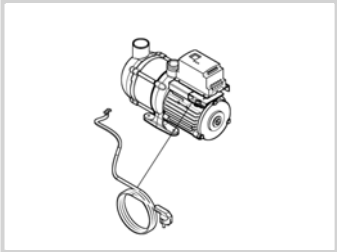
Position the frequency converter on top of the bracket.



3

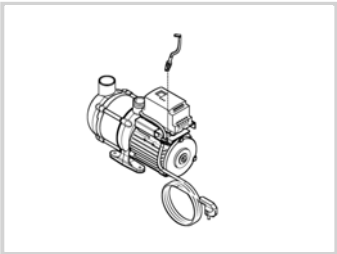
Insert and tighten the screws securing the frequency converter in place on the bracket.

For electrical connection details, refer to the Motor Controllers product data sheet.



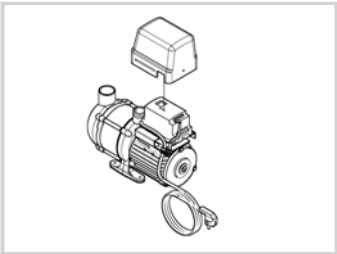
4

Attach the power cable to the motor controller.



5

Attach the signal cable to the motor controller.



6

Position the motor controller cover on the frequency converter.

Scheduled Maintenance

Interval	Action	Note
Weekly.	Carry out a visual inspection of the unit.	Remove any foreign matter that may interfere with function/ operation of the Vacuumarator™ pump.
Once per year (annually).	Check the Vacuumarator™ pump for scale build-up.	Carry out descaling of the Vacuumarator™ pump.
2 years or 6000 hours, whichever occurs first.	Change the bearings on the electrical motor.	
	Inspect and, if necessary, replace the shaft seal, Vacuumarator™ and electrical motor.	

Troubleshooting

Jets Vacuum AS provides the following troubleshooting information to assist in resolving issues that may arise with your installation. For more detailed information or assistance, please contact Jets Vacuum AS.

Problem	Cause	Action
The pump does not start.	The macerator has become clogged.	Remove the blockage from the macerator.
	Power connection failure.	Disconnect the power supply. Clean and dry the connection and reconnect the power supply.
		Check for a tripped fuse and replace/reconnect if necessary.
Low Vacuum.	Lack of liquid to the Vacuumarator™ pump.	Check that the water supply to the Vacuumarator™ pump is sufficient during operation and correct if insufficient.
	Leakage in the vacuum pipes.	Check for leakage in the pipes and repair.
	The macerator has become clogged.	Remove the blockage.
	The pipes are clogged.	Remove the blockage from the pipes.
	Build up of urine scale in the pipes and/or pump.	Carry out descaling of the Vacuumarator™ pump.
	Foaming in the pump (may occur with too much soap or incorrect antifreeze).	Remove the foam by running freshwater through the pump.
Water is leaking from the Vacuumarator™ pump.	Defective shaft seals.	Check and replace the shaft seals.
Frequent start and stop of the Vacuumarator™ pump.	Leakage in the vacuum pipes (CVS system).	Check for leakage in the pipes and repair.
Overload of the electric motor.	The motor protection relay has tripped.	Investigate the cause for the overload and repair.
Running faults.	Errors in the motor controller settings.	See the troubleshooting information in the motor controllers technical information.

Designed to control the speed and operation of a motor. The motor controller converts alternating current (AC) of one frequency to alternating current of another frequency. This results in a connection suitable for standard household power supply.

Warranty

All products of the company are sold and all services of the company are offered subject to Jets Vacuum AS General Sales Conditions detailing warranty and terms and conditions of sale, copies of which will be furnished upon request. The information provided herein is for guidance only; it does not constitute a guarantee of the performance or specification of any individual product or component.

Technical Data

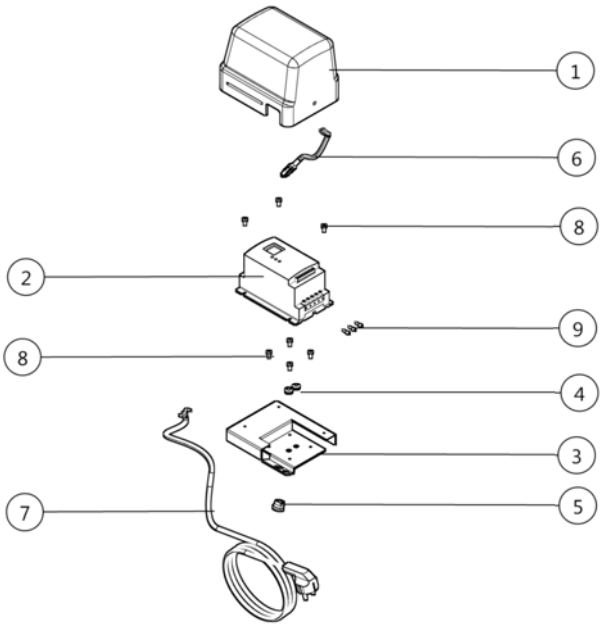
Weight	1.4 kg
Connection - In	Input 1(2)/N/PE AC 230/240V 9.0A 50-60Hz
Recommended Circuit Breaker	C16 A
Earth Leakage Current	>3.5 mA to PE
Cable Length	3 m
Plug Type	HS-R2
Protection Class	IP 20

Operating Data

Temperature Range	Minimum 0°C to Maximum 55°C

Patents and Trademarks

Disclaimer



Components

Construction Characteristics

1	Cover	031151330
2	Frequency Converter 0.75kW	121512217*
3	Bracket	010100722
4	Cable entry protection	121200423
5	Cable entry protection	121200424
6	Signal Cable 0,25m, female	121516203
7	Cable 2x1mm2+J, 3m	121200293*
8	Screw, M4x10	036532015
9	Cable Sleeve 1,5mm2	121200426

** Component/s avaliable as replacement parts.*

Important Health and Safety Information

Installation, operation and maintenance must be carried out in strict accordance with this guide and with all applicable regulations. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets Vacuum AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets Vacuum AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets Vacuum AS (citing the safety reference number) for further clarification.

For further information about the included warnings or any other safety concerns please contact Jets Vacuum AS.

Safety Warning Symbols


Warns of risk of electrical shock which may cause significant physical injury or equipment damage.


Symbol denotes required personal protective equipment is required.


Warns of biological materials that carry a significant health risk.


NOTICE: Indicates important information, which if not followed, may cause damage to equipment.


WARNING: Indicates a potentially hazardous situation which, if not avoided could result in death or serious injury or equipment damage.


Symbol denotes required personal protective equipment is required.


DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury or equipment damage.

Important Health and Safety Warnings


1.5 Personal Protective Equipment - Goggles
Wear safety glasses with side shields at all times when working with equipment.


3.2 Warning
Never work on the equipment when mains power is applied.
For equipment fitted with a frequency converter: After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the equipment.


3.5 Warning
Ensure that the line voltage and frequency of electrical current supply agrees with the equipment specifications


3.6 Warning
Risk of electric shock. Never connect the green (or green and yellow) wire to a live terminal.


3.10 Warning
For equipment fitted with a frequency converter: In European CE compliant installations and in other installations where EMC emissions must be minimized, make a 360° high frequency grounding of cable entries in order to suppress electromagnetic disturbances


3.14 Warning
For equipment fitted with a frequency converter: A motor with frequency converter supply may energize even if the motor is at standstill.


3.15 Warning
For equipment fitted with a frequency converter: Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that the following is observed.


3.16 Notice
Voltage between frequency converter input phases U1, V1 and W1 and the frame is close to 0 V


3.17 Warning
Do not work on the control cables when power is applied to the frequency converter or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the frequency converter even when the main power on the frequency converter is switched off.


3.18 Notice
Do not make any insulation or voltage withstand tests on the frequency converter or frequency converter modules.


3.19 Notice
When reconnecting the motor cable, always check that the phase order is correct.


3.20 Warning
The terminals on the equipment are at a dangerously high voltage when the input power is on, regardless of whether the motor is running or not.


3.21 Warning
Do not use plugs or connectors that are damaged.


3.27 Warning
Never work on the equipment when mains power is applied.
For equipment fitted with a frequency converter: After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the equipment. Before undertaking any electrical service, the main circuit breaker should be de-energized and labeled "out of service".


7.1 Warning
To reduce the risk of electrical shock, the pump should be plugged directly into a properly installed and grounded 3-prong grounding type receptacle. The green (or green and yellow) conductor in the cord is the grounding wire. The motor must be securely and adequately grounded for protection against shock.


7.2 Warning
Do not touch an operating motor. Do not work on the equipment when the rotor is in operation. Before installation and maintenance work on equipment, stop the motor. Be aware of rotating parts of the motor.


7.3 Danger
Keep fingers and foreign objects away from ventilation and other openings. Do not insert any objects into the motor.


7.4 Warning
Never place objects on top of the vacuum system. Restricting the vacuum system ventilation openings can cause overheating.


7.5 Warning
Never operate the vacuum system with the cover removed.


7.6 Warning
Never install, use or service any component of this device in an atmosphere with potentially flammable or explosive vapors.


7.7 Danger
Do not handle the pump or pump motor with wet hands when standing on a wet or damp surface or when standing in water. Fatal electric shock may occur.


7.8 Warning
Pump motor is equipped with an automatic resetting thermal protector and may restart unexpectedly. Protector tripping is an indication of motor overloading because of operating pump at low heads (low discharge restriction), excessively high or low voltage, inadequate wiring, incorrect motor connections or defective motor or pump.

7.9 Warning
Operation of any pumping system with a blocked suction and discharge must be avoided in all cases. Operation, even for a brief period under these conditions, can cause superheating of enclosed pump and result in a violent explosion. All necessary measures must be taken by the end user to ensure this condition is avoided.

7.11 Warning
Do not run the pump dry. Running the pump without sufficient water will result in damage to equipment. Ensure that a sufficient water level is maintained.

9.2 Danger
Disease Hazards: Effluent is a common mode of transmission for parasitic organisms. Some of these may be pathogenic, meaning that they may have the capability of causing serious communicable disease. Good personal hygiene, use of disinfectant soap and avoidance of hand to mouth transfer are necessary for all working in contact with the equipment. Skin abrasions, punctures or wounds of any other nature require immediate and proper medical attention.

12.5 Notice
Use this equipment only in the manner intended by Jets Vacuum AS. If you have questions after reading these instructions contact Jets Vacuum AS directly.

7.10 Notice
DO NOT obstruct the openings and slits provided for ventilation and heat dispersal.

7.12 Warning
A pump is a pressure vessel. Any pressure vessel can explode, rupture, or discharge its contents if sufficiently over pressurized causing death, personal injury, property damage, and/or damage to the environment. All necessary measures must be taken to ensure over pressurization does not occur.

12.2 Notice
Additional and replacement parts should only be obtained from the manufacturer or distributor

Delivery, Receipt of Goods and Transportation

Goods to be protected against shock, dust, humidity and moisture. Suitable adequately dimensioned transporting equipment is to be used. Note that the equipment may contain components that are easily damaged as a result of inappropriate handling. Jets Vacuum AS is not responsible for or liable for delivery delays resulting from occurrences outside of Jets Vacuum AS' immediate control. On receipt of goods, check for visual damage. Any damage detected after dispatch should be reported immediately to Jets Vacuum AS. Damages and/or discrepancies must be reported in writing no later than eight (8) days after receipt of goods. Commissioning must be postponed until the equipment has been inspected. Do not dispose of damaged items. Your direct supplier will advise you of the procedure to follow.

Storage

Unless otherwise specified, goods are to be stored in a dry environment between -30°C and +40°C prior to installation. The storage location must be dust free, low humidity (≤95%) and be free from moisture. Keep clear of foreign objects.

Installation to End Use

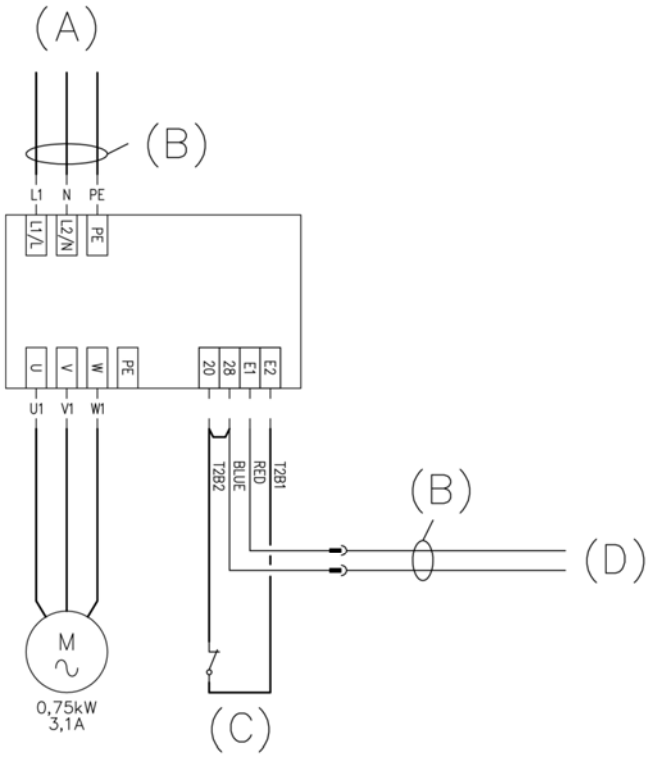
Site to be a dry environment between +0°C and +45°C. Use in environments below 0°C requires use of antifreeze in liquids. The site location is to be low vibration Vrms <0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free and protected from grinding and welding. It is of utmost importance that the site be protected from water, frost, moisture and humidity. Goods are to be stored as per the instructions for delivery, storage and transport. A visual inspection is to carried out on receipt of goods as well as at the time of installation to ensure that storage and transport conditions after receipt have not compromised the quality of the product/s.

Installation

Electrical Connection Diagram

3.1 Warning
All wiring should be performed by a licensed or certified electrician.

(A) Power Supply
(B) Pre-wired
(C) Temp. sensor
(D) Equipment/Control System



Service and Maintenance

All service and maintenance is to be carried out by a licenced or certified electrician. Please read all safety information prior to carrying out any maintenance to the equipment.

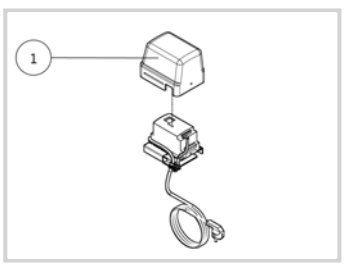
Troubleshooting Information

Refer to troubleshooting information for detailed settings information.

Note: In the event of an OC6 (motor overload) failure there is a 3 minute delay before resetting is possible. The delay is intended to allow time for the motor to cool.

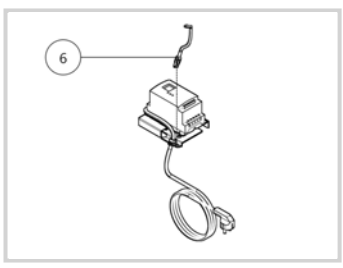
If the power is removed when the drive is in an "OC6" fault state, when the power is restored the "OC6" fault state will still be present and the delay will still be active even if the power was removed for longer than 3 minutes.

Disassembly Instructions



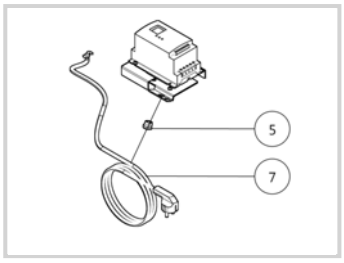
1

Remove the Cover ① from the assembly.



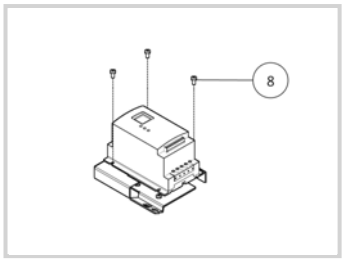
2

Remove the Signal Cable 0,25m, female ⑥ from the assembly.



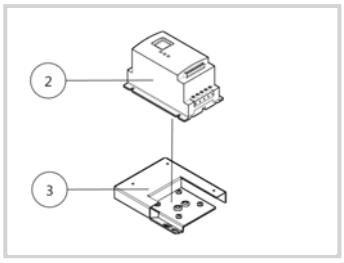
3

Remove the Cable entry protection ⑤ and the cable (Cable 2x1mm2+J, 3m) ⑦ from the assembly.



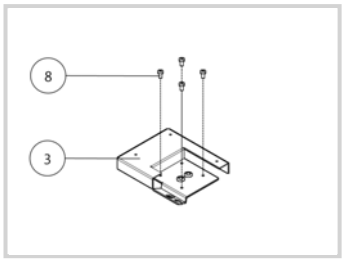
4

Unscrew the screws (Screw, M4x10) ⑧ on the Frequency Converter 0.75kW.



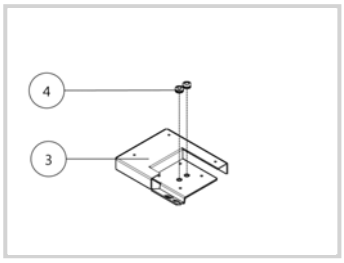
5

Lift the Frequency Converter 0.75kW ② from the Bracket ③.



6

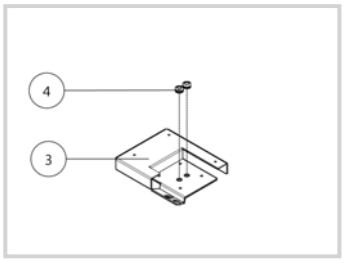
Remove the screws (Screw, M4x10) ⑧ from the Bracket ③.



7

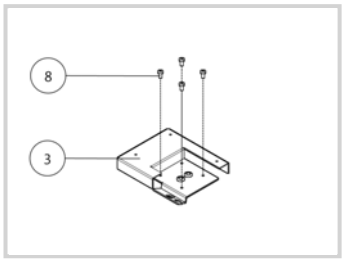
Remove the Cable entry protection ④ from the Bracket ③.

Assembly Instructions



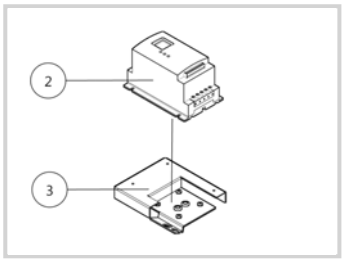
1

Affix the Cable entry protection ④ to the Bracket ③.



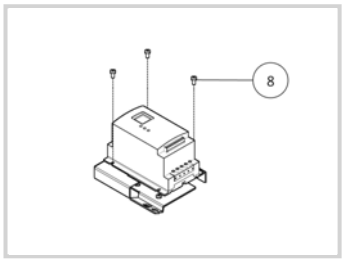
2

Screw in the four screws (Screw, M4x10) ⑧ to attach the Bracket ③.



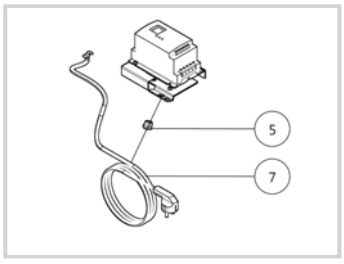
3

Position the Frequency Converter 0.75kW ② on the Bracket ③.



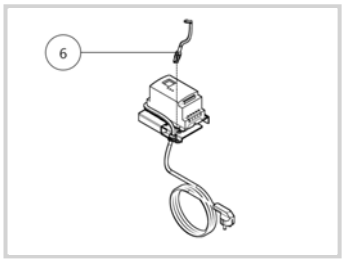
4

Secure the Frequency Converter 0.75kW with the screws (Screw, M4x10) ⑧.



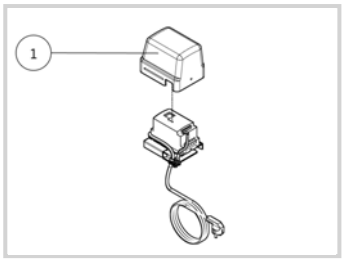
5

Affix the Cable entry protection ⑤ and the cable (Cable 2x1mm2+J, 3m) ⑦.



6

Affix the Signal Cable 0,25m, female ⑥.

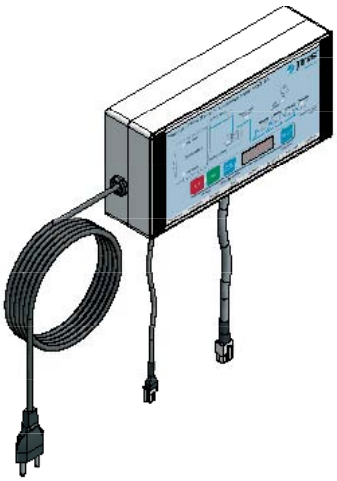


7

Place the Cover ① over the assembly.

Troubleshooting

Problem	Cause	Action
Display = OFF Stop (outputs U, V, W inhibited)	LOW signal at terminal 28.	Set terminal 28 to HIGH.
Display = CL Current limit reached	Controllable overload.	Automatically
Display = LU Undervoltage on DC bus	Mains voltage is too low.	Check the mains voltage.
Display = EEr External error	Digital input "TRIP set" is active.	Remove the external error.
Display = LC Automatic start inhibited	c42=0	LOW-HIGH signal change at terminal 28.
Display = OC 1 Short-circuit or overload	Short-circuit.	Find the reason for the short-circuit, check the motor cable.
	Excessive capacitive charging current of the motor cable.	Use shorter motor cables with lower charging current.
	Acceleration time (C12, c01) is too short.	- Increase acceleration time. - Check controller selection.
	Defective motor cable.	Check the wiring.
	Internal fault in the motor.	Check the motor.
	Frequent and long overload.	Check the controller selection.
Display = OC6 Motor overload (I^2t overload)	The motor is thermally overloaded due to: - impermissable continious current. - frequent or too long acceleration process.	- check the controller selection. - Check the setting of c20.
Display = OH Controller overtemperature	The controller is too hot inside.	- Reduce controller load. - Improve cooling.
Display = OU Overvoltage on DC bus	Mains voltage is too high.	Check the mains voltage.
	Excessively short deceleration time or motor in general mode.	Increase deceleration time or use dynamic braking operation.
	Earth leakage on the motor side.	Check the motor/motor cable (separate motor from the controller).
Display = StP Output frequency = 0 Hz (outputs U, V, W inhibited)	Setpoint = 0 Hz (C31 = 0)	Setpoint selection.
	Quick stop activated through digital input.	Deactivate quick stop.



VTS Controller

VOD

JETS STANDARD AS

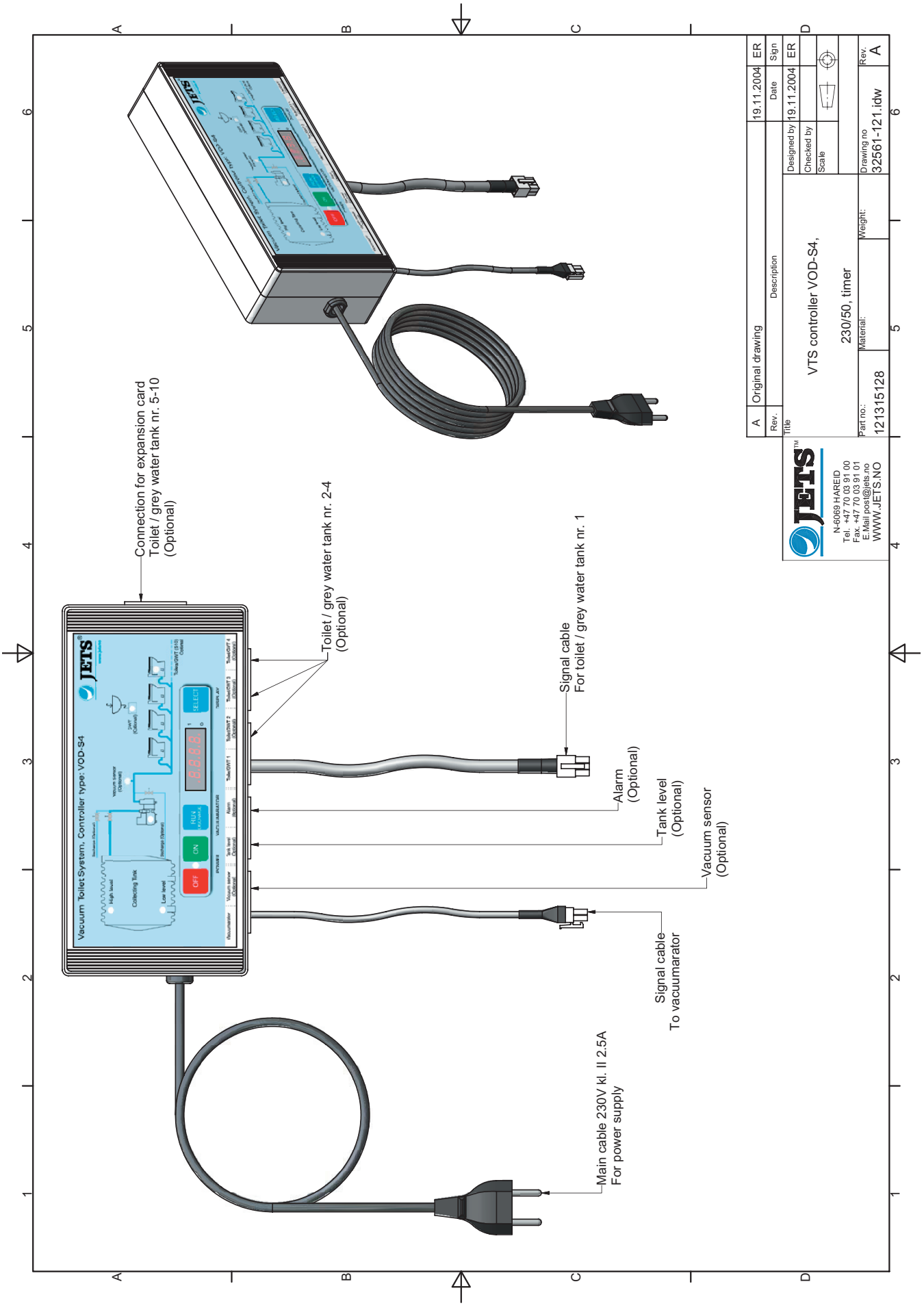
VTS-controller

The VTS-controller is the controller in a VOD-system. It recieves signal from the ush button in order to empty the toilet, start/stop of the Vacuumarator etc.
The VTS-controller is factory-programmed for 1 toilet, but is prepared for connection of 4 toilets/Grey Water Tanks.
It is possible to connect up to 10 toilets/Grey Water Tanks with an extension box connected.
All of the connected items can be changed to function as Grey Water Tank.
It is possible to integrate a level sensor in the collection tank for high/low level.
It is possible to integrate an external alarm.
It is also possible to integrate a vacuum transmitter for emptying of the toilets with exact vakuum level.

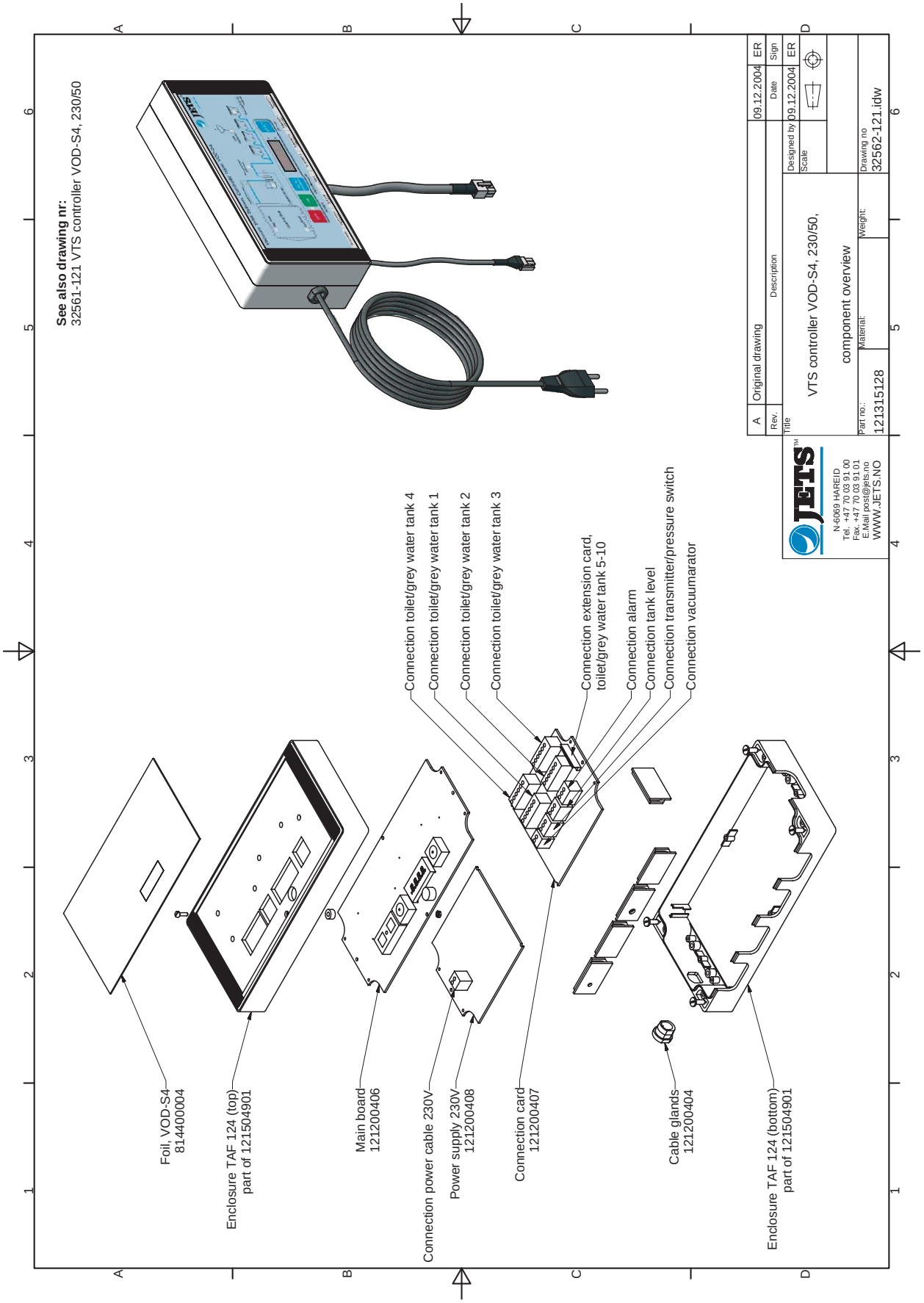
Part no. 230 VAC: 121 3151 28
Part no. 12-36VDC: 121 3151 29
Overall dimensions: 240 x 120 x 60 mm (l x w x h)

Content

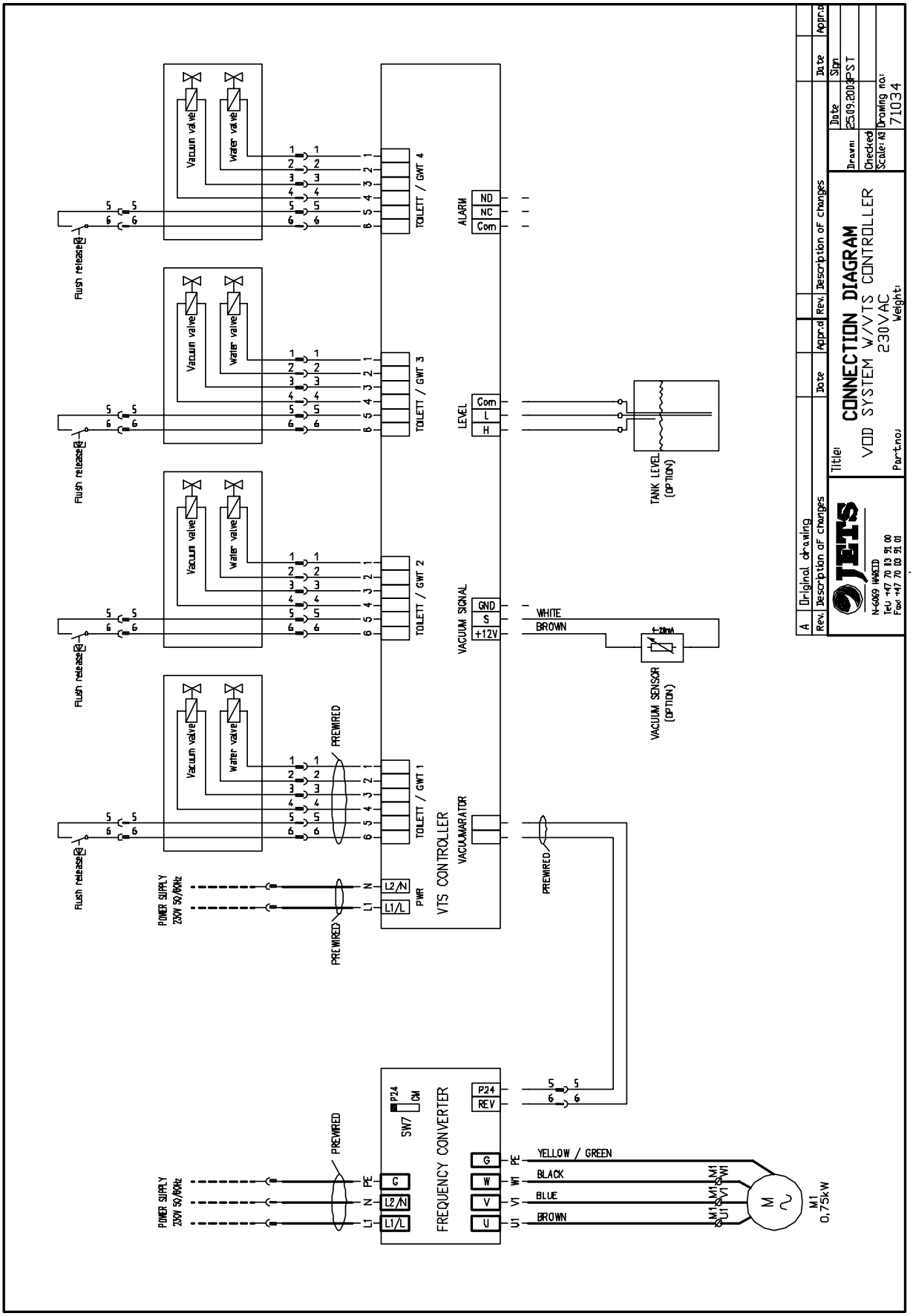
VTS - controller - 230VAC



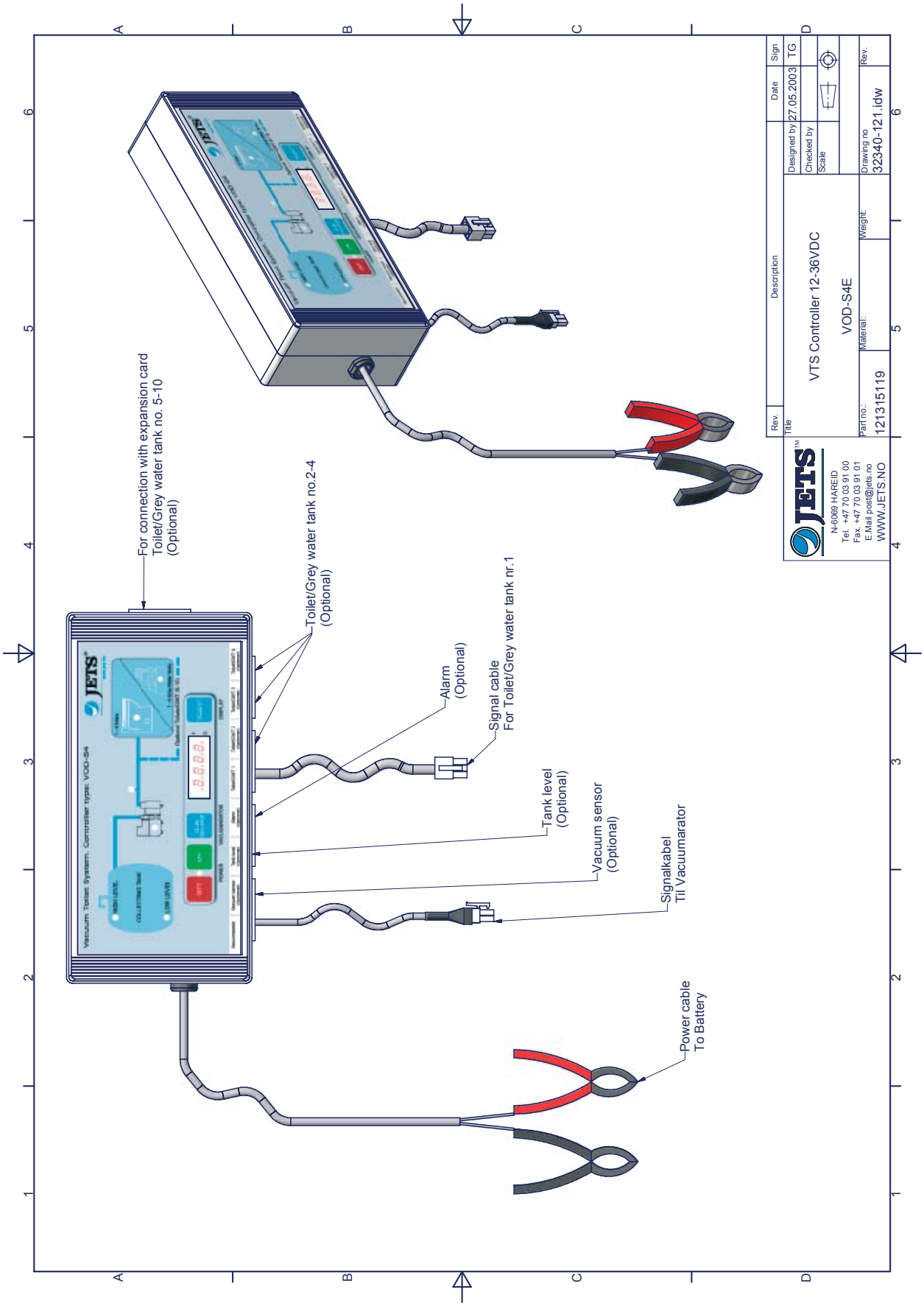
Component overview 230VAC



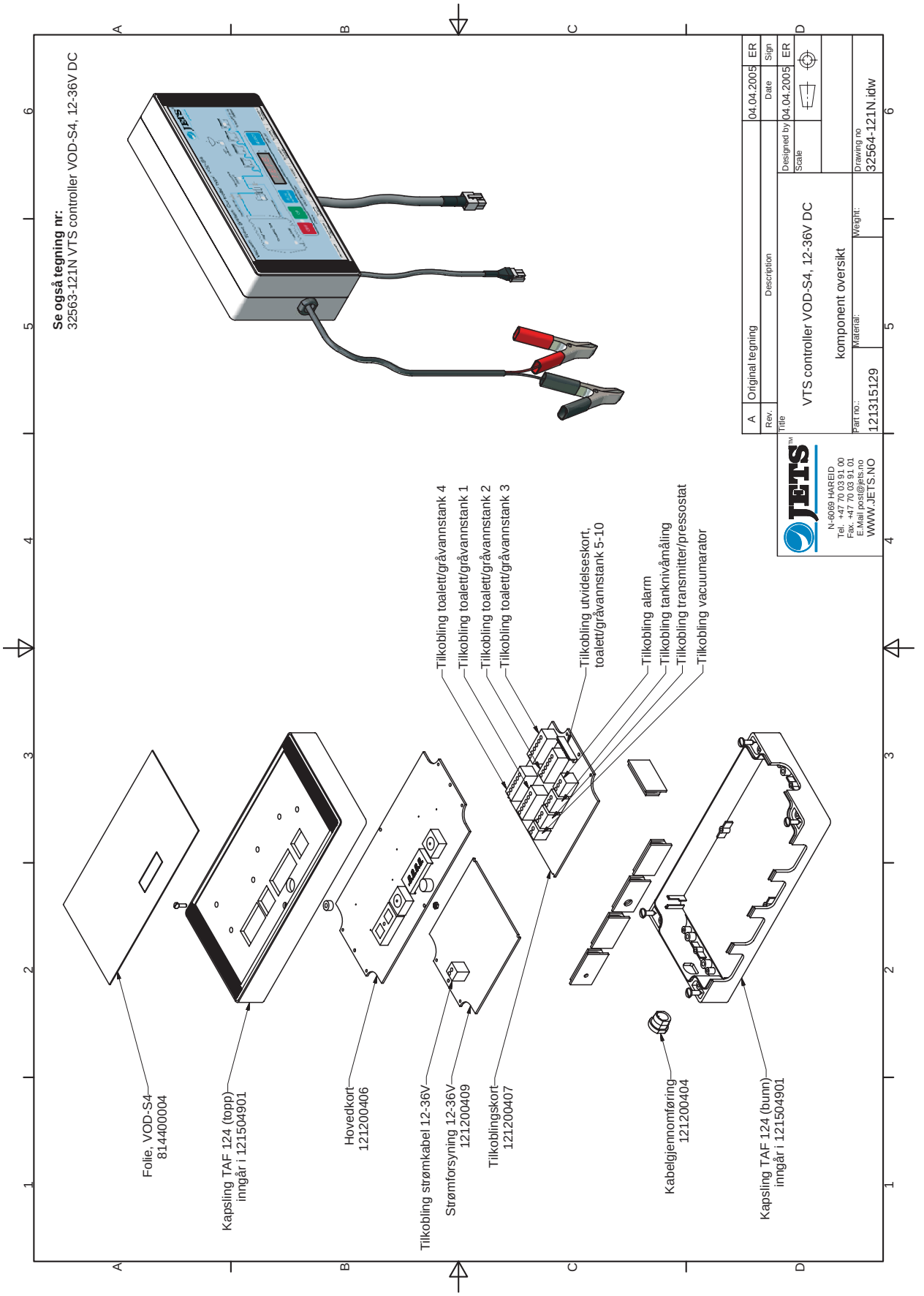
Connection diagram 230VAC



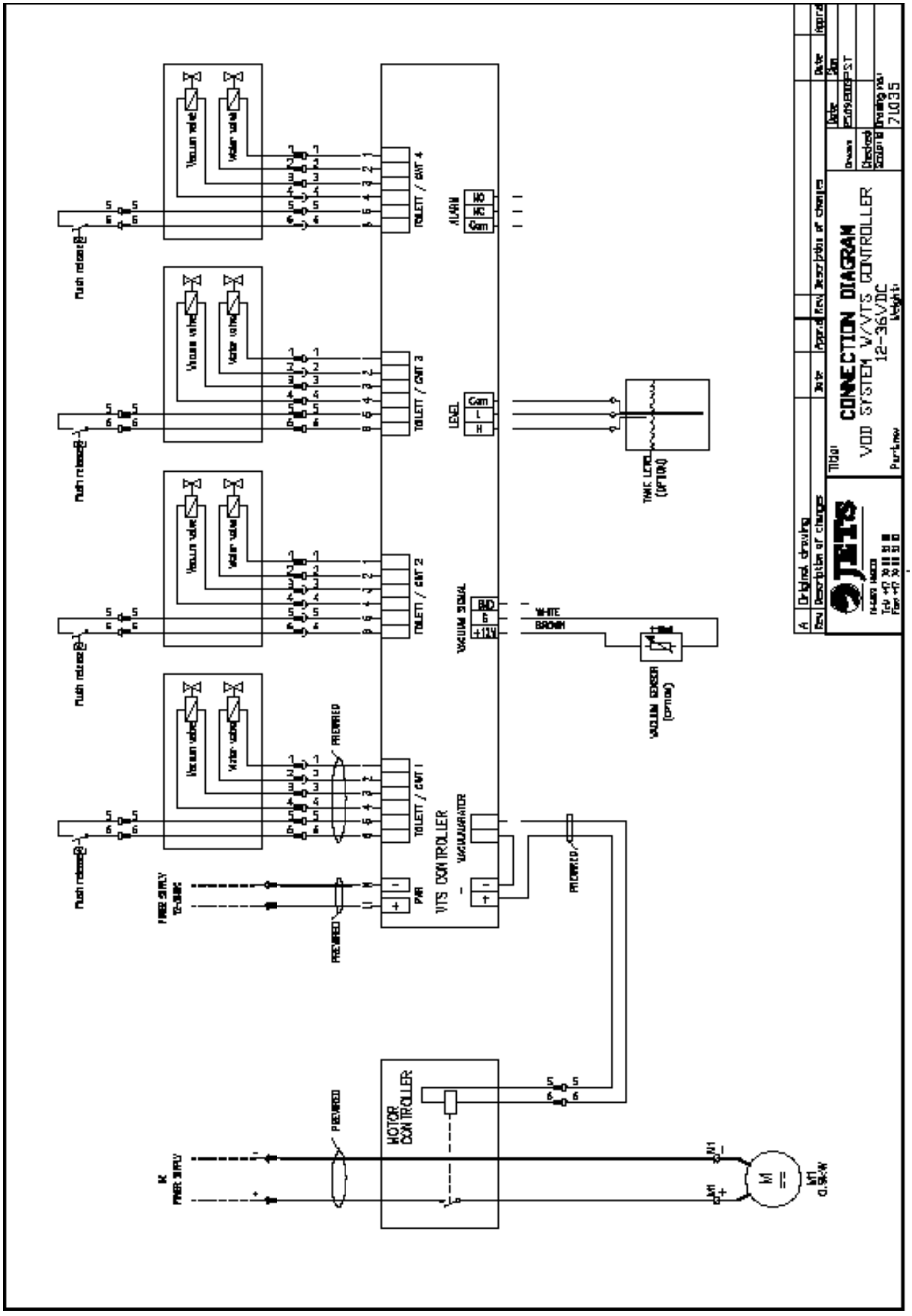
VTS Controller 12-36VDC



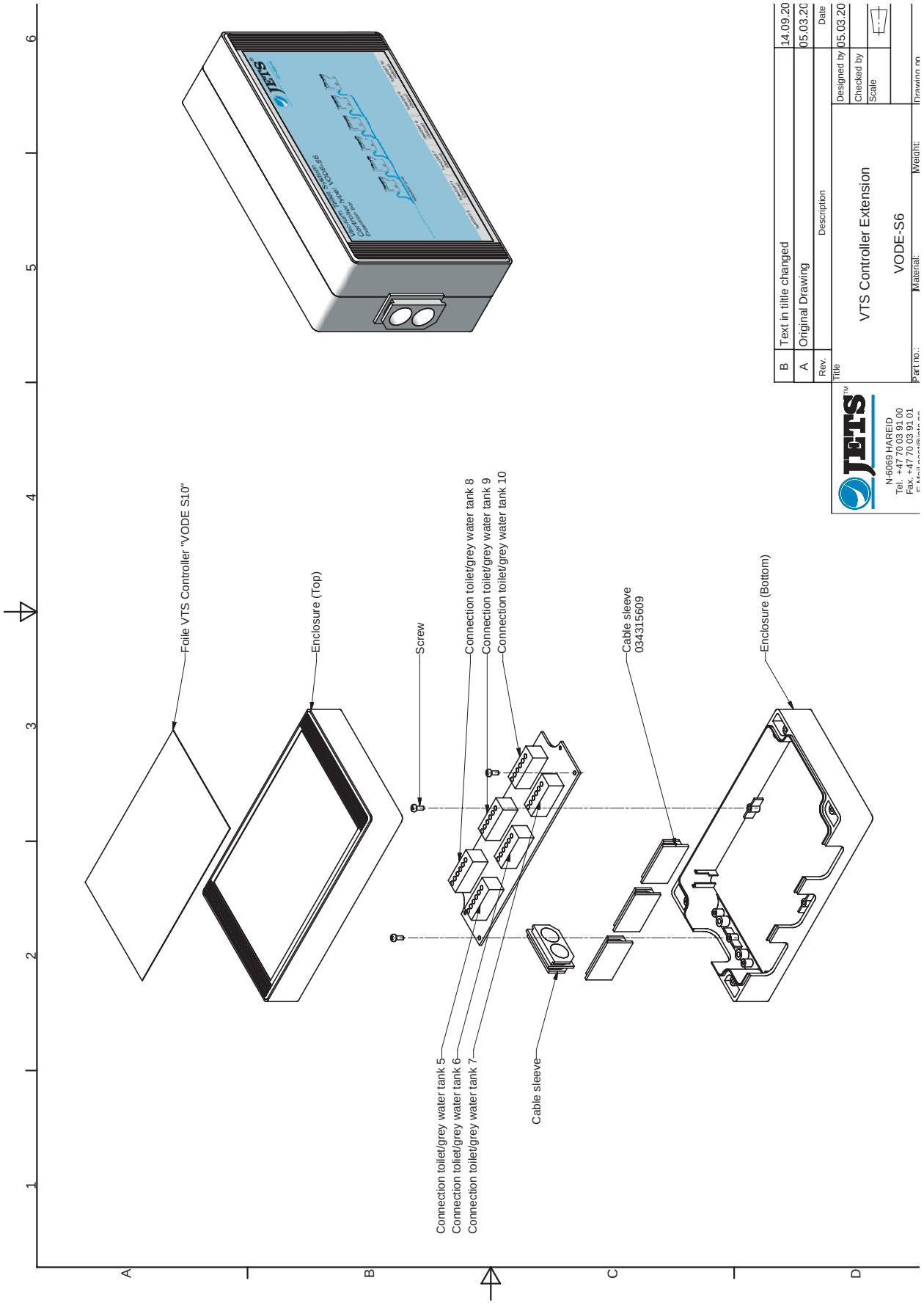
Component overview 12-36VDC



Connection diagram 12-36VDC



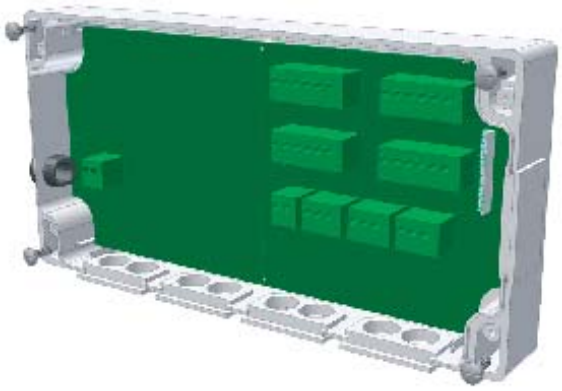
VTS Controller extension



Mounting of VTS-Controller

NB!
In order to avoid electric shock, pull out the electric contact. Do not reconnect it until the VTS-controller is assembled!

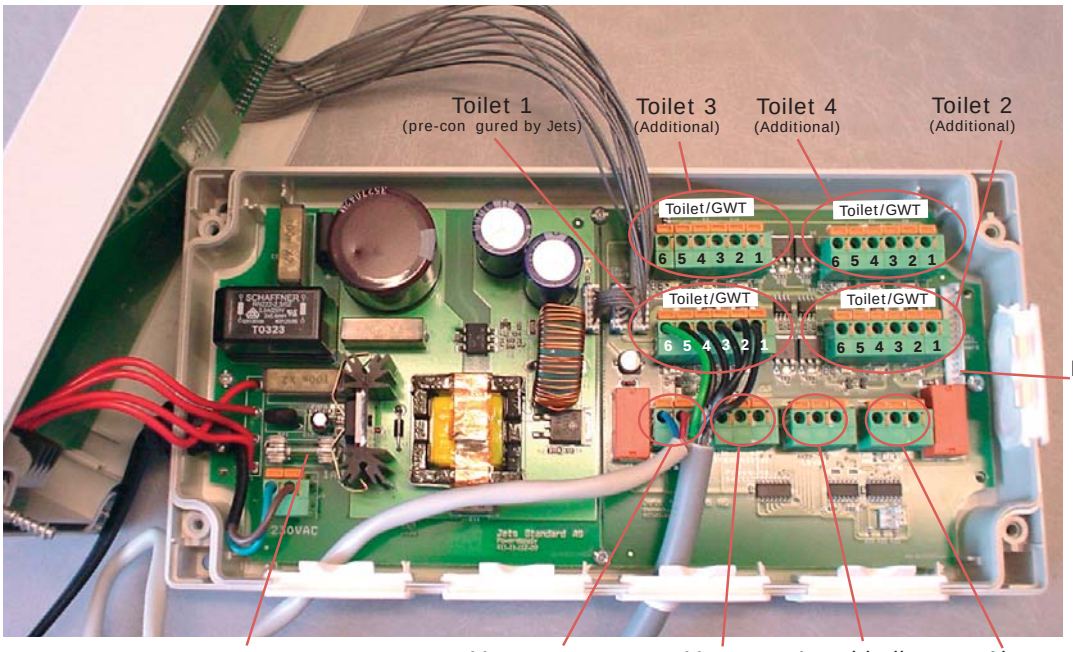
Use a screwdriver to remove the two small strips on the top of the panel to gain access to the four lock screws. Remove these.



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



Glass fuse
(12V: 10A
230V: 1A
disruption to mains supply can cause fuse to blow)

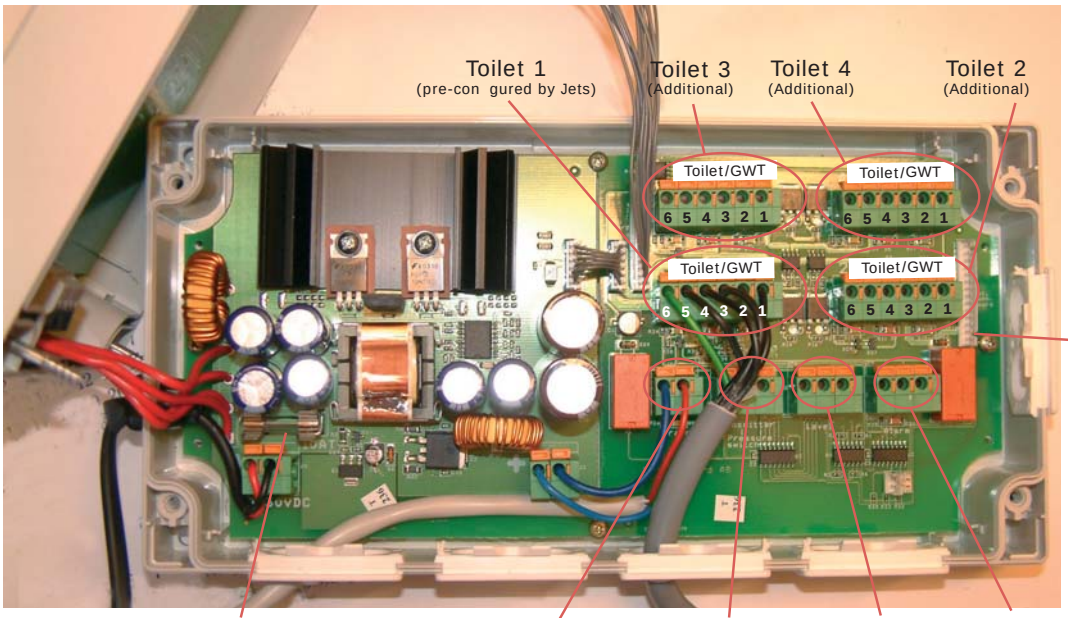
Vacuumarator
(Pre-con gured by Jets)

Vacuum transmitter
(Additional)

Level indicator
(Additional)

Alarm
(Additional)

VTS-Controller, 12V:



Glass fuse
(12V: 10A
230V: 1A
disruption to mains supply can cause fuse to blow)

Vacuumarator
(Pre-con gured by Jets)

Vakuum transmitter
(Additional)

Level indicator
(Additional)

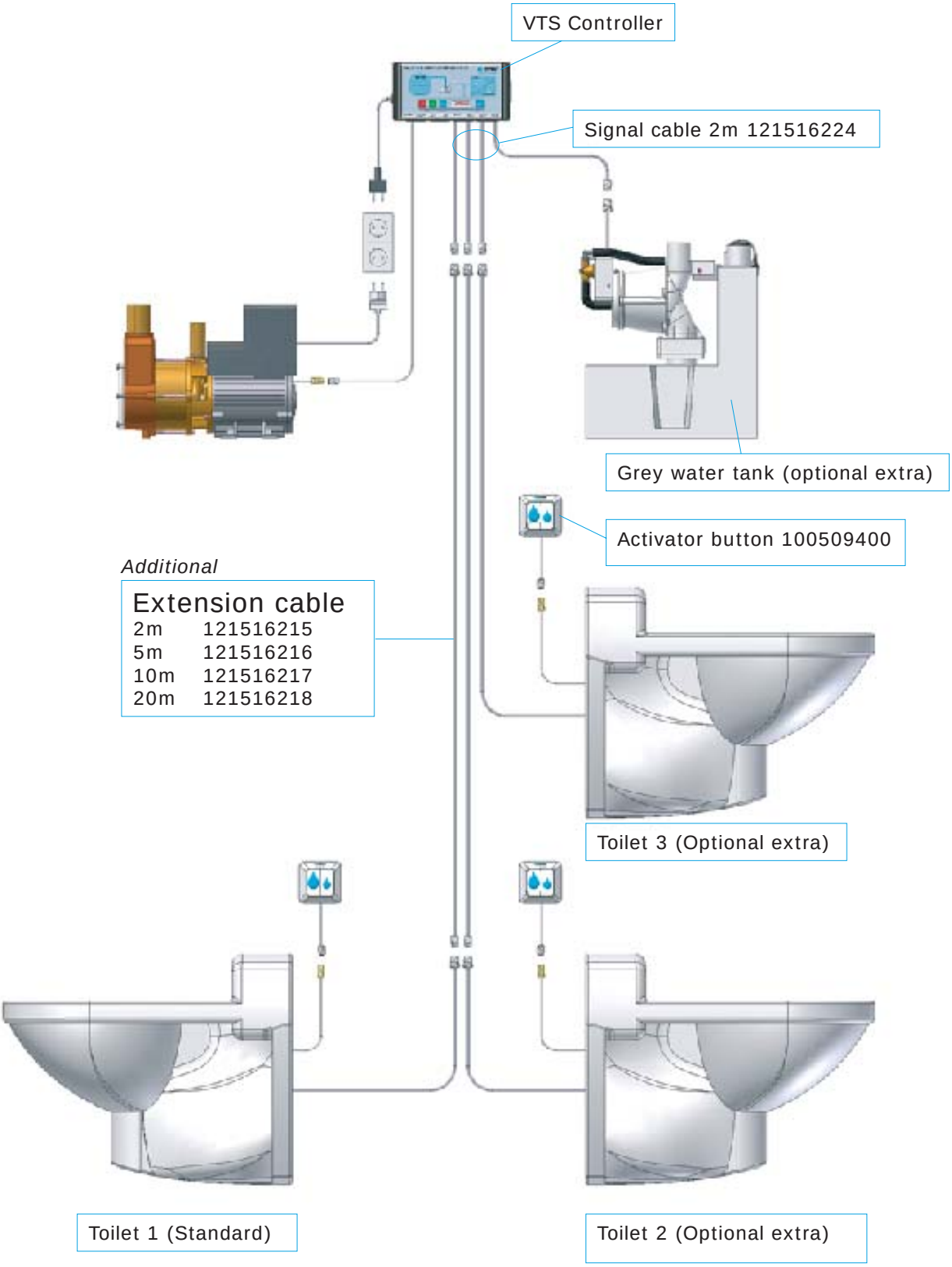
Alarm
(Additional)

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.

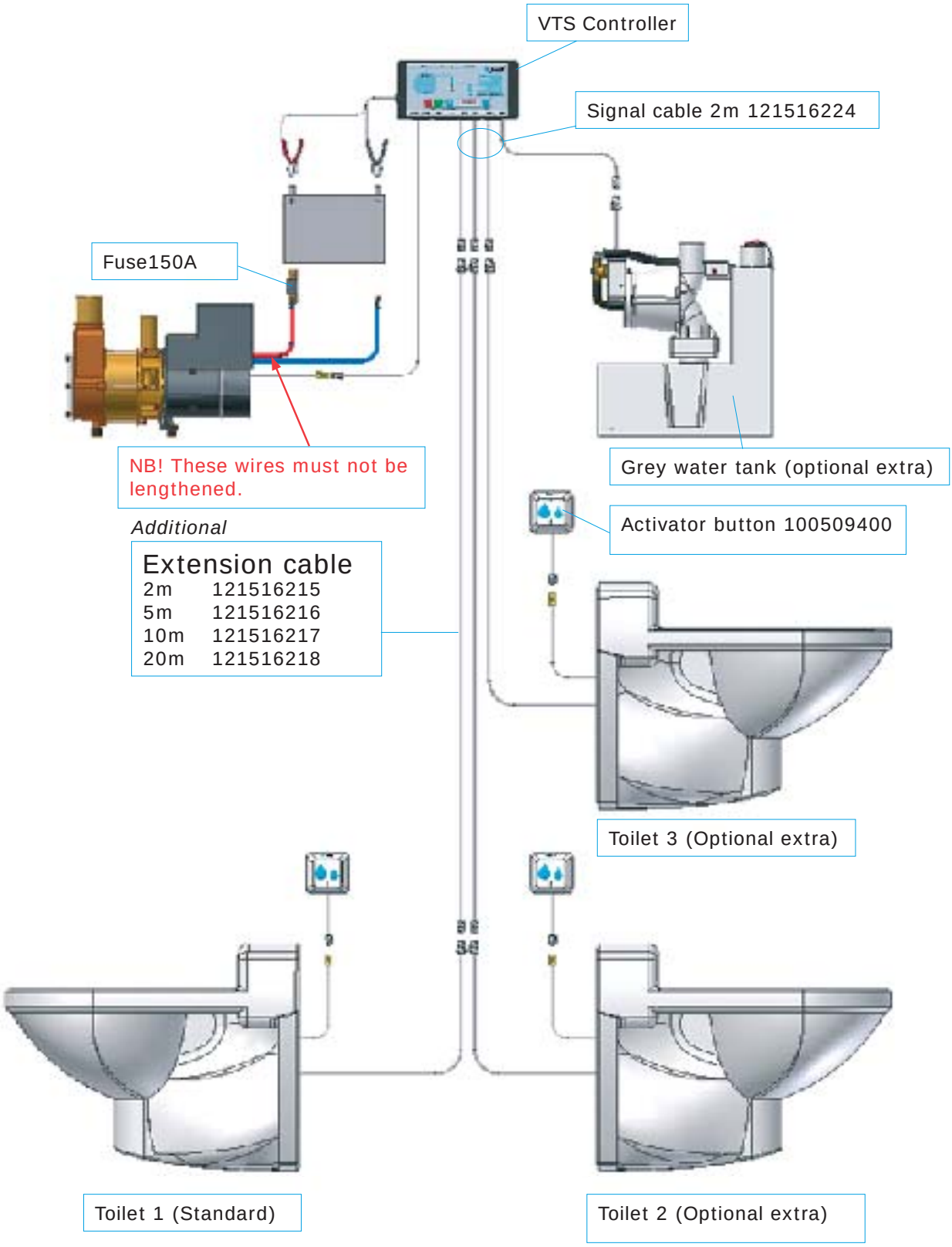
Electrical connections

Electrical connections for VTS controller, AC 230V

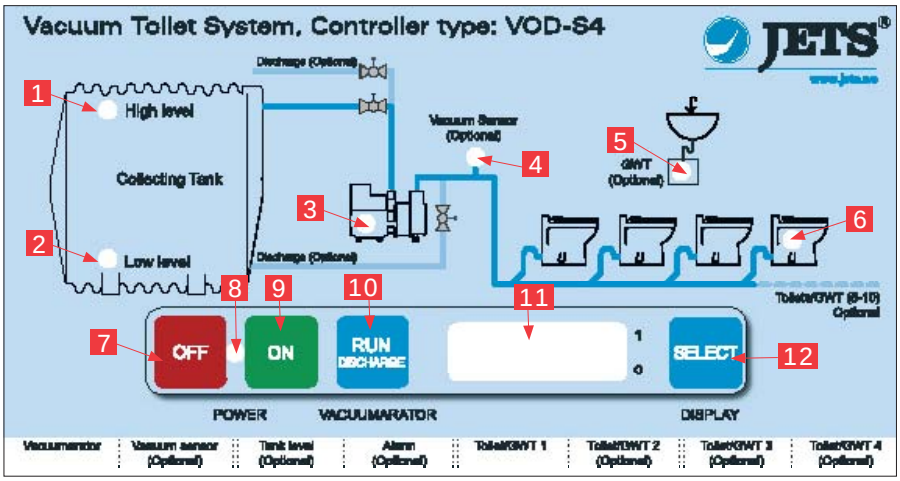


Electrical connections

Electrical connections for VTS controller, DC 12V



Electronic control (VOD 1)



1. Indicator, high level
2. Indicator, low level
3. Indicator, Vacuumarator
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 Vacuumarator
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. Vacuumarator installed with standard pipe pack (no extension).

Use and operation:

To switch on 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 switch off the controller unit, press 

This should be done for maintenance/repair/ installation.

To run the Vacuumarator manually, press 

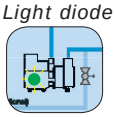
(This may be necessary if extended ushing of the toilet is required. Run the Vacuumarator for 15 seconds more than normal whilst activating the activator button.) This button can be activated for troubleshooting, to check the connection between the controller and the Vacuumarator.

Electronic control (VOD 1)

Settings menu:

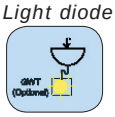
Press SELECT and RUN DISCHARGE simultaneously to activate or deactivate the menu. New settings can be saved by going to the next menu or by exiting the menu.

Press SELECT

Display: P 1 — *Light diode* 

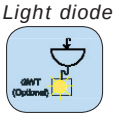
Adjustment of running time, Vacuumarator for ushing (1-40 secs.)
Default setting: 1 sec.
Values can be changed by pressing “RUN”.

Press SELECT

Display: P1 - — *Light diode* 

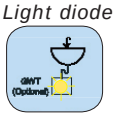
Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no. 1: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

Press SELECT

Display: P2 - — *Light diode* 

Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no. 2: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

Press SELECT

Display: P3 - — *Light diode* 

Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no. 3: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

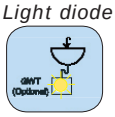
Press SELECT

Display: P4 - — *Light diode* 

Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no. 4: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

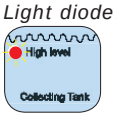
(If expansion unit is fitted, the menu will go to 10)

Press SELECT

Display: P 15 — *Light diode* 

Adjust disch. time for grey water tank (2 - 40 secs.).
Default setting: 15 secs.
Time can be adjusted in accordance with the size of the tank. If several different sizes of grey water tanks are connected, the discharge time should be set for the biggest.
Values can be changed by pressing “RUN”.

Press SELECT

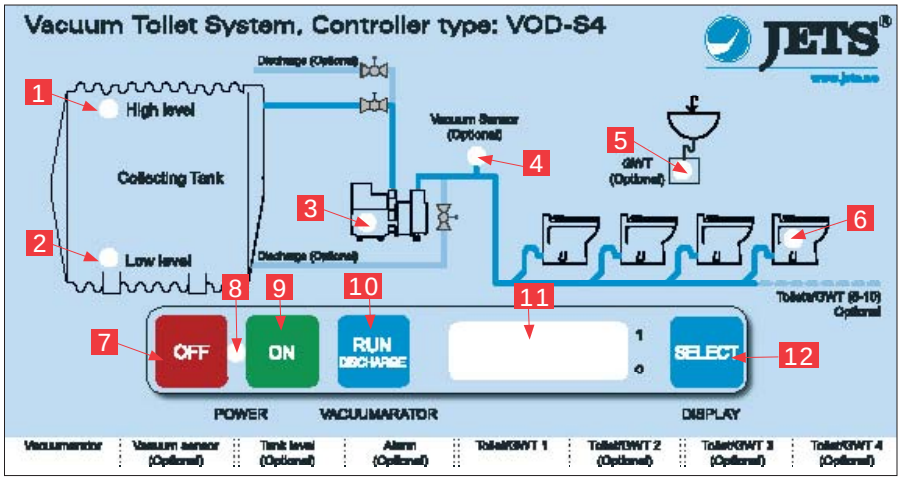
Display: P 50 — *Light diode:* 

Adjust number of ushes before system shuts down – high level in tank (10 – 60).
Default setting: 50
If a level indicator is installed in the collection tank, the number of ushes after the rst warning can be adjusted.

Press SELECT

Electronic control (VOD 2)

If Vacuum transmitter is connected, the controller will automatic detect the transmitter when it is switched on. The function and menu will then be for VOD2:



1. Indicator, high level
2. Indicator, low level
3. Indicator, Vacuumarator
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 Vacuumarator
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. Vacuumarator installed with standard pipe pack (no extension).

Use and operation:

To switch on the controller unit, press 

All indicator lights will light up for 3 secs., jets will appear in the display and the alarm will sound. vod2 will appear for 2 seconds.
After 5 secs., the display will automatically deactivate.
The system is now ready for use.

To switch off the controller unit, press 

This should be done for maintenance/repair/ installation.

To run the Vacuumarator manually, press 

(This may be necessary if extended ushing of the toilet is required. Run the Vacuumarator 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 Vacuumarator.

Electronic control - user menu VOD 2

Settings menu:

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

Press SELECT

Display: P 1 — *Light diode*

Adjustment of vacuum level, Vacuumarator for ushing (10-95%)
Default setting: 40%
Values can be changed by pressing “RUN”.

Press SELECT

Display: P1 — *Light diode*

Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no.1: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

Press SELECT

Display: P2 — *Light diode*

Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no. 2: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

Press SELECT

Display: P3 — *Light diode*

Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no. 3: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

Press SELECT

Display: P4 — *Light diode*

Switch grey water tank function on/off.
Default setting: 0 (Off).
For connection of grey water tank no. 4: Press function symbol. Values can be changed by pressing “RUN”. Display will show Off (Red stripe by 0) or On (Red stripe by 1)

(If expansion unit is fitted, the menu will go to 10)

Press SELECT

Display: P 15 — *Light diode*

Adjust disch. time for grey water tank (2 - 40 secs.).
Default setting: 15 secs.
Time can be adjusted in accordance with the size of the tank. If several different sizes of grey water tanks are connected, the discharge time should be set for the biggest.
Values can be changed by pressing “RUN”.

Press SELECT

Display: P 50 — *Light diode:* High level / Collecting Tank

Adjust number of ushes before system shuts down – high level in tank (10 – 60).
Default setting: 50
If a level indicator is installed in the collection tank, the number of ushes after the rst warning can be adjusted.

Press SELECT

Electronic control - user menu

(VOD 1 and VOD 2)

History:

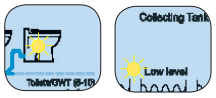
To display information on performance, press SELECT

Display: *Light diodes:*

The value in the display will show the number of normal ushes. The example on the shows that the activator button has been activated 300 times for normal ushing.

Trykk SELECT

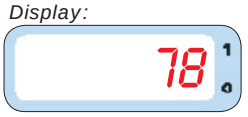
Display: *Light diodes:*

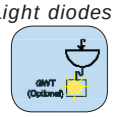


The value in the display will show the number of half ushes. The example on the shows that the activator button has been activated 400 times for half ushing.

Trykk SELECT

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.

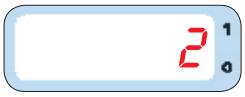
Trykk SELECT

Display:

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

Trykk SELECT

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 SELECT

Display: *Light diodes:*

The value in the display shows the vacuum level in the system.

NB! This menu will only display in VOD 2!

Trykk SELECT

The history menu will automatically switch off after 1 min.

Electronic control - supervisor menu

(VOD 1 and VOD 2)

In supervisor menu it´s possible to activate special function.

Press SELECT and RUN DISCHARGE simultaneously as the power is switched on to activate the menu.

Switch off the controller to exit the supervisor menu.

Press SELECT

Display: s 4 0 *Light diode*

Adjustment of max runtime Vacuumarator (5 - 60 min.)
Default setting: 40 min..
Values can be changed by pressing “RUN”.

Press SELECT

Display: 5 _ *Light diode*

Change function for the manual run switch
Press the ”RUN/DISCHARGE” to alter between impulse or on/off function with discharge mode.
(To use discharge mode, the low level switch must be activated).

Press SELECT

Display: 5 _ *Light diode* Low level

Activate discharge mode (low level switch):
Press the ”RUN/DISCHARGE” to switch on/off level switch.

Press SELECT

DMK 331

Industrial Pressure Transmitter

Ceramic Sensor

accuracy according to IEC 60770:
0.5 % FSO

Nominal pressure

from 0 ... 400 mbar up to 0 ... 600 bar

Output signals

2-wire: 4 ... 20 mA
3-wire: 0 … 20 mA / 0 … 10 V
others on request

Special characteristics

- pressure port G 1/2" flush for pasty and polluted media
- pressure port G 1/2" open port PVDF for aggressive media
- oxygen application

Optional versions

- IS-version
  Ex ia = intrinsically safe for gases and dusts
- SIL 2
  according to IEC 61508 / IEC 61511
- customer specific versions

The industrial pressure transmitter DMK 331 with ceramic sensor has been especially designed for pasty, polluted or aggressive media and for oxygen applications at low pressure range.

As with all industrial pressure transmitters made by BD|SENSORS, you may choose between various electrical and mechanical connections also on DMK 331.

Preferred areas of use are

- Plant and Machine Engineering
- Energy Industry
- Environmental Engineering (water - sewage - recycling)
- Medical Technology

BD SENSORS GmbH
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Tel: +49 (0) 92 35 / 98 11- 0
Fax: +49 (0) 92 35 / 98 11- 11

www.bdsensors.com
info@bdsensors.de

Input pressure range [1]																			
Nominal pressure gauge	[bar]	-1…0	0.4	0.6	1	1,6	2,5	4	6	10	16	25	40	60	100	160	250	400	600[2]
Nominal pressure abs.	[bar]	-	-	0.6	1	1,6	2,5	4	6	10	16	25	40	60	100	160	250	400	600[2]
Overpressure	[bar]	4	1	2	2	4	4	10	10	20	40	40	100	100	200	400	400	600	800
Burst pressure ≥	[bar]	7	2	4	4	5	7,5	12	18	30	50	75	120	180	300	500	750	1000	1100
Vacuum resistance		P_N ≥ 1 bar: unlimited vacuum resistance												P_N < 1 bar: on request					

[1] PVDF pressure port possible for nominal pressure ranges up to 60 bar
[2] nominal pressure 600 bar without UL certification

Output signal / Supply	
Standard	2-wire: 4 ... 20 mA / V_S = 8 ... 32 V_{DC}
Option IS-protection	2-wire: 4 ... 20 mA / V_S = 10 ... 28 V_{DC}
Options 3-wire	3-wire: 0 ... 20 mA / V_S = 14 ... 30 V_{DC} 0 ... 10 V / V_S = 14 ... 30 V_{DC}
Performance	
Accuracy [3]	≤ ± 0.5 % FSO
Permissible load	current 2-wire: $R_{max} = [(V_S – V_{S\ min}) / 0.02\ A]\ \Omega$ current 3-wire: R_{max} = 500 Ω voltage 3-wire: R_{min} = 10 kΩ
Influence effects	supply: 0.05 % FSO / 10 V load: 0.05 % FSO / kΩ
Long term stability	≤ ± 0.3 % FSO / year at reference conditions
Response time	2-wire: ≤ 10 msec 3-wire: ≤ 3 msec

[3] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

Thermal effects (Offset and Span) / Permissible Temperatures	
Thermal error	≤ ± 0.2 % FSO / 10 K
in compensated range	-25 ... 85 °C
Permissible temperatures [4]	medium: -40 ... 125 °C electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C

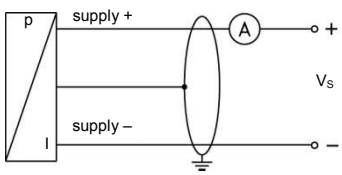
[4] for pressure port of PVDF the minimun temperature is -30 °C

Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
Mechanical stability	
Vibration	10 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	500 g / 1 msec according to DIN EN 60068-2-27
Materials	
Pressure port	standard: stainless steel 1.4404 (316 L) optional for G1/2" open port with nominal pressure range up to 60 bar: PVDF others on request
Housing	stainless steel 1.4404 (316 L)
Option compact field housing	stainless steel 1.4305 (303) with cable gland brass, nickel plated others on request
Seals (media wetted)	standard: FKM options: EPDM (for P_N ≤ 160 bar), NBR others on request
Diaphragm	ceramic Al_2O_3 96 %
Media wetted parts	pressure port, seals, diaphragm
Explosion protection (only for 4 … 20 mA / 2-wire)	
Approval DX19-DMK 331	**IBExU 10 ATEX 1068 X / IECEx IBE 12.0027X** stainless steel pressure port: zone 0: II 1G Ex ia IIC T4 Ga zone 20: II 1D Ex ia IIIC T 85°C Da plastic pressure port: zone 1: II 2G Ex ia IIC T4 Gb zone 21: II 2D Ex ia IIIC T 85°C Db
Safety technical maximum values	U_i = 28 V_{DC}, I_i = 93 mA, P_i = 660 mW, C_i ≈ 0 nF, L_i ≈ 0 µH, the supply connections have an inner capacity of max. 27 nF to the housing
Permissible temperatures for environment	in zone 0: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar in zone 1 or higher: -20 ... 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance:signal line/shield also signal line/signal line: 1µH/m
Miscellaneous	
Option SIL[5] 2	according to IEC 61508 / IEC 61511
Option oxygen application	for P_N ≤ 15 bar: O-ring in 70 EPDM 281 (with BAM-approval); permissible maximum values are 15 bar / 60° C and 10 bar / 90° C for P_N ≤ 25 bar: O-ring in FKM Vi 567 (with BAM-approval); permissible maximum values are 25 bar / 150° C
Current consumption	signal output current: max. 25 mA signal output voltage: max. 7 mA
Weight	approx. 140 g
Installation position	any
Operational life	> 100 x 10^6 pressure cycles
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A) [6]
ATEX Directive	94/4/EG

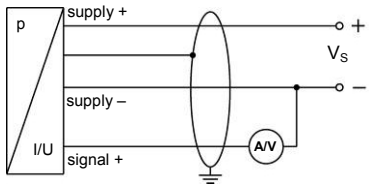
[5] only for 4 … 20 mA / 2-wire
[6] This directive is only valid for devices with maximum permissible overpressure > 200 bar

Wiring diagrams

2-wire-system (current)



3-wire-system (current / voltage)

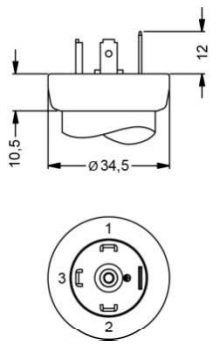


Pin configuration

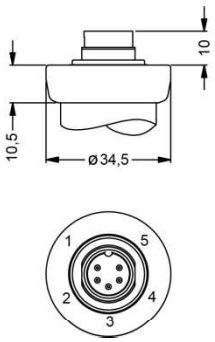
Electrical connection	ISO 4400	Binder 723 (5-pin)	M12x1 / metal (4-pin)	field housing	cable colours (DIN 47100)
Supply +	1	3	1	IN +	wh (white)
Supply –	2	4	2	IN -	bn (brown)
Signal + (only for 3-wire)	3	1	3	OUT+	gn (green)
Shield	ground pin	5	4	⏚	ye/gn (yellow / green)

Electrical connections (dimensions in mm)

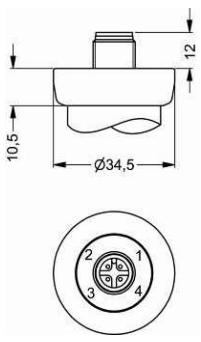
standard **option**



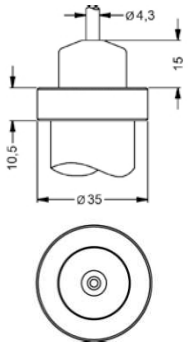
ISO 4400
(IP 65)



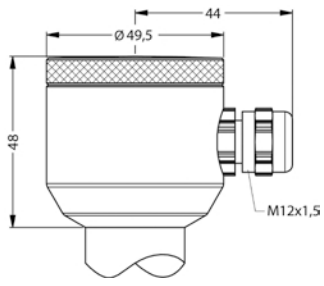
Binder Series 723 5-pin
(IP 67)



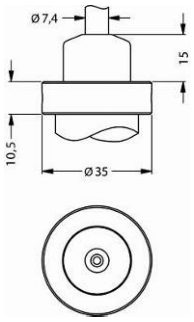
M12x1 4-pin
(IP 67)



cable outlet with PVC cable
(IP 67) [7]



compact field housing
(IP 67)



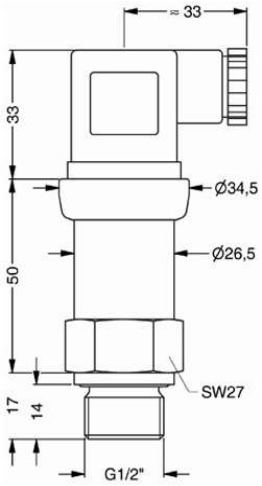
cable outlet,
cable with ventilation tube
(IP 68) [8]

⇨ **universal field housing stainless steel 1.4404 (316 L) with cable gland M20x1.5 (ordering code 880) and other versions on request**

[7] *standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70°C)*
[8] *different cable types and lengths available, permissible temperature depends on kind of cable*

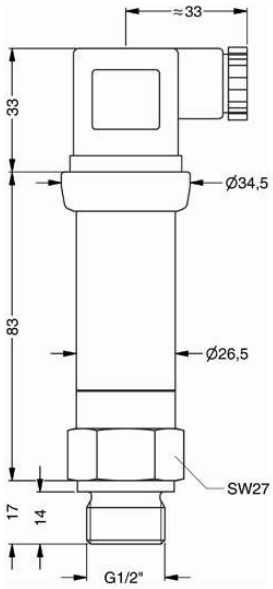
Mechanical connection (dimensions in mm)

standard



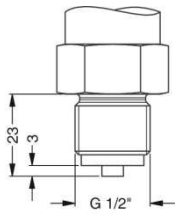
G1/2" DIN 3852
with ISO 4400

standard for SIL- and SIL-IS-version

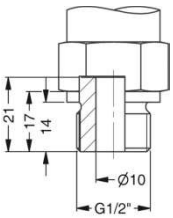


G1/2" DIN 3852
with ISO 4400

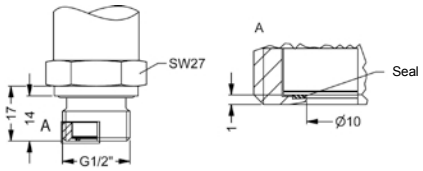
option



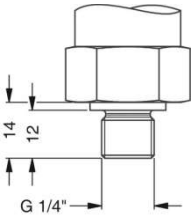
G1/2" EN 837



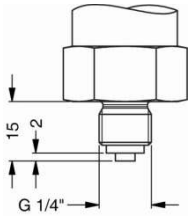
G1/2" open port



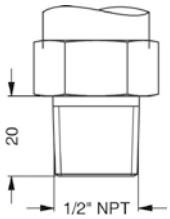
G1/2" semi-flush DIN 3852; M20x1.5 [9]



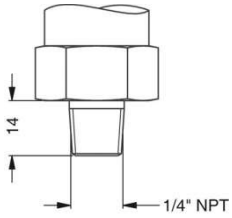
G1/4" DIN 3852



G1/4" EN 837



1/2" NPT



1/4" NPT

⇨ **metric threads and other versions on request**

[9] *possible for nominal pressure ranges $P_N \leq 25$ bar; absolute pressure ranges on request*

Tel: +49 (0) 92 35 / 98 11- 0
Fax: +49 (0) 92 35 / 98 11- 11
www.bdsensors.com
info@bdsensors.de

BD|SENSORS
pressure measurement

Ordering code DMK 331

DMK 331 □□□-□□□□-□-□-□□□-□□□-□-□-□-□□□

Pressure																									
gauge	2	5	0																						
absolute	2	5	1																						
Input	**[bar]**																								
0.40				4	0	0	0																		
0.60				6	0	0	0																		
1.0				1	0	0	1																		
1.6				1	6	0	1																		
2.5				2	5	0	1																		
4.0				4	0	0	1																		
6.0				6	0	0	1																		
10				1	0	0	2																		
16				1	6	0	2																		
25				2	5	0	2																		
40				4	0	0	2																		
60				6	0	0	2																		
100				1	0	0	3																		
160				1	6	0	3																		
250				2	5	0	3																		
400				4	0	0	3																		
600				6	0	0	3																		
-1 … 0				X	1	0	2																		
customer				9	9	9	9																		consult
Output																									
4 … 20 mA / 2-wire								1																	
0 … 20 mA / 3-wire								2																	
0 … 10 V / 3-wire								3																	
Intrinsic safety 4 … 20 mA / 2-wire								E																	
SIL2 4 … 20 mA / 2-wire								1S																	
SIL2 with Intrinsic safety 4 … 20 mA / 2-wire								ES																	
customer								9																	consult
Accuracy																									
0.5 %									5																
customer									9																consult
Electrical connection																									
Male and female plug ISO 4400										1	0	0													
Male plug Binder series 723 (5-pin)										2	0	0													
Cable outlet with PVC cable [1]										T	A	0													
Cable outlet with cable										T	R	0													
Male plug M12x1 (4-pin) / metal										M	1	0													
compact field housing stainless steel 1.4404 (316L)										8	5	0													
customer										9	9	9													consult
Mechanical connection [2]																									
G1/2" DIN 3852													1	0	0										
G1/2" EN 837													2	0	0										
G1/4" DIN 3852													3	0	0										
G1/4" EN 837													4	0	0										
G1/2" DIN 3852 with semi-flush sensor [3]													F	0	0										
G1/2" DIN 3852 open pressure port													H	0	0										
1/2" NPT													N	0	0										
1/4" NPT													N	4	0										
customer													9	9	9										consult
Seals																									
FKM																1									
EPDM [4]																3									
NBR																5									
customer																9									consult
Pressure port																									
Stainless steel 1.4404 (316L)																	1								
PVDF [5]																	B								
customer																	9								consult
Diaphragm																									
Ceramics Al_2O_3 96%																		2							
customer																		9							consult
Special version																									
standard																			0	0	0				
oxygen application [6]																			0	0	7				
customer																			9	9	9				consult

[1] standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70°C)

[2] metric threads and others on request

[3] possible for nominal pressure ranges $P_N \leq 25$ bar; absolute pressure ranges on request

[4] possible for nominal pressure range $P_N \leq 160$ bar

[5] PVDF only with G1/2" DIN 3852 open pressure port (up to 60 bar), minimum permissible temperature is -30 °C

[6] oxygen application with FKM-seal up to 25 bar and with EPDM-seal up to 15 bar possible

01.06.2013

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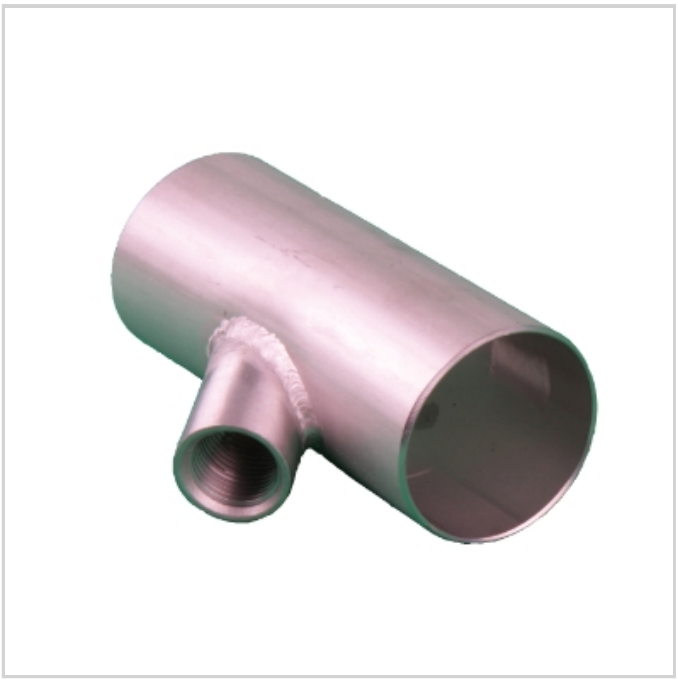


Technical Data

Outside Dimensions.....120mm x 50mm x 80mm (LxWxH)

Weight.....0.3 kg

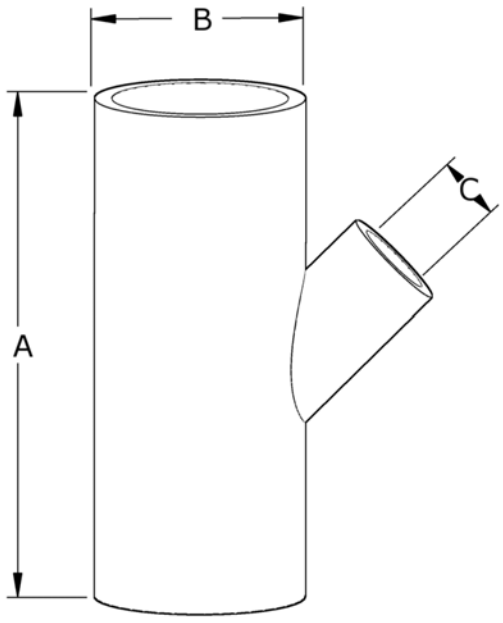
Material Type.....AISI 316

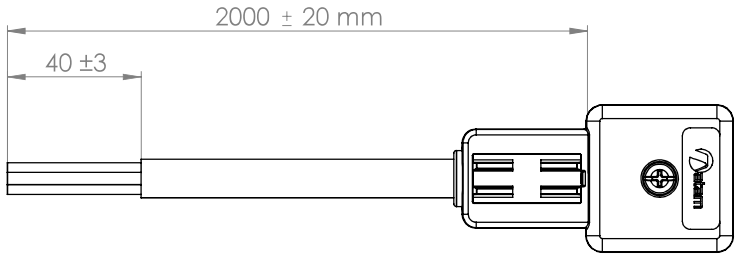
Dimensions..... A - 120 mm
B - Ø 50 mm
C - 1/2 "BSP

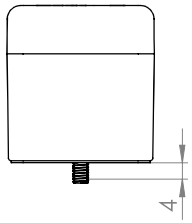
Patents and Trademarks

Disclaimer

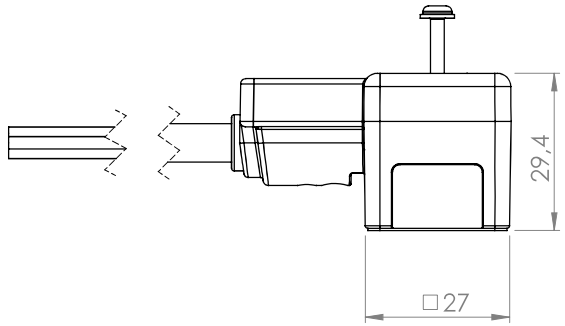
Warranty

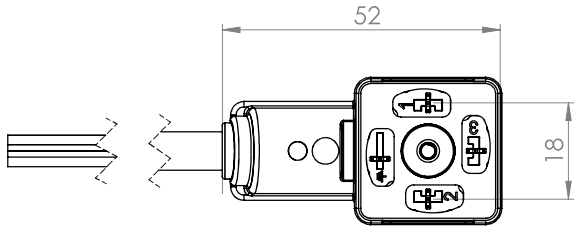


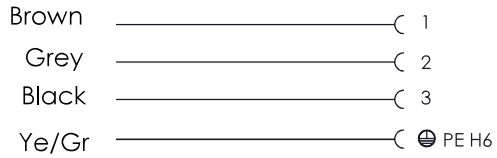




Central screw







Description	
P18 connector with mouldet cable, integrated gasket (PUR) and central fixing screw	
Standard	EN1750301-803 A
Rated voltage	250 V AC/DC
Rated current	5A
Suppressor	NO
LED colour	NO LED
Number of contacts	3 poles + PE
Contact material	CuSn silver plated
Contact holder material	PA6 GF
Overmoulding and colour material	TPU black
Pin dimension	6,3 x 0,8 ; 4,8 x 0,8 (mm)
Mounting	Central screw M3x28,5 Zink
Fixing screw torque	0,3 - 0,5 N/m
Cable type and colour jacket	PVC H05VV-F black
Conductor specification	4 G 0,75 mm²
Cable diameter +/-5%	7,3 mm
Temperature range	-15°C to +70°C static application
Overvoltage category	III
Protection class (IEC 60529)	IP 67 when correctly assembled

I.R.	DESCRIZIONE REVISIONE	DATA	OPER.	VISORE
1				
2				
3				
4				
5				

CUSTOMER

REFERENCE

APPROVALS SIGNATURE

DATA 15/03/12 Foglio 1 di 1

OPERATORE R. Serra VISORE A. Ciceri

SCALA 1:1 TOLL. GEN. DIN 16901-130B

DENOMINAZIONE
Standard connector

CODICE MA246000PA05200 I.R. 0

Pipe Clamp, ø50mm - 1/2"

Tel. +47 70 03 91 00
www.jetsgroup.com

Product No. 034233040

Issued | Rev 2014-04-29 09:46:30

Technical Data

Outside Dimensions.....87 x 53 x 84 mm (LxWxH)

Weight.....0.12 kg

Generic Material.....PP

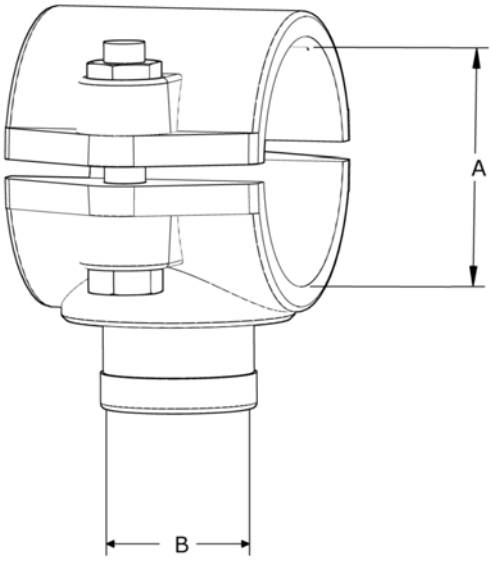
Dimensions..... A - Ø 50 mm
B - Ø ½ in

Patents and Trademarks

Disclaimer

Warranty

All products of the company are sold and all services of the company are offered subject to Jets Vacuum AS General Sales Conditions detailing warranty and terms and conditions of sale, copies of which will be furnished upon request. The information provided herein is for guidance only; it does not constitute a guarantee of the performance or specification of any individual product or component.



Compensator Ø50mm

Tel. +47 70 03 91 00
www.jetsgroup.com

Product No. 034307100

Issued | Rev 2014-04-29 08:46:18

Technical Data

Outside Dimensions.....74 x 76 x 100 mm (LxWxH)
Weight.....0.5 kg
Hardness..... 60 Shore
Generic Material.....EPDM
Connection..... Ø 50 mm

Patents and Trademarks

Disclaimer

Warranty

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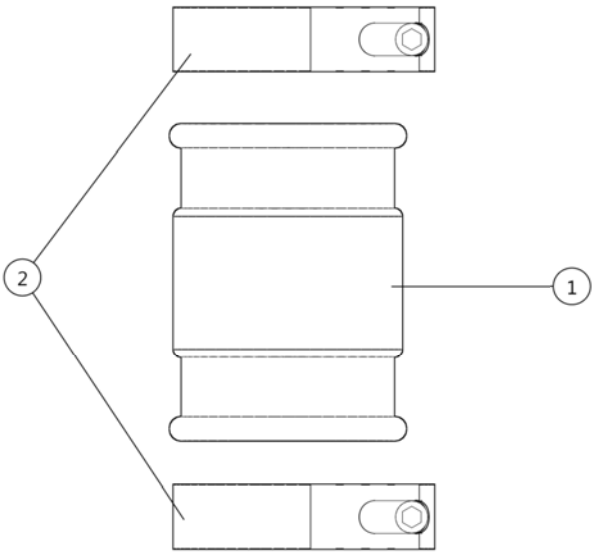

Components

Construction Characteristics

(1) Hose, compensator Ø50.....034507502*
(2) Hose Clip 64-70mm.....034507420*

** Component/s avaliable as replacement parts.*

Hose Clip 50-70mm

Tel. +47 70 03 91 00
www.jetsgroup.com

Product No. 034506900

Issued 2013-06-14 | Rev 1.0

Technical Data

Weight	28 g
Width	17mm
Generic Material	A4 / AISI 316L
Connection Diameter	Ø 50 - 70mm

Patents and Trademarks

Disclaimer

Warranty

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With a focus on both simple elegant design and comfort, this wall mounted toilets contemporary look complements any installation.

Warranty

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Disclaimer

Product color reproduction is as near to actual color as product methods allow. Information is subject to change without notice. No part of this document may be reproduced in any form by any means without prior written approval.

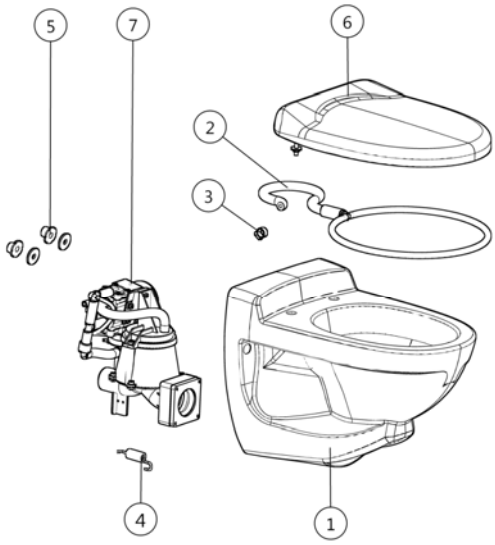
Technical Data

Outside Dimensions.....530 x 360 x 420 mm (LxWxH)
Weight.....20 kg
General Tolerance.....Bowl dimensions ±2%
Discharge Valve Outlet.....Outside diameter Ø 50 mm
Water Connection.....½" male BSP

Operating Data

Flushing Time..... 5 seconds
Discharge Time..... 2 seconds
Water Pressure.....2-7 bar
Operating Vacuum.....Recommended 30-55 % Vacuum
Air Consumption.....Approx. 48 liters at 50% Vacuum
Water Consumption.....1 liter/s (3 bar)
Note:.....Values dependent on valve type.

Patents and Trademarks



Options

Optional functions compatible with this product.

CFD: Central Flush and Discharge

Components

Construction Characteristics

1 Toilet Bowl JETS 59M.....066005000*
2 Flushing ring.....069510500*
3 Hose Clip 13-20mm.....034233401*
4 Spring.....053531725*
5 .....N/A
6 Seat & Cover.....Product Selection
7 Valve.....See options listed above

** Component/s avaliable as replacement parts.*

Accessories

Construction Characteristics

Cap.....069606304
Fastening Kit, wall - Land.....069606302
Pipe Packet.....034399300

Important Health and Safety Information

Installation, operation and maintenance must be carried out in strict accordance with this guide and with all applicable regulations. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets Vacuum AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets Vacuum AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets Vacuum AS (citing the safety reference number) for further clarification.

For further information about the included warnings or any other safety concerns please contact Jets Vacuum AS.

Safety Warning Symbols

General information to all users.

Symbol denotes required personal protective equipment is required.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or equipment damage.

Symbol denotes required personal protective equipment is required.

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury or equipment damage.

Important Health and Safety Warnings

1.1 Warning
Jets Vacuum AS recommend qualified person(s) in accordance with all applicable codes and standards to carry out all installation work, electrical wiring, plumbing and operate this product. Equipment damage, injury to personnel or death could result from improper installation/use.

1.2 Warning
Be thoroughly familiar with the controls and the proper use of the equipment prior to installing, starting or using the equipment. Know the equipment application, limitations and potential hazards.

1.3 Warning
Failure to properly lift and support equipment can result in serious physical injury and/or equipment damage. Lift equipment only at specifically identified lifting points or as instructed in the current IOM. Note: Lifting devices (eyebolts, slings, spreaders, etc.) must be rated, selected, and used for the entire load being lifted.

1.4 Warning
Safety equipment (PPE) necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.

1.5 Personal Protective Equipment - Goggles
Wear safety glasses with side shields at all times when working with equipment.

1.6 Warning
Keep work area clean, uncluttered and ensure adequate lighting.

1.7 Warning
Keep other persons at a safe distance from work area.

1.9 Personal Protective Equipment - Gloves
Wear suitable protective gloves at all times when working with equipment.

2.1 Warning
The safety of the equipment is guaranteed only if it is used in compliance with the instructions provided by the supplier. The limits indicated must never be exceeded in any given situation.

12.5 Notice
Use this equipment only in the manner intended by Jets Vacuum AS. If you have questions after reading these instructions contact Jets Vacuum AS directly.

Delivery, Receipt of Goods and Transportation

Goods to be protected against shock, dust, humidity and moisture. Suitable adequately dimensioned transporting equipment is to be used. Note that the equipment may contain components that are easily damaged as a result of inappropriate handling. Jets Vacuum AS is not responsible for or liable for delivery delays resulting from occurrences outside of Jets Vacuum AS' immediate control. On receipt of goods, check for visual damage. Any damage detected after dispatch should be reported immediately to Jets Vacuum AS. Damages and/or discrepancies must be reported in writing no later than eight (8) days after receipt of goods. Commissioning must be postponed until the equipment has been inspected. Do not dispose of damaged items. Your direct supplier will advise you of the procedure to follow.

Storage

Unless otherwise specified, goods are to be stored in a dry environment between -30°C and +40°C prior to installation. The storage location must be dust free, low humidity (≤95%) and be free from moisture. Keep clear of foreign objects.

Installation to End Use

Site to be a dry environment between +0°C and +45°C. Use in environments below 0°C requires use of antifreeze in liquids. The site location is to be low vibration Vrms <0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free and protected from grinding and welding. During installation, the site is to be protected from water, frost, moisture and humidity. Goods are to be stored as per the instructions for delivery, storage and transport. A visual inspection is to be carried out on receipt of goods as well as at the time of installation to ensure that storage and transport conditions after receipt have not compromised the quality of the product/s.

Installation

Standards and Regulations

To install a Jets™ toilet it is first required that the room be prepared according to all local, state and federal standards and requirements. Industry specific standards must also be met. Considerations that must be made include but are not limited to:

- Appropriate proportioned drain pipes.
- Water barriers/membrane.

Water Barrier

Note that in some countries, and as per the majority of standards and regulations, it is prohibited to mount toilets directly onto the wall if mounting requires that the water barrier be compromised. Wall mounted toilets, in these circumstances, are therefore required to be mounted on internally constructed walls within the water barrier. Check requirements according to local codes and standards before beginning any installation work.

General Disclaimer

Drawings provided in the following examples are for illustration purposes only. Product details may vary from your individual purchase.

Pre-Installation Considerations

It is recommended that items such as wall mounted release buttons, false boxed walls, drainage and piping etc. be installed/constructed, prior to installation of the toilet.

Connection with Pressurized/Mains Water

To connect pressurized water (i.e. mains water) to the toilet, the water pipe must be installed. The connection required is a 1/2" BSP standard connection. The water pressure must be a minimum of 1.8kp/2 bar and must not exceed 7 bar.

Installation Instructions

Toilet installation requires the following procedures to be carried out. For more specific technical details, refer to the component products individual technical data sheet. For documentation that is delivered as a part of a manual or compiled technical document, the contents list contains a listing of all enclosed documentation. For further information on any of the instructions supplied, any questions regarding installation and or the products, please contact your local supplier or Jets™ Service Department.

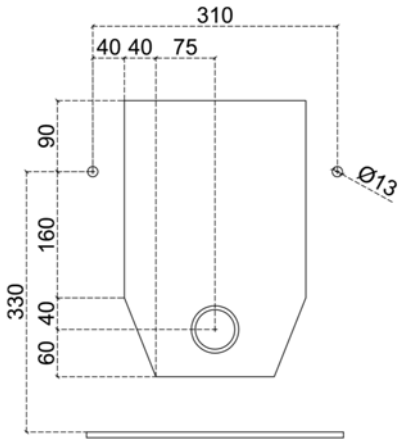
Pre-Installation Wall Preparation

The toilet is a wall mounted model which can be installed in locations where

- a service hatch at the rear is available (see Service Access).
- the toilet bowl is to be removed from the wall for service (see Standard Installation).

For retrofit installations, contact your local approved supplier or Jets Vacuum AS for further information.

Service Access

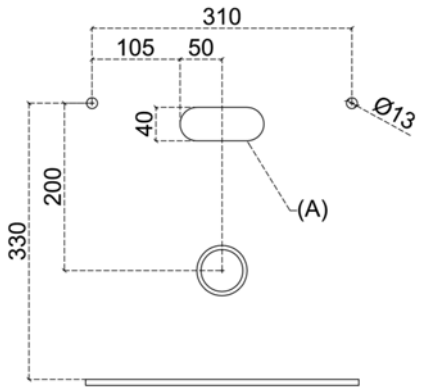


Optional Service Access:

If service access from the rear is available, a cutout in the wall surface will allow for maintenance to be carried out without removing the toilet from the wall.

Standard Installation

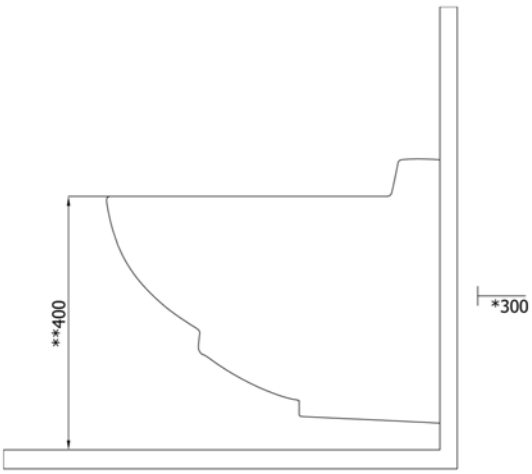
The toilet is delivered with a fastening kit aimed at installation on existing wall mounted bolts. Note that the fastening kit with the mounting bolts is not included in the delivery. The fastening kit may be purchased through your Jets Vacuum AS supplier.



Bolts should be installed on adequately dimensioned weight bearing studs or a suitable mounting frame. Ensure that mounting bolts are positioned horizontally 310mm apart.

(A) Water Connection/Vacuum Breaker (Optional)

Maintenance Access and Installation Height



* 300mm Cavity

If maintenance is to occur without removing the bowl from the wall fixture, a 300mm cavity is required.

If maintenance is to occur by removing the bowl from the wall fixture, no maintenance cavity is required behind the wall.

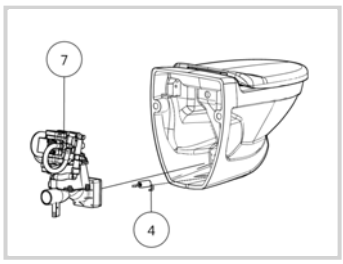
** 400mm Toilet Height

Seat height is variable. It is recommended that the top of the toilet bowl be installed at a height of 400mm from the floor surface for standard installations.

1

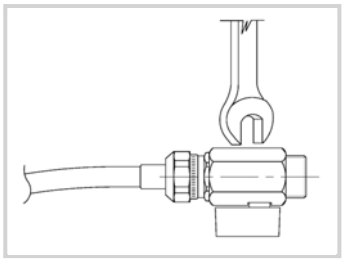
Prepare the Wall Mounting

Prepare the wall mounting as per the instructions above. Note that the toilet may be mounted on appropriately positioned pre-existing mounting bolts, bolts installed for the purpose of mounting this toilet or an appropriately dimensioned mounting frame.



2

Install the Valve ⑦ and Spring ④, as per the products installation instructions found in the products technical data. Note: Only for deliveries supplied without a pre-installed valve.



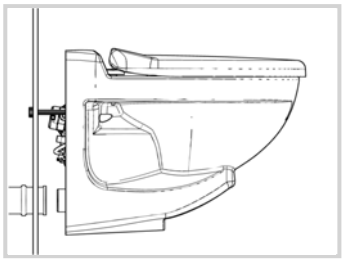
3

Connect the ball valve from the valve to the water main.
Note: Do not over tighten.

4

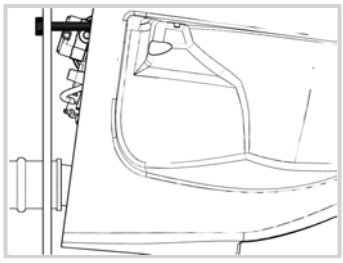
Connect the release button/mechanism hose to the toilet valve.

For connection information see the installation description provided in the Release Button's technical data sheet.



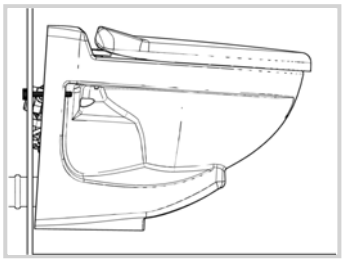
5

The toilet is to be positioned with the mounting bolts through the mounting holes in the porcelain bowl.



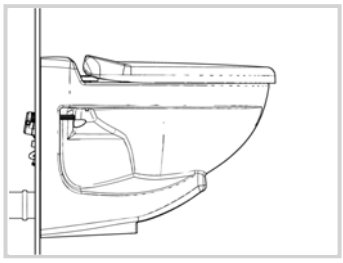
6

When lowering the toilet bowl into position on the bolts, ensure that the valve outlet is securely fitted in the outlet pipe in the wall.



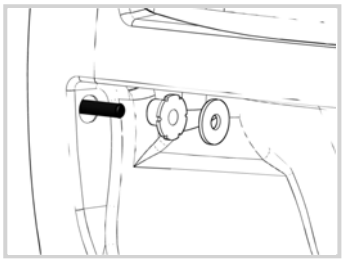
7

Press the toilet firmly into the outlet pipe to secure the connection.



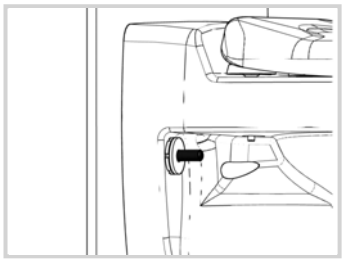
8

The bowl should be even and aligned with the wall surface.



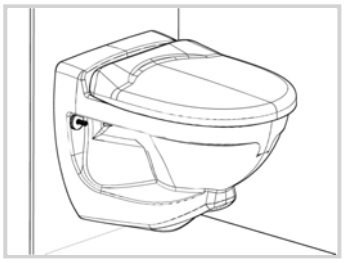
9

Fit the Fastening Kit, wall to secure the toilet to the mounting bolts.



10

Note that an M12 nut is required to secure the toilet (not supplied in the standard delivery). Secure the nut firmly without over tightening.



11

Completed.

12

Function Check to be Completed Prior to Use

1. Clean the bottom of the bowl.
2. Ensure that the discharge valve has been securely connected to the outlet pipe.
3. Check that the water supply is connected and water pressure is adequate.
4. Turn on the water supply.
5. Press the release mechanism to activate the valve.
6. Check that the bowl fills with water.
7. Check that sufficient vacuum is created when activating the release mechanism to release the contents of the bowl.
8. Check that the water level in the bowl is restored.
9. Check that water is dispersed on the bowl surface by the flushing mechanism.
10. Check that there are no water or air leaks.

Service and Maintenance

Out of Use - Not in Regular Use

The following procedures are to be followed if a toilet is to be out of use over a longer period of time (i.e for cabins and recreational houses).

1. Close the water supply valve.
2. Run a flush cycle by activating the release mechanism.
3. Close the toilet seat cover.
4. CAUTION: This toilet is not intended for use in temperatures below freezing without appropriate antifreeze measures being taken. For locations where frost/freezing may occur, frost protection measures must be taken. For further information contact Jets Vacuum AS or your nearest supplier for a copy of technical information regarding frost protection measures.
5. CAUTION: Never use automotive antifreeze (ethylene glycol) in the toilet system.
6. Turn off the power.

NOTE: Failure to adequately protect the toilet system from damages may result in void of your warranty coverage.

NOTE: Jets Vacuum AS reserves the right to deny any warranty claim submitted if the claim is caused by frost/freezing damage.

Cleaning Instructions

1. Mild soap or biological cleaners are recommended for cleaning the toilet. See Jets Vacuum AS product range for suitable cleaning solutions.
2. Do not use cleaners that create foam.
3. The toilet is to be cleaned regularly to maintain hygiene.
4. Do not use caustic cleaners (such as drain cleaner) or bleach. These products may damage components in the toilet system.
5. If using abrasive, chlorine or corrosive cleaners, avoid contact with the seat and cover/hinges.
6. For scale buildup, we recommend use of Jets Vacuum AS biological descale products. Contact your Jets Vacuum AS supplier for information.
7. Note that maintaining water in the toilet bowl will prevent odors.

Spare Parts and Accessories

Available spare parts are indicated in the component list for the toilet. Spare parts and accessories can be ordered via your local Jets Vacuum AS supplier. For multi-toilet installations, a complete recommendation for spare parts is available. Contact your Jets Vacuum AS supplier for details.

Service and Maintenance

Jets Vacuum AS provides all customers with 24 hour worldwide technical assistance. For urgent matters please contact Jets Vacuum AS service department directly at +47 70039100. For other matters, please contact your nearest Jets Vacuum AS supplier.

1. Disassembly of the toilet must be carried out by a licensed professional.
2. All local, state and fedral regulations regarding water barriers and plumbing must be adhered to.
3. Disassembly of components may void the warranty.
4. Refer to the technical data sheets for specific product information. Refer to the products troubleshooting information for general maintenance.
5. It is recommended that service and maintenance routines be carried out in accordance with the information in this document.

When making enquiries, please have the following information available.

1. Toilet model number.
2. For valve enquiries: Valve serial number (the serial number identification is located on the label applied to the valve).
3. Part number, description, quantity (see the product component list for details).

Locating a Water Leak

To locate the source of a water leak, first thoroughly dry all surfaces. Leaks at room temperature can make it difficult to feel wetness. Using a piece of soft tissue pat the surface. When the tissue comes in contact with water it will immediately change texture.

Scheduled Maintenance

Interval	Action	Note
Regularly - dependent on frequency of use.	Clean the toilet.	Clean the toilet as per instructions provided in the products technical information.
As required.	Check for damage to equipment. Replace or repair damaged equipment and take measures to prevent future damage to the system.	Note that frost and/or freezing may damage sanitary systems if precautions have not been taken. Contact your nearest Jets™ supplier for information on Jets™ range of frost protection products for installations in cold climate locations.

Troubleshooting

Jets Vacuum AS provides the following troubleshooting information to assist in resolving issues that may arise with your installation. For more detailed information or assistance, please contact Jets Vacuum AS.

Problem	Cause	Action
Water is refilled in the toilet, but the content is not discharged	Loss of vacuum in the toilet/pipe system.	Check the vacuum level to ensure that it is adequate.
		Check the pipes and any connected equipment including the valve, pump etc. for foreign objects. Remove any blockages in the system.
		Check the pipe system to ensure there is no air entering the pipes/damage to the pipe system.
The normal water level in the toilet bowl is reducing/low.	Low water pressure.	Increase the water pressure.
		Check the filter in the water connection/ball valve to ensure that it is not blocked. Replace the filter if required.
The toilet bowl is slow to empty.	The pump/pipes are blocked.	Check for foreign objects and remove the blockage.
	Build up of urine scale in the pipes and/or pump.	Check for urine scale build-up and descale the affected areas. See Jets™ selection of cleaning products for this purpose.
Air bubbles in the toilet bowl.	Blocked pipe outlet.	Check for blockages and remove. Correct any environmental causes. Note blockages may be caused by frost etc.
	Backflow in the installation.	Check the pipes have been correctly installed.
	The Non-return Valve is not closing.	Clean the non-return valve.
	If connected to a tank, the tank is full.	Empty the tank.
Mist forms from the flushing nozzles.	The water pressure/flow needs to be reduced.	Reduce the water pressure/flow by partially closing the ball valve on the water connection.
Flushing results in water from the nozzles spraying outside of the toilet bowl.		

CFD Valve 12VDC, Complete

Tel. +47 70 03 91 00
www.jetsgroup.com

Product No. 055100150

Issued 2013-10-28 | Rev 1.0

Jets™ CFD Valve is an electronically controlled flush and discharge valve.

Features:

- Low water consumption.
- Design optimized for easy maintenance.
- Designed for connection to mains water supply.

Warranty

All products of the company are sold and all services of the company are offered subject to Jets Vacuum AS General Sales Conditions detailing warranty and terms and conditions of sale, copies of which will be furnished upon request. The information provided herein is for guidance only; it does not constitute a guarantee of the performance or specification of any individual product or component.

Technical Data

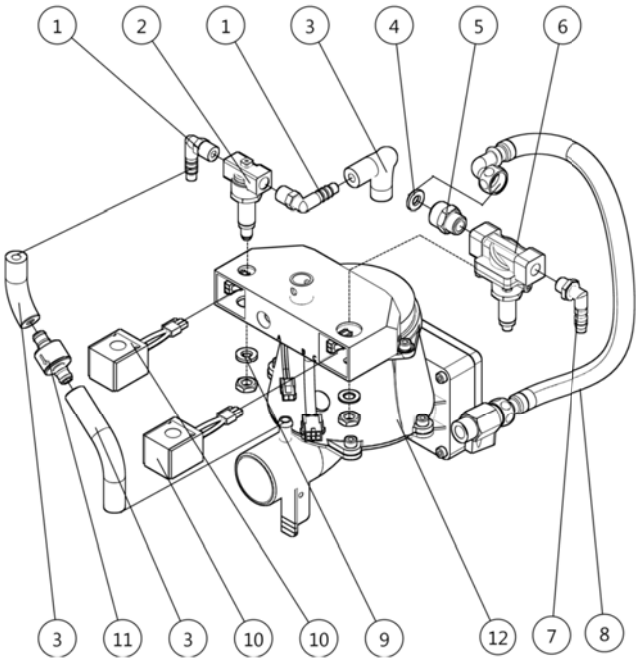
Type	Electronically Operated
Outside Dimensions	235 x 197 x 300 mm (LxWxH)
Weight	2.4 kg
Discharge Valve Outlet	Outside diameter Ø 50 mm
Generic Material	PP
Water Connection	½" male BSP

Operating Data

Flushing Time	5 seconds
Discharge Time	2 seconds
Water Pressure	2-7 bar
Operating Vacuum	Recommended 30-55 % Vacuum
Air Consumption	Approx. 48 liters at 50% Vacuum
Water Consumption	1 liter/s (3 bar)
Voltage DC	12V
Power Consumption	24 W

Patents and Trademarks

Disclaimer



Components

Construction Characteristics

1	Nipple	034501500*
2	Solenoid Valve	122502100*
3	Hose	034509000*
4	Sealing Ring	037504201*
5	Nipple	034505100*
6	Solenoid Valve	122513900*
7	Nipple	034501510*
8	Hose w/ball valve	034509620*
9	Washer	036508700*
10	Coil 12VDC	122514200*
11	Non-return Valve	034501705*
12	CFD/LFD Valve	055100151

** Component/s avaliable as replacement parts.*

Explanation of CFD Valve Function

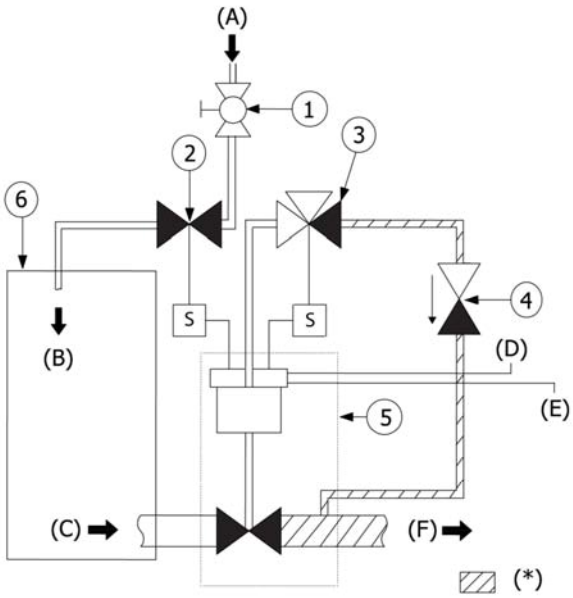
① Solenoid Valve, Water
② Solenoid Valve, Air
③ Non-return Valve
④ CFD/LFD Valve
⑤ Source (toilet, urinal, etc.)

(A) Water Supply
(B) Water Inlet to the Source
(C) Outlet from the Source
(D) Controller
(E) Release Mechanism
(F) CFD/LFD Valve Outlet

(*) Vacuum in the piping as indicated.

Normal Position: Closed Valve

- Solenoid Valve ② - CLOSED
- Solenoid Valve ③ - CLOSED
  (open to atmosphere)
- CFD/LFD Valve ⑤ - CLOSED

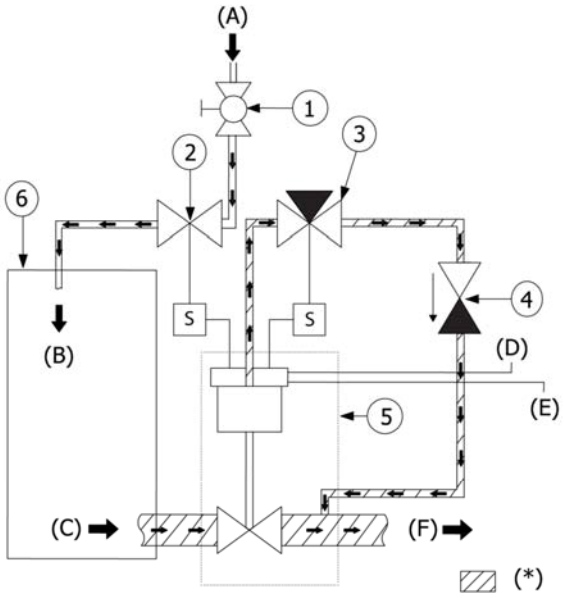


Emptying Sequence

1. Release Mechanism (E) - ACTIVATED
2. Solenoid Valve ② - OPEN
3. Solenoid Valve ③ - OPEN
   (closed to atmosphere)
4. CFD/LFD Valve ⑤ - OPEN

Closing Sequence

1. Release Mechanism (E) - DEACTIVATED
2. Solenoid Valve ③ - CLOSED
   (open to atmosphere)
3. CFD/LFD Valve ⑤ - CLOSED
4. Solenoid Valve ② - CLOSED



Result: Effluent is sucked by vacuum from the source. Water flows to the source.

Important Health and Safety Information

Installation, operation and maintenance must be carried out in strict accordance with this guide and with all applicable regulations. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets Vacuum AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets Vacuum AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets Vacuum AS (citing the safety reference number) for further clarification.

For further information about the included warnings or any other safety concerns please contact Jets Vacuum AS.

Safety Warning Symbols


Warns of risk of electrical shock which may cause significant physical injury or equipment damage.


WARNING: Indicates a potentially hazardous situation which, if not avoided could result in death or serious injury or equipment damage.


Symbol denotes required personal protective equipment is required.


NOTICE: Indicates important information, which if not followed, may cause damage to equipment.


Indicates recyclable material/recycling information.


General information to all users.


CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or equipment damage.

Important Health and Safety Warnings


1.2 Warning
Be thoroughly familiar with the controls and the proper use of the equipment prior to installing, starting or using the equipment. Know the equipment application, limitations and potential hazards.


1.9 Personal Protective Equipment - Gloves
Wear suitable protective gloves at all times when working with equipment.


2.1 Warning
The safety of the equipment is guaranteed only if it is used in compliance with the instructions provided by the supplier. The limits indicated must never be exceeded in any given situation.


2.9 Warning
Do not disassemble, repair or modify the product without contacting a qualified tradesman.


3.5 Warning
Ensure that the line voltage and frequency of electrical current supply agrees with the equipment specifications


11.1 Notice
Jets AS supports responsible recycling and disposal of all packaging materials and refuse.


11.6 Notice
Discarded products should not be disposed of together with household waste. Deliver this product at the nearest depot for safe treatment.


12.5 Notice
Use this equipment only in the manner intended by Jets Vacuum AS. If you have questions after reading these instructions contact Jets Vacuum AS directly.


1.4 Warning
Safety equipment (PPE) necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.


1.12 Warning
Depending on the external wiring, dangerous voltages may be present.


2.2 Warning
It is the responsibility of the client to ensure compliance when installing, servicing and maintaining the equipment. All extra maintenance work must be carried out by a qualified technician.


2.13 Caution
Installation, service and maintenance are to be carried out with due care. Shock, innapropriate handling, incorrect use of tools and general mishandling of the product may result in damage to components.


3.28 Warning
Never work on the equipment when power is applied.


11.3 Notice
Never leave packaging residues unattended in the home. Separate the various packaging materials by type and consign them to the nearest disposal centre.


12.2 Notice
Additional and replacement parts should only be obtained from the manufacturer or distributor


12.6 Notice
DO NOT use the Jets™ sanitary system if any component is damaged or missing.

Delivery, Receipt of Goods and Transportation

Goods to be protected against shock, dust, humidity and moisture. Suitable adequately dimensioned transporting equipment is to be used. Note that the equipment may contain components that are easily damaged as a result of inappropriate handling. Jets Vacuum AS is not responsible for or liable for delivery delays resulting from occurrences outside of Jets Vacuum AS' immediate control. On receipt of goods, check for visual damage. Any damage detected after dispatch should be reported immediately to Jets Vacuum AS. Damages and/or discrepancies must be reported in writing no later than eight (8) days after receipt of goods. Commissioning must be postponed until the equipment has been inspected. Do not dispose of damaged items. Your direct supplier will advise you of the procedure to follow.

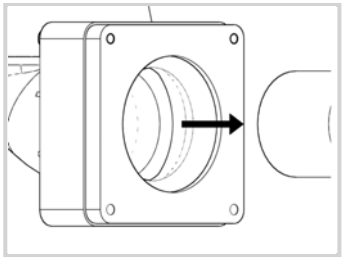
Storage

Unless otherwise specified, goods are to be stored in a dry environment between -30°C and +40°C prior to installation. The storage location must be dust free, low humidity (≤95%) and be free from moisture. Keep clear of foreign objects.

Installation to End Use

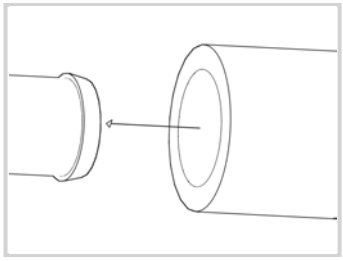
Site to be a dry environment between +0°C and +45°C. Use in environments below 0°C requires use of antifreeze in liquids. The site location is to be low vibration Vrms <0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free and protected from grinding and welding. During installation, the site is to be protected from water, frost, moisture and humidity. Goods are to be stored as per the instructions for delivery, storage and transport. A visual inspection is to be carried out on receipt of goods as well as at the time of installation to ensure that storage and transport conditions after receipt have not compromised the quality of the product/s.

Installation



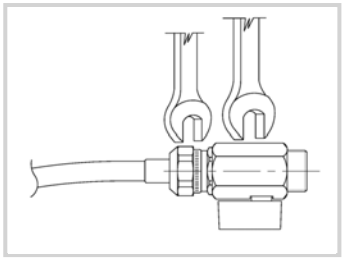
1

Push the valve onto the pipe sleeve/ stud connection.



2

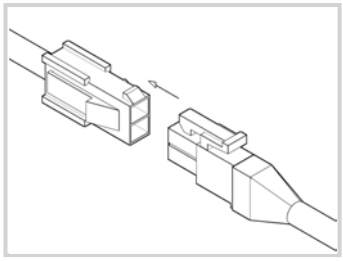
Connect the flushing device to the valve.



3

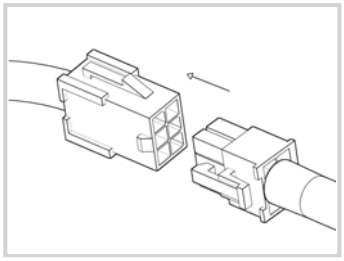
Connect the water supply.

Note: Do not over tighten.



4

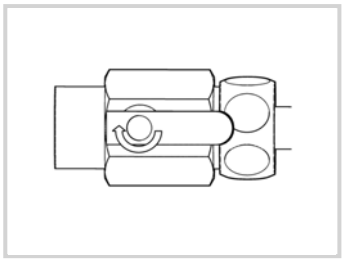
Connect the release mechanism.



5

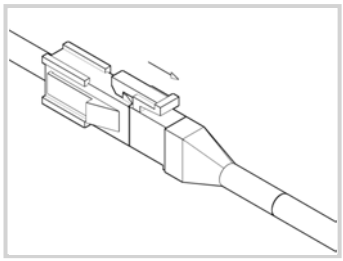
Connect the control device.

Disassembly Instructions



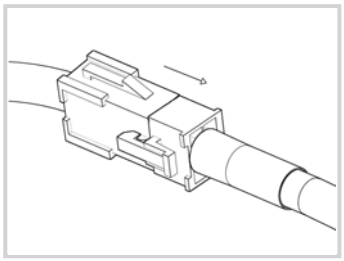
1

Close the ball valve for the water supply to the valve. Release any liquid in the water source (i.e. toilet, urinal etc.). Disconnect the flexible water supply hose from the ball valve.



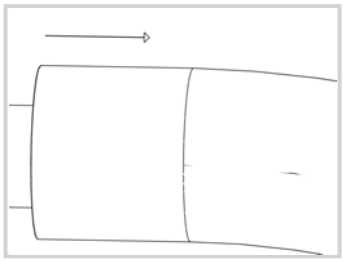
2

Disconnect the release mechanism from the valve.



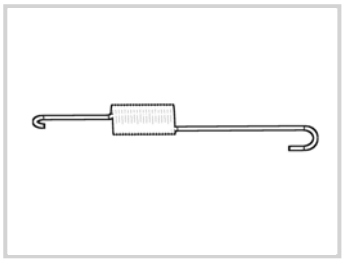
3

Disconnect the control device.



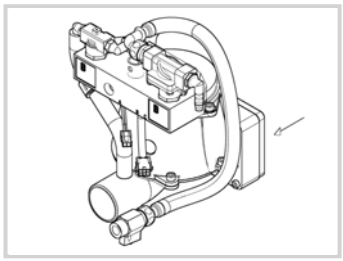
4

Pull to remove the flushing device.



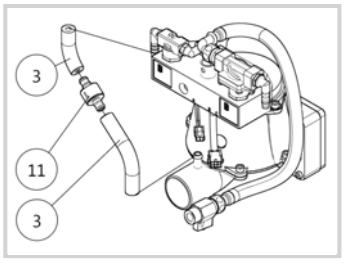
5

If a transport spring is installed, release the spring (connecting the lower housing of the valve to the bowl) and remove it.



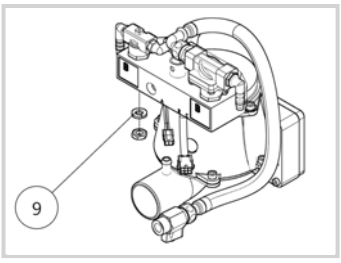
6

Pull the complete CFD Valve to release it.



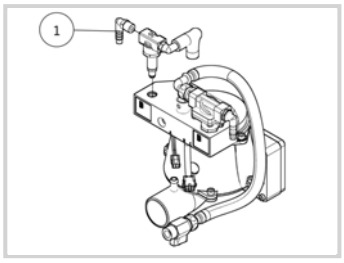
7

Pull the rubber Hose ③ to disconnect it from the stud on the outlet pipe of the CFD/LFD Valve. Pull the opposite end of the Hose ③ off of the nipple attached to the Solenoid Valve. Pull the Hoses ③ to remove the Non-return Valve ⑪.



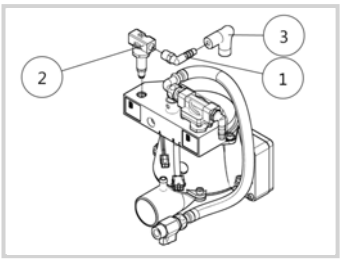
8

Unscrew the Nut and Washer ⑨ to remove the Solenoid Valve.



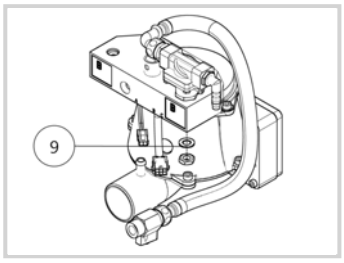
9

Remove the Solenoid Valve. Separate the Solenoid Valve from the Nipple ①.



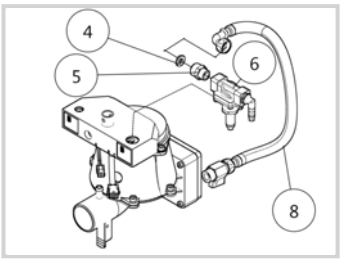
10

Separate the Solenoid Valve ② from the Nipple ①. Pull to remove the Hose ③.



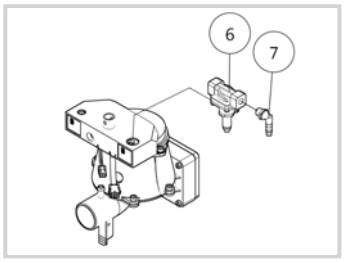
11

Unscrew the Nut and Washer ⑨ to release the Solenoid Valve.



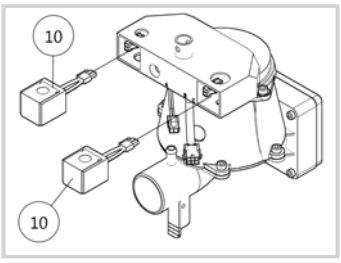
12

Release the Solenoid Valve ⑥. Unscrew and remove the Nipple ⑤ and the Sealing Ring ④ to release the Hose w/ball valve ⑧.



13

Separate the Nipple ⑦ from the Solenoid Valve ⑥.



14

Remove the two coils (Coil 12VDC ⑩).

Assembly Instructions

Assembly is to be performed in the reverse order of the disassembly procedure.

When re-assembling the valve, teflon tape is to be used on the threads between the nipples and the solenoid valves if not otherwise sealed.

Troubleshooting

Jets Vacuum AS provides the following troubleshooting information to assist in resolving issues that may arise with your installation. For more detailed information or assistance, please contact Jets Vacuum AS.

Problem	Cause	Action
No reaction or insufficient flushing when pressing the release button.	No vacuum in the discharge pipe line.	Check the vacuum.
	The release button does not activate flushing.	Replace the release button.
	Dirt/blockage in the Non-return Valve.	Clean the Non-return Valve.
	Leakage in the lifting membrane.	Replace the lifting membrane.
The toilet bowl slowly fills up with water.	The solenoid valve is leaking.	Clean or replace the solenoid valve.
Only flushing and no discharge is taking place.	The vacuum is below 25%.	Check the vacuum level and take action to increase the vacuum.

	Leakage in the lifting membrane.	Replace the lifting membrane.
The normal water level in the toilet bowl is reducing/low.	Low pressure on the water supply.	Increase pressure on the water supply.
	Dirt in the water supply filter.	Clean or replace the filter.
	Impurities prevent the shut-off membrane from closing.	Lower housing to be cleaned.
		The shut-off membrane requires cleaning.
	Shut-off membrane is damaged.	Replace the shut-off membrane.

Jets™ CFD/LFD Valve effectively controls discharge flow in a range of electrically operated vacuum discharge valves.

Warranty

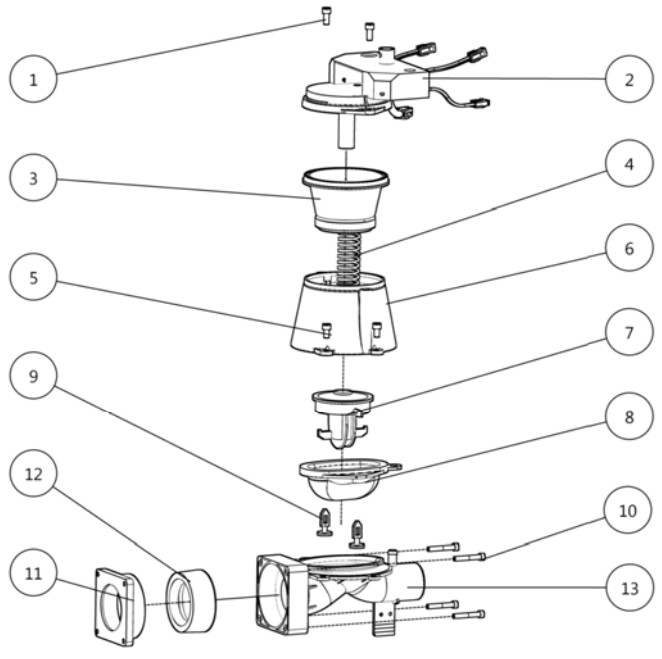
All products of the company are sold and all services of the company are offered subject to Jets Vacuum AS General Sales Conditions detailing warranty and terms and conditions of sale, copies of which will be furnished upon request. The information provided herein is for guidance only; it does not constitute a guarantee of the performance or specification of any individual product or component.

Technical Data

Outside Dimensions.....235 x 175 x 270 mm (LxWxH)
Weight.....1.25 kg
Generic Material.....PP
Discharge Valve Inlet.....Inside diameter Ø 60 mm
Discharge Valve Outlet.....Outside diameter Ø 50 mm

Patents and Trademarks

Disclaimer



Components

Construction Characteristics

1. Screw, M6x16.....036500200*
2. Top Housing CFD/LFD.....055100101*
3. Lifting Membrane.....050500800*
4. Spring.....050500700*
5. Screw, M6x12.....036500100*
6. Center Housing.....051500900*
7. Membrane Guide.....051501000*
8. Shut-off Membrane.....050501200*
9. Membrane Lifter.....051501100*
10. Screw, M5x40.....036531800*
11. Flange.....053531200*
12. Seal.....037531100*
13. Lower Housing.....054110020*

** Component/s avaliable as replacement parts.*

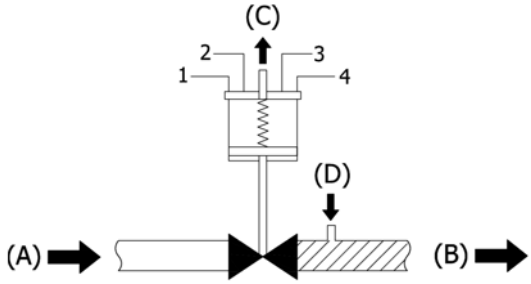
Explanation of CFD/LFD Valve Function

① Solenoid Valve, Air
② Release Mechanism
③ Controller
④ Solenoid Valve, Water (CFD) / Water Pump (LFD)

Normal Position: Closed

(A) Effluent Inlet
(B) Vacuum Supply/Effluent Outlet
(C) Air Outlet
(D) Vacuum Connection

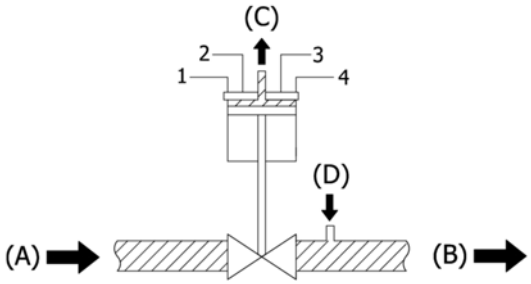
* Vacuum in the piping as indicated. (*)



Operating Position: Open

(A) Effluent Inlet
(B) Vacuum Supply/Effluent Outlet
(C) Air Outlet
(D) Vacuum Connection

* Vacuum in the piping as indicated. (*)



Important Health and Safety Information

Installation, operation and maintenance must be carried out in strict accordance with this guide and with all applicable regulations. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets Vacuum AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets Vacuum AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets Vacuum AS (citing the safety reference number) for further clarification.

For further information about the included warnings or any other safety concerns please contact Jets Vacuum AS.

Delivery, Receipt of Goods and Transportation

Goods to be protected against shock, dust, humidity and moisture. Suitable adequately dimensioned transporting equipment is to be used. Note that the equipment may contain components that are easily damaged as a result of inappropriate handling. Jets Vacuum AS is not responsible for or liable for delivery delays resulting from occurrences outside of Jets Vacuum AS' immediate control. On receipt of goods, check for visual damage. Any damage detected after dispatch should be reported immediately to Jets Vacuum AS. Damages and/or discrepancies must be reported in writing no later than eight (8) days after receipt of goods. Commissioning must be postponed until the equipment has been inspected. Do not dispose of damaged items. Your direct supplier will advise you of the procedure to follow.

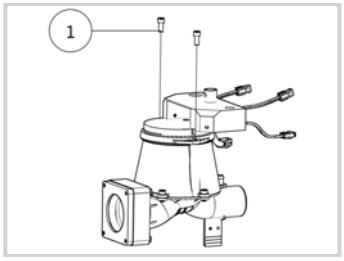
Storage

Unless otherwise specified, goods are to be stored in a dry environment between -30°C and +40°C prior to installation. The storage location must be dust free, low humidity (≤95%) and be free from moisture. Keep clear of foreign objects.

Installation to End Use

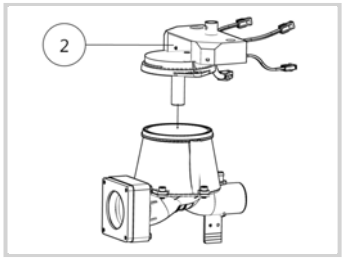
Site to be a dry environment between +0°C and +45°C. Use in environments below 0°C requires use of antifreeze in liquids. The site location is to be low vibration Vrms <0.2 mm/s) with vibration resistance to acceleration up to 0.7g. The site is to be dust free and protected from grinding and welding. During installation, the site is to be protected from water, frost, moisture and humidity. Goods are to be stored as per the instructions for delivery, storage and transport. A visual inspection is to be carried out on receipt of goods as well as at the time of installation to ensure that storage and transport conditions after receipt have not compromised the quality of the product/s.

Disassembly Instructions



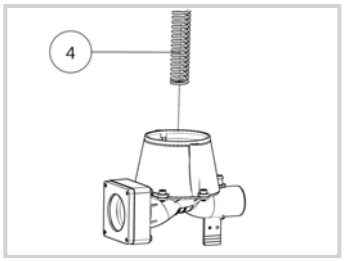
1

Disconnect the CFD/LFD Valve from other parts if it is part of an assembly. Unscrew and remove the two screws (Screw, M6x16) ① securing the Top Housing CFD/LFD to the Center Housing.



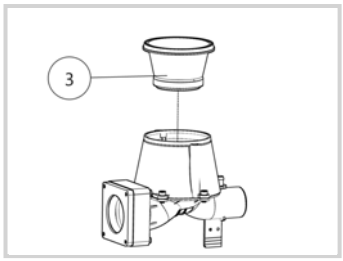
2

Pull out the Top Housing CFD/LFD ②.



3

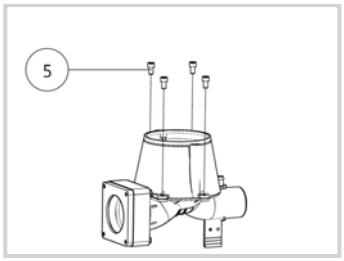
Remove the Spring ④.



4

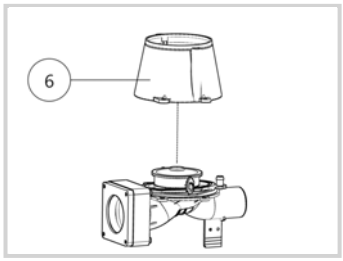
Pull out and remove the Lifting Membrane ③ from the Center Housing.

2.13 Caution
Installation, service and maintenance are to be carried out with due care. Shock, innapropriate handling, incorrect use of tools and general mishandling of the product may result in damage to components.



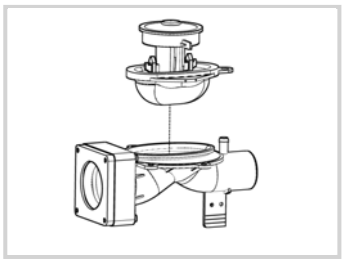
5

Unscrew and remove the four screws (Screw, M6x12) ⑤ holding the Center Housing to the Lower Housing.



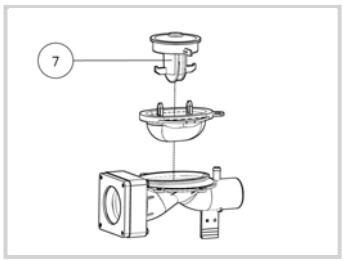
6

Pull upwards and remove the Center Housing ⑥.



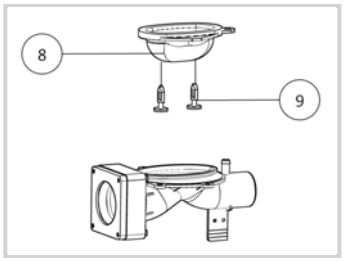
7

Lift the Shut-off Membrane and Membrane Guide out of the Lower Housing.



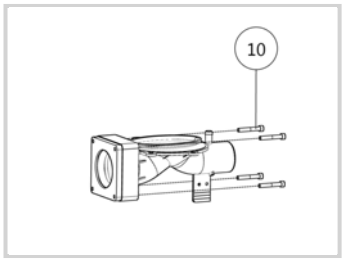
8

Lift out and remove the Membrane Guide ⑦.



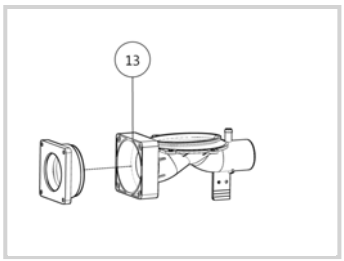
9

Remove the two Membrane Lifters ⑨ from the Shut-off Membrane ⑧.



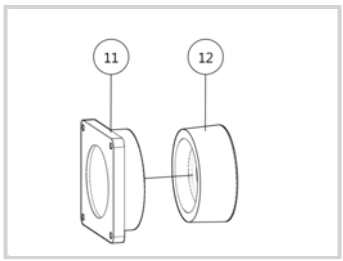
10

Unscrew and pull to remove the four screws (Screw, M5x40) ⑩ holding the Flange and Seal on the Lower Housing.



11

Pull to remove the Flange ⑪ from the Lower Housing.



12

Pull to remove the Seal ⑫ from Flange ⑪.

Technical Data

Weight.....0.030 g per meter
Material Type.....Silicone
Color Range.....White
Adhesive Type.....Self Adhesive

Operating Data

Application.....Dust, Sound, Smoke and Drafts

Patents and Trademarks

Disclaimer

Warranty

All products of the company are sold and all services of the company are offered subject to Jets Vacuum AS General Sales Conditions detailing warranty and terms and conditions of sale, copies of which will be furnished upon request. The information provided herein is for guidance only; it does not constitute a guarantee of the performance or specification of any individual product or component.

VOD Piping Guidelines

Information Data Sheet

These guidelines contain complete piping installation information for Jets™ VOD vacuum toilet sanitary systems installed in homes/cabins.

Guidelines are appropriate to both locations with and without connected power/mains water.

Jets™ Product Information

The information contained in this guide is intended to aid both lay persons and professionals in installing Jets AS sanitary systems. Instructions are intended to assist plumbers installing Jets sanitary systems to avoid design errors.

All plumbing work is the responsibility of the customer. Jets AS cannot be held liable for malfunctions in the system caused by incorrect pipeline design or construction. All local, state and federal requirements must be observed when installing Jets AS sanitary systems.

Illustrations are intended to provide general assistance in installation. Variations may occur dependent on products purchased. Principles and information provided must be adhered to. For additional information contact your supplier.

For specific product related installation information, please refer directly to the independent product data sheet.

Note: Changes without prior notice.

Myravegen 1, N-6060 Hareid, Norway. Tel. + 47 70 03 91 00. Fax + 47 70 03 91 01. E-mail: post@jets.no

Function and Principle

Jets AS VOD toilet systems operate on a vacuum on demand principle whereby the Vacuumarator™ pump is activated by a release mechanism, triggering vacuum in the pipe between the pump and the toilet. Effluent is transported through the sanitary system by vacuum.

The **suction side** of the pump refers to the pipe installation between the toilet and the pump.
The **pressure side** of the pump refers to the pipe installation between the pump and the tank/sewer.

Safety and Environment Instructions

NOTE **1.1** Installation, operation and maintenance must be performed in strict accordance with this guide. For your own protection and the protection of others, it is necessary to familiarize yourself with, and always follow, the contained safety and environmental precautions for our products.

This manual is an integral part of the product/delivery. Always keep it in a safe place for future reference. It is entirely the owner's responsibility to ensure that all safety and environmental measures, in accordance with local, state and federal laws are followed. Jets AS assumes no responsibility for equipment damage, personal injury or death and/or delays that result from a lack of respect for the instructions for installation and/or use as stated in this documentation. Disregarding these instructions may invalidate all warranties.

Safety information references are in accordance with Jets AS documentation system. If you do not understand the warnings, stop work immediately and contact Jets AS (citing the safety reference number) for further clarification. For further information about the included warnings or any other safety concerns please contact Jets AS.

WARNING **3.4.0** Safety equipment (PPE) necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.

WARNING **5.1** The safety of the equipment is guaranteed only if it is used in compliance with the instructions provided by Jets AS. The limits indicated must never be exceeded in any given situation.

WARNING **5.4** When cutting or drilling into walls or ceilings, avoid damaging electrical wiring and other hidden utilities.

WARNING **10.3** Toilets connected to pressurized water must be positioned in a room with adequate drainage in line with all applicable regulations and standards.

WARNING **10.4** Pipe connections must be positioned without pressure or force being applied by outside influences resulting in damage to piping and causing leakage.

BIO HAZZARD **11.2** Disease Hazards: Effluent is a common mode of transmission for parasitic organisms. Some of these may be pathogenic, meaning that they may have the capability of causing serious communicable disease. Good personal hygiene, use of disinfectant soap and avoidance of hand to mouth transfer are necessary for all working in contact with the equipment. Skin abrasions, punctures or wounds of any other nature require immediate and proper medical attention.

Piping Guidelines

For all VOD Installations

1. Minimum 2 bar water pressure is required.

2. Where mains water supply is unavailable, it is recommended that a water filter be installed (with the exception of LFD). This applies to water supply from wells, water cans and other water sources which are under pressure.

3. The Vacuumarator™ pump must be positioned at the same level as or lower than the lowest toilet in the system. On the pressure side of the pump, the outlet pipe (Ø32mm) must be positioned a minimum of 32cm (total height) from the pump outlet. This results in 20cm of visible pipe between the pipe connections. It is advantageous to increase this height up to 50cm).

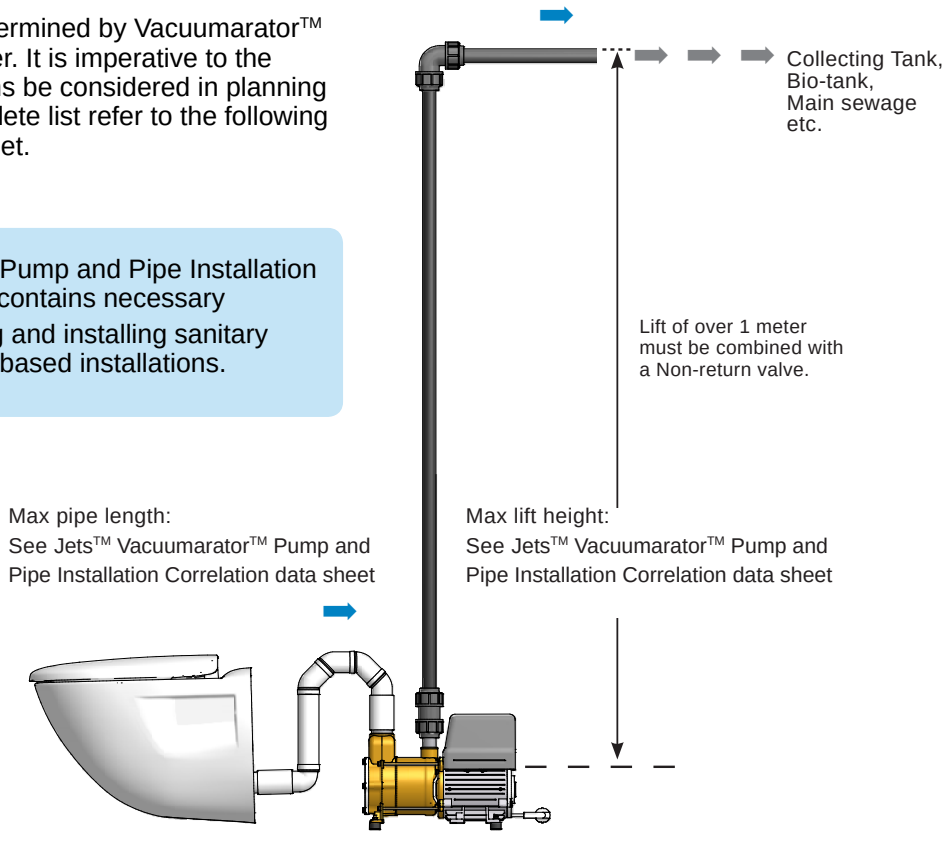
Grey Water Tanks

The recommendations and installation requirements provided are actual for both toilet and grey water tank installations.

Important Information Regarding Pipe Length and Lift Limitations

Maximum pipe length is determined by Vacuumarator™ pump size and pipe diameter. It is imperative to the system that these restrictions be considered in planning and installation. For a complete list refer to the following Jets™ Information Data Sheet.

Jets™ Vacuumarator™ Pump and Pipe Installation Correlation data sheet contains necessary information for planning and installing sanitary systems/pipes for land based installations.

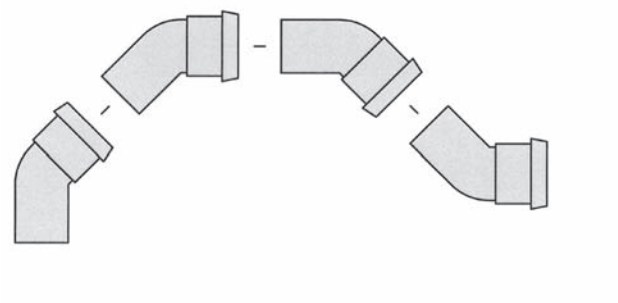


2.0 Transport Pockets

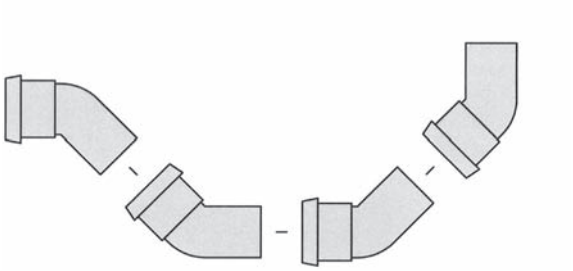
2.1 Goose Neck Pipe Fittings / 2.2 Reverse Goose Neck Pipe Fittings

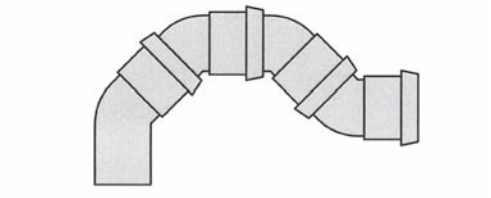
4 x 45 degree bends of Ø50 mm.

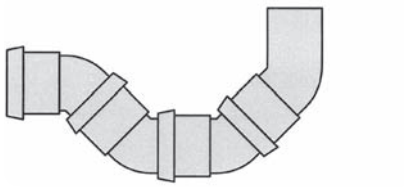
Goose neck fittings prevent back flow to the toilet.



Reversed goose neck fittings used for raised pipes to the pump.

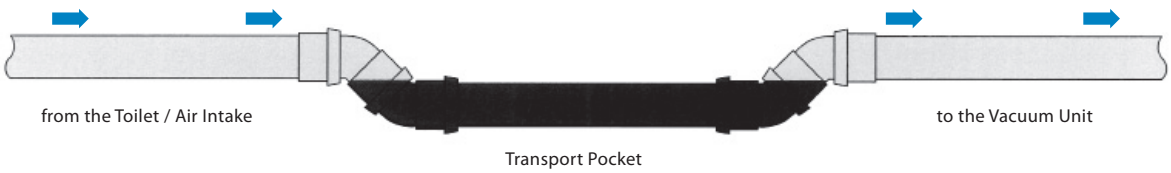


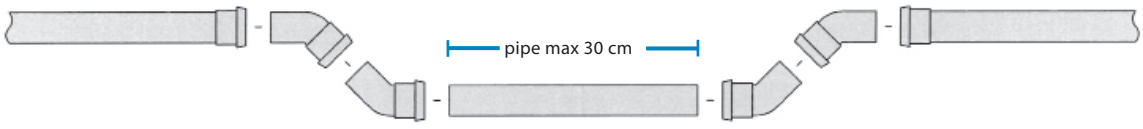




2.3 Transport Pockets

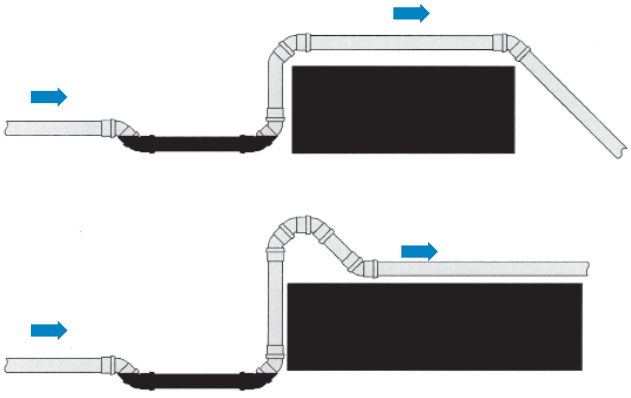
4 x 45 degree bends for long pipe lengths of Ø50 mm.





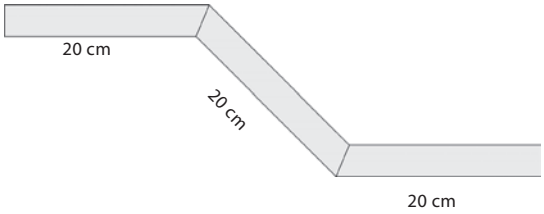
2.4 Obstacles

If an obstacle is present, the transport pocket is to be positioned in front of the obstacle. If the obstacle has a longer length, a goose neck fitting is also required.



2.5 Transport Pockets on the Pressure Side

A moulded transport pocket for longer raising stretches of pipe at Ø32mm may be required.



3.0 Pipe between Toilet/s and Vacuumarator™ Pump

3.1 Pipe Details

> Ø50mm PP pipe is the standard pipe and dimension used between a toilet and a pump.
> It is not necessary to glue joints, however, clamps should be used.
> The use of flexible hoses/sanitation hoses is not recommended if they can be avoided.
> Silicon spray or similar may be used as necessary when connecting the pipes.
> The total pipe length is not to exceed 12 meters.
> Plastic pipes under vacuum do not tolerate temperatures over 60°C.

3.2 Pipe Bend Details

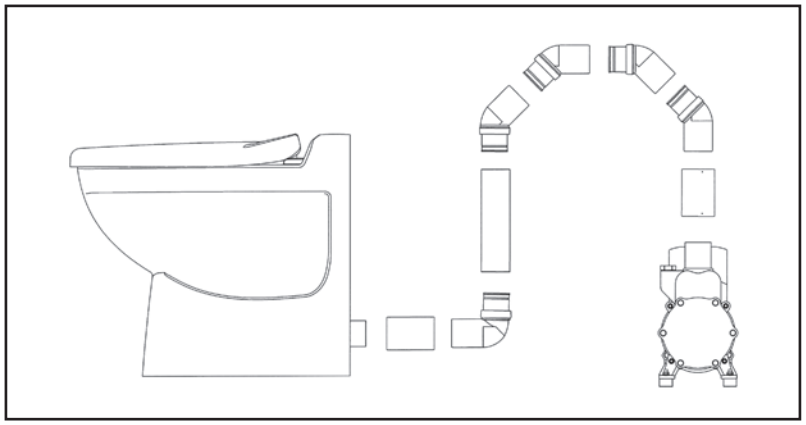
> 90 degree bends should not be used*. In instances where a 90 degree bend cannot be avoided an exception can be made, however, two 45 degree bends should otherwise be used at all times.
> T Connections should not be used between the toilet and the pump.

* Only from the toilet

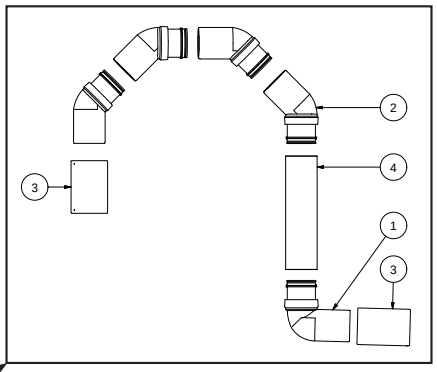
3.3 Pipe Connections to a Toilet

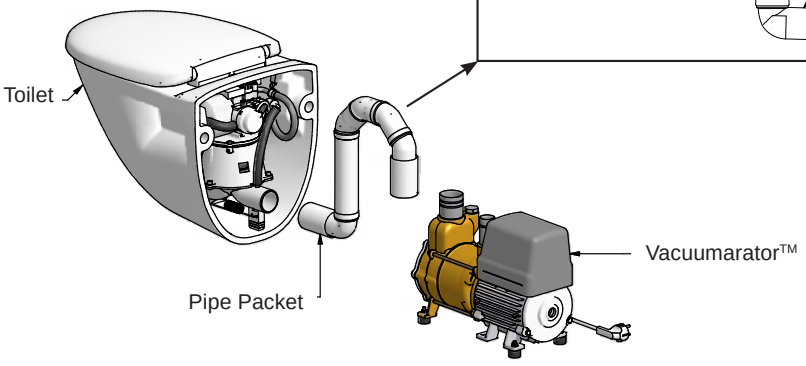
3.3.1. Standard Pipe Assembly

> Pipes should not be forced into position as this may result in leakage.
> The horizontal pipe on the suction side must not be installed with an incline towards the pump.

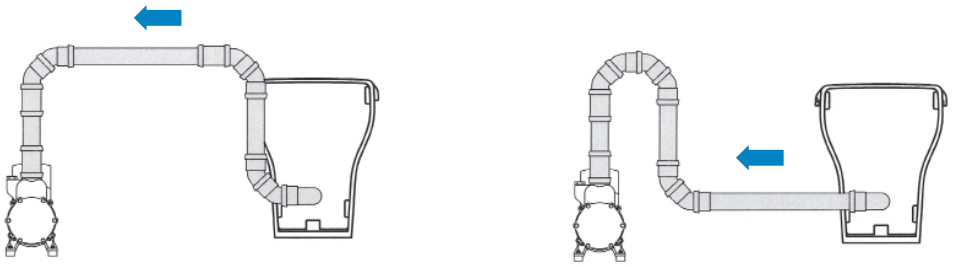


Item	Title
1	Pipe, elbow 90° bend
2	Pipe, bend 45° bend
3	Pipe 100mm
4	Pipe 140mm





3.3.2. Extended Distance between Toilet and Pump

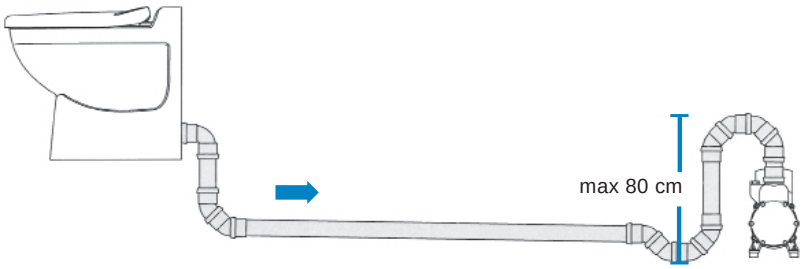


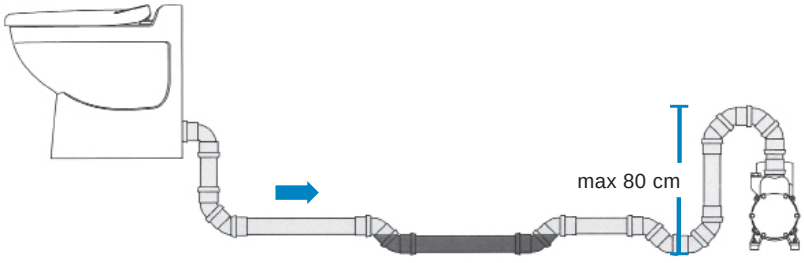
3.3 Single Toilet Connection

3.3.3. Toilet and pump at the same level > Pump lowered under the floor.

Up to a maximum 12m pipe length:

> To lay pipes to a Vacuumarator™ positioned under floor level, a 90 degree bend (2 x 45 degree bends) is required from the toilet. The standard pipe assembly is not required.
> Start as high up in the floor as is possible.
> Lay pipes with a 1cm fall per meter towards the Vacuumarator™ pump.
> Include a reversed goose neck fitting (air pocket) prior to the vertical riser pipe for the pump.





If it is not possible to lay pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length. A reversed goose neck fitting (slug pocket) is required prior to the vertical riser pipe for the pump.

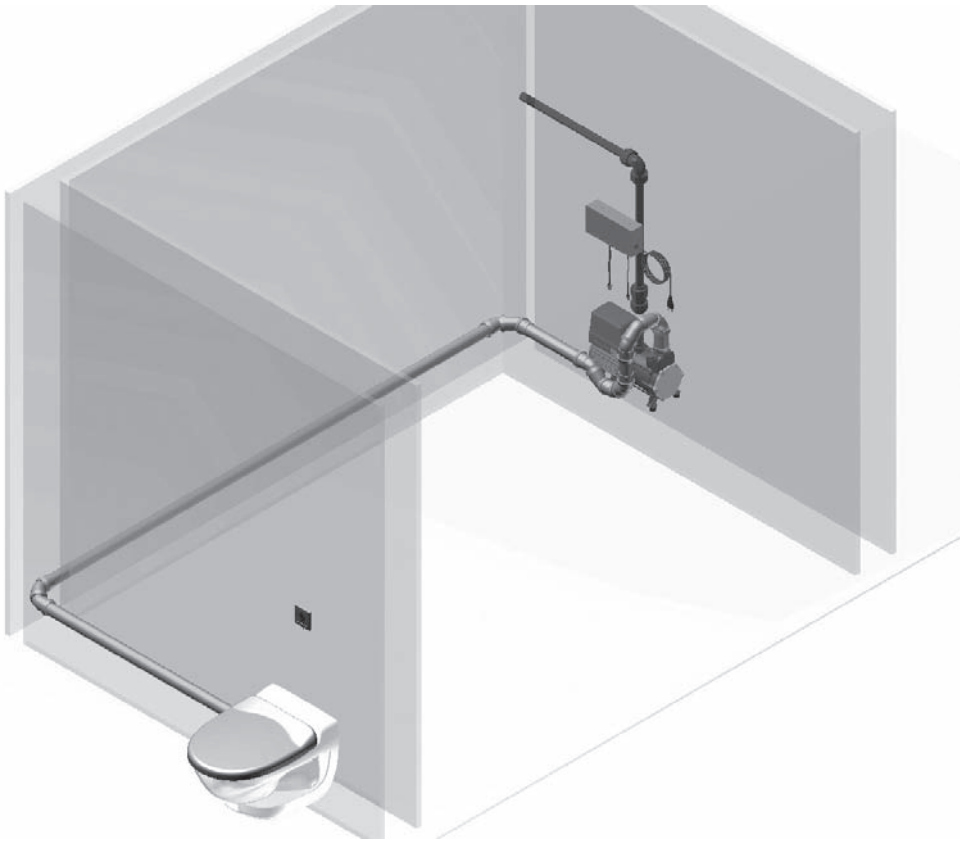
The horizontal pipe on the suction side must not be installed with an incline towards the pump.

3.3 Single Toilet Connection

3.3.3. Toilet and pump at the same level > Pump and pipes in the wall cavity.

Up to a maximum 12m pipe length:

- To lay pipes in a wall cavity to a Vacuumarator™, a 90 degree horizontal bend (2 x 45 degree bends) is required from the toilet. The standard pipe assembly is not required.
- Start as high as possible so as to lay pipes with a 1cm fall per meter towards the Vacuumarator™ pump.
- Include a reversed goose neck fitting (air pocket) prior to the vertical riser pipe for the pump.



If it is not possible to lay pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length. A reversed goose neck fitting (air pocket) is required prior to the vertical riser pipe for the pump.

The horizontal pipe on the suction side must not be installed with an incline towards the pump.

3.3 Single Toilet Connection

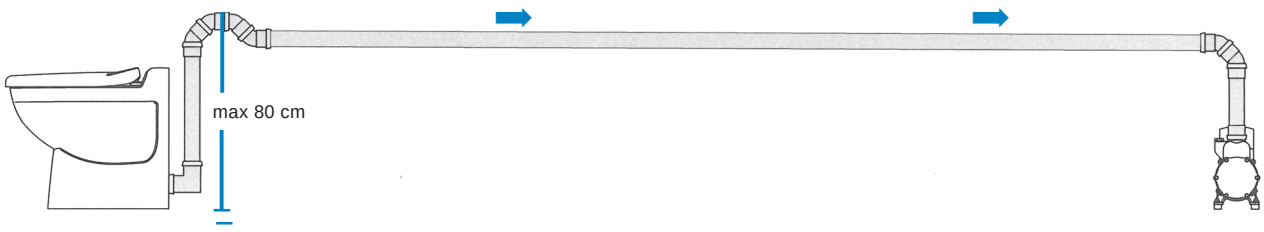
3.3.3. Toilet and pump at the same level > Raised pipes.

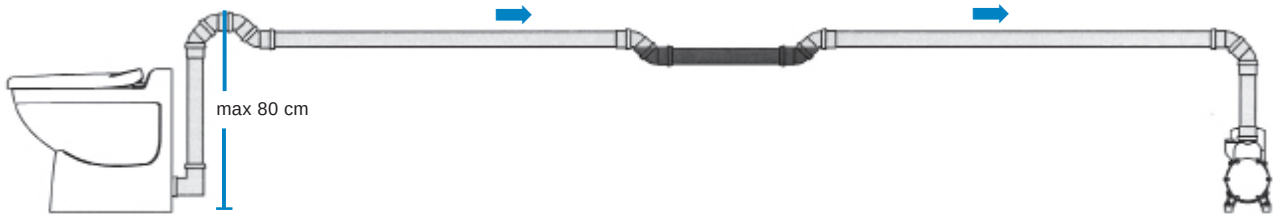
Up to a maximum 12m pipe length with maximum raised height of 80cm:

> To lay raised pipes to a Vacuumarator™, a 90 degree bend (2 x 45 degree bends) is required from the toilet. The standard pipe assembly is not required.
> Lay pipes with a 1cm fall per meter towards the Vacuumarator™ pump.

If it is not possible to lay pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length.

The horizontal pipe on the suction side must not be installed with an incline towards the pump.





3.3 Single Toilet Connection

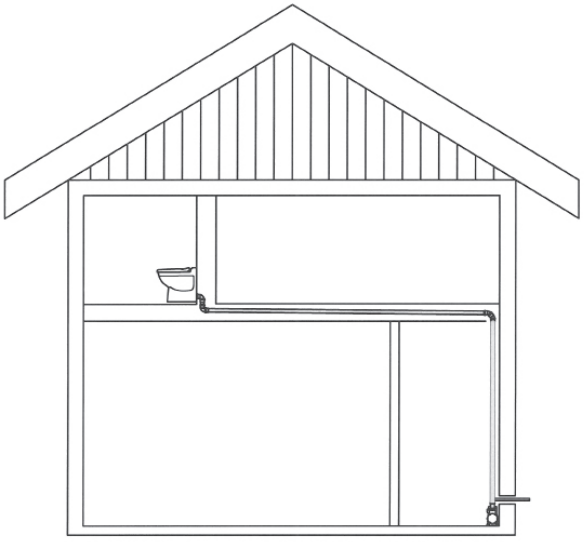
3.3.4. Pump below toilet level > Pipes through the floor.

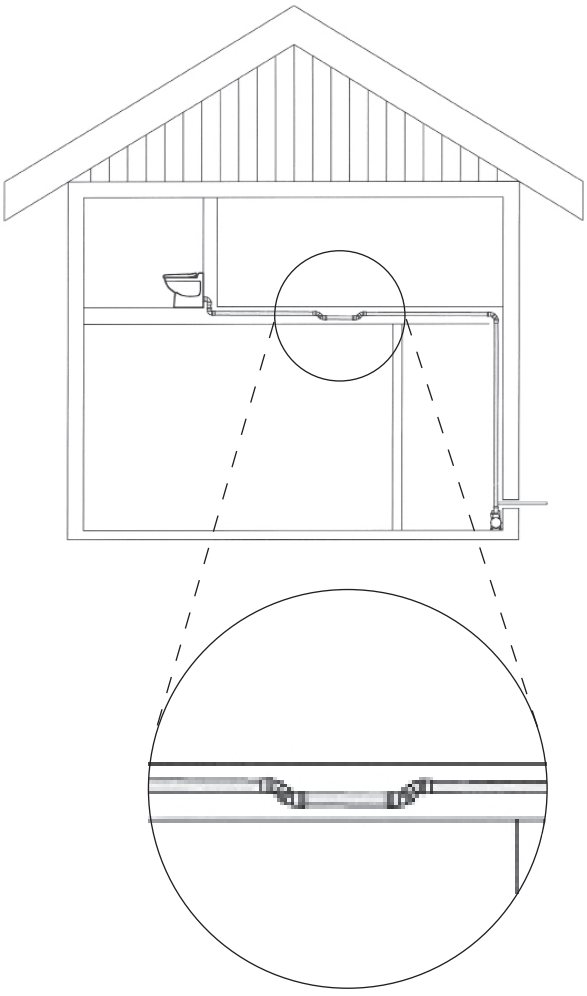
Up to a maximum 12m pipe length:

> To lay pipes through the floor level to a Vacuumarator™, a 90 degree bend (2 x 45 degree bends) is required from the toilet. The standard pipe assembly is not required.
> On the horizontal pipe a 1cm fall per meter towards the Vacuumarator™ pump is required.

If it is not possible to lay pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to horizontal pipes over 6m in length.

The horizontal pipe on the suction side must not be installed with an incline towards the pump.





3.4. Multiple Toilet Connections

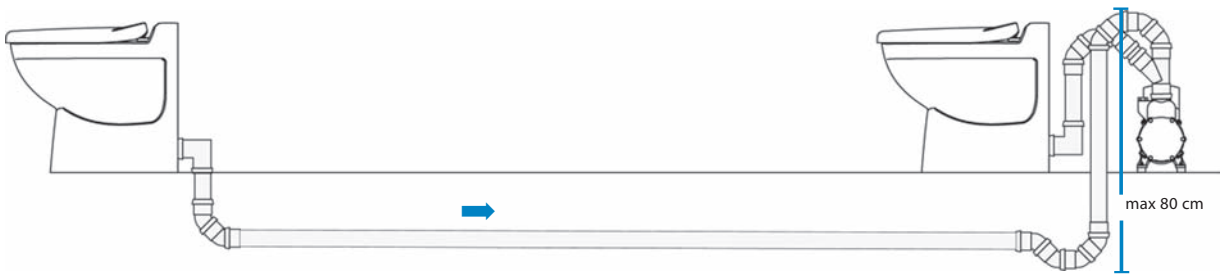
3.4.1. Toilets and pump at the same level > Pipes in the floor cavity.

Up to a maximum 12m pipe length:

> If possible, pump should be positioned at the end of the toilets (not in-between).
> The longest pipe length from a toilet is to be arranged to connect through the top of the “Y” at the inlet to the Vacuumarator™ pump.
> To lay pipes in the floor cavity a 90 degree bend (2 x 45 degree bends) is required from the toilet. The standard pipe assembly is not required.
> Start as high as possible so as to lay pipes with a 1cm fall per meter towards the Vacuumarator™ pump.
> Include a reversed goose neck fitting (air pocket) prior to the vertical riser pipe for the pump.

If it is not possible to lay pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length

A “Y” branch/s is required (positioned directly on the pump) if the pump is positioned level with the toilet. If the pump is positioned lower than the lowest toilet, a “Y” branch is not required. In the event that multiple “Y” branches are used the pump must be positioned lower than the toilets (maximum raised height of 80cm). The horizontal pipe/s on the suction side must not be installed with an incline.



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3.4 Multiple Toilet Connections

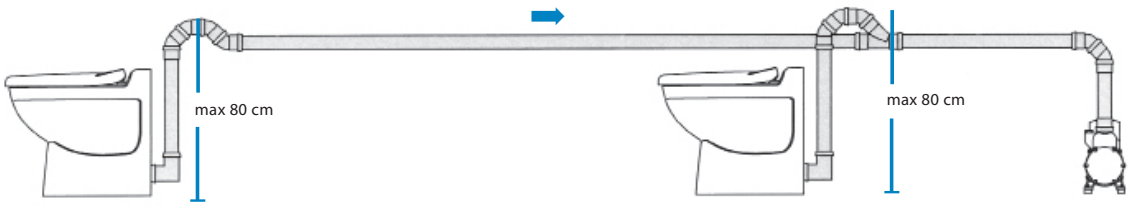
3.4.1. Toilets and pump at the same level > Raised pipes.

Up to a maximum 12m pipe length with maximum raised height of 80cm:

- Toilets to branch from the main pipe (See information for Gooseneck).
  - Ensure 45 degree bends are positioned in the flow direction.
  - Always connect from the top/upper side.
- To lay raised pipes to a Vacuumarator™, a 90 degree bend (2 x 45 degree bends) is required from the toilet/s. The standard pipe assembly is not required.
- Lay pipes with a 1cm fall per meter towards the Vacuumarator™ pump.

If it is not possible to lay pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length.

A "Y" branch/s is required (positioned directly on the pump) if the pump is positioned level with the toilet. If the pump is positioned lower than the lowest toilet, a "Y" branch is not required. In the event that multiple "Y" branches are used the pump must be positioned lower than the toilets (maximum raised height of 80cm). The horizontal pipe/s on the suction side must not be installed with an incline.



3.4 Multiple Toilet Connections

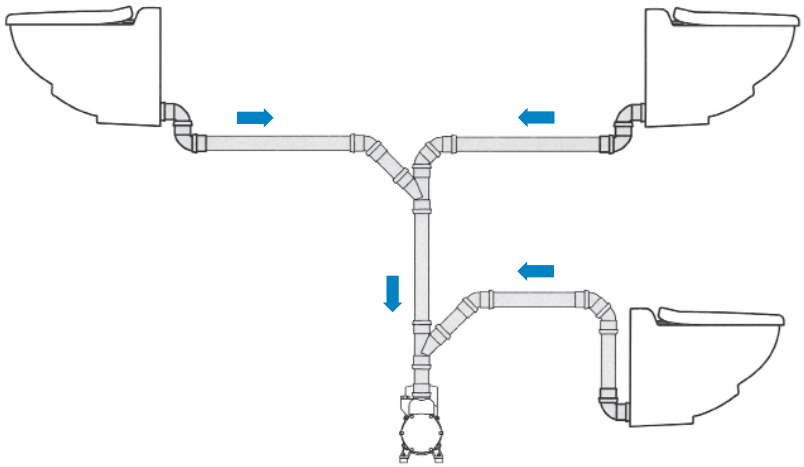
3.4.2. Toilets at varying levels > Toilets both above and at the same level as the pump.

Up to a maximum 12m pipe length:

- To lay pipes in a floor cavity and downwards to a Vacuumarator™, a 90 degree bend (2 x 45 degree bends) is required from the toilet/s. The standard pipe assembly is not required.
- To lay raised pipes downwards to a Vacuumarator™, a 90 degree bend (2 x 45 degree bends) is required from the toilet/s.
- Install horizontal pipes with a 1cm fall per meter towards the Vacuumarator™ pump.

If it is not possible to lay horizontal pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length.

A "Y" branch/s is required (positioned directly on the pump) if the pump is positioned level with the toilet. If the pump is positioned lower than the lowest toilet, a "Y" branch is not required. In the event that multiple "Y" branches are used the pump must be positioned lower than the toilets (maximum raised height of 80cm). The horizontal pipe/s on the suction side must not be installed with an incline.



3.4 Multiple Toilet Connections

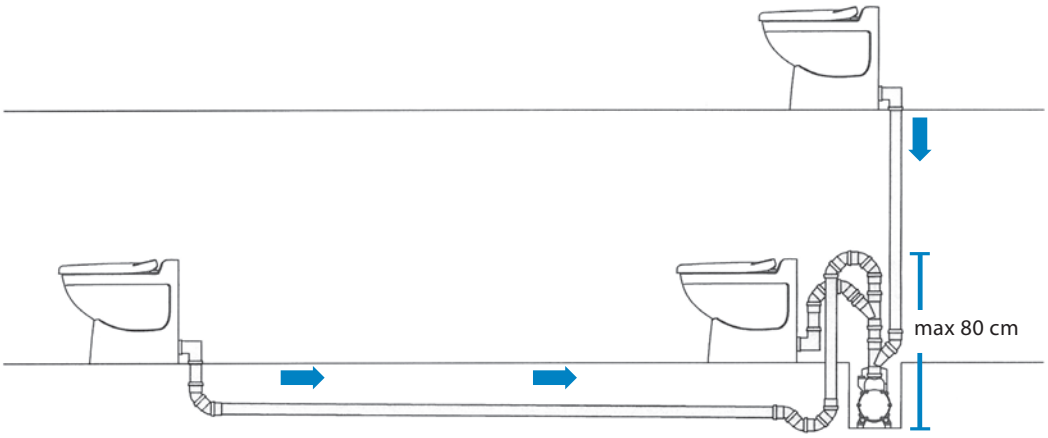
3.4.2. Toilets at varying levels > Pump behind a toilet at the lowest level.

Up to a maximum 12m pipe length:

- To lay raised pipes to a Vacuumarator™, a 90 degree bend (2 x 45 degree bends) is required from the toilet/s with/without a standard pipe assembly as necessary.
- Install horizontal pipes with a 1cm fall per meter towards the Vacuumarator™ pump.

If it is not possible to lay horizontal pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length.

A "Y" branch/s is required (positioned directly on the pump) if the pump is positioned level with the toilet. If the pump is positioned lower than the lowest toilet, a "Y" branch is not required. In the event that multiple "Y" branches are used the pump must be positioned lower than the toilets (maximum raised height of 80cm). The horizontal pipe/s on the suction side must not be installed with an incline.



3.4 Multiple Toilet Connections

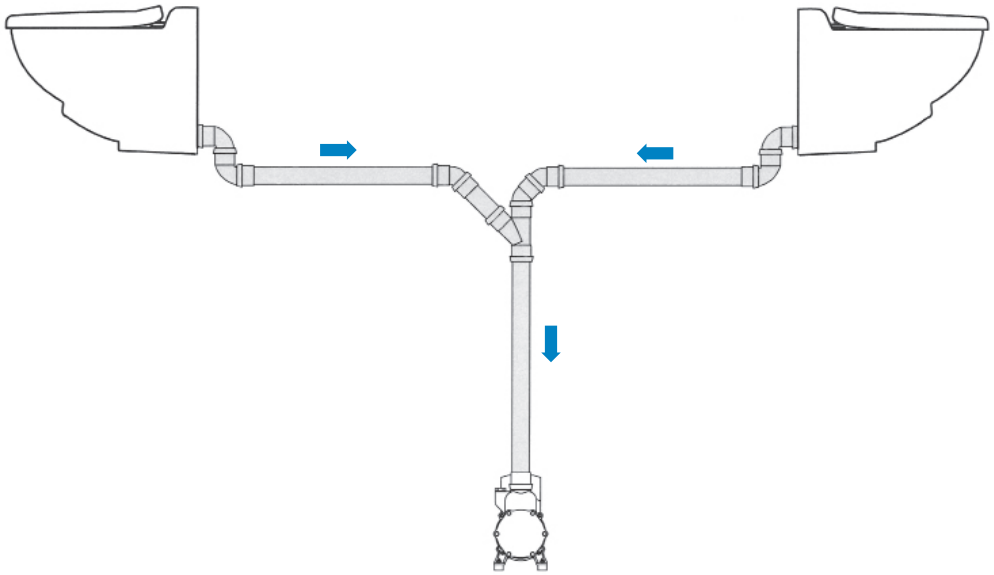
3.4.2. Toilets and pump at different levels > Pump at a lower level than the toilets.

Up to a maximum 12m pipe length:

- To lay raised pipes to a Vacuumarator™, a 90 degree bend (2 x 45 degree bends) is required from the toilet/s. The standard pipe assembly is not required.
- Install horizontal pipes with a 1cm fall per meter towards the Vacuumarator™ pump/Y-branch.

If it is not possible to lay horizontal pipes with the required fall, a transport pocket must be included centrally along the pipe. This applies to pipes over 6m in length.

A "Y" branch/s is required (positioned directly on the pump) if the pump is positioned level with the toilet. If the pump is positioned lower than the lowest toilet, a "Y" branch is not required. In the event that multiple "Y" branches are used the pump must be positioned lower than the toilets (maximum raised height of 80cm). The horizontal pipe/s on the suction side must not be installed with an incline.



4.1 Pipe Types and Bends

Type of Pipe

Ø32mm PEL hose, (or PE(PEH) rør).

> Prefabricated Ø32mm transport pockets.

> Transport pockets can be installed naturally in the terrain where possible.
PEL hose can be manipulated with heat.

Secure connections must be used (screwed, clamp rings, glued). If necessary silicon spray, or similar, can be used when connecting pipes.

See Vacuumarator™ pump details regarding recommended minimum/maximum pipe length.

Bends

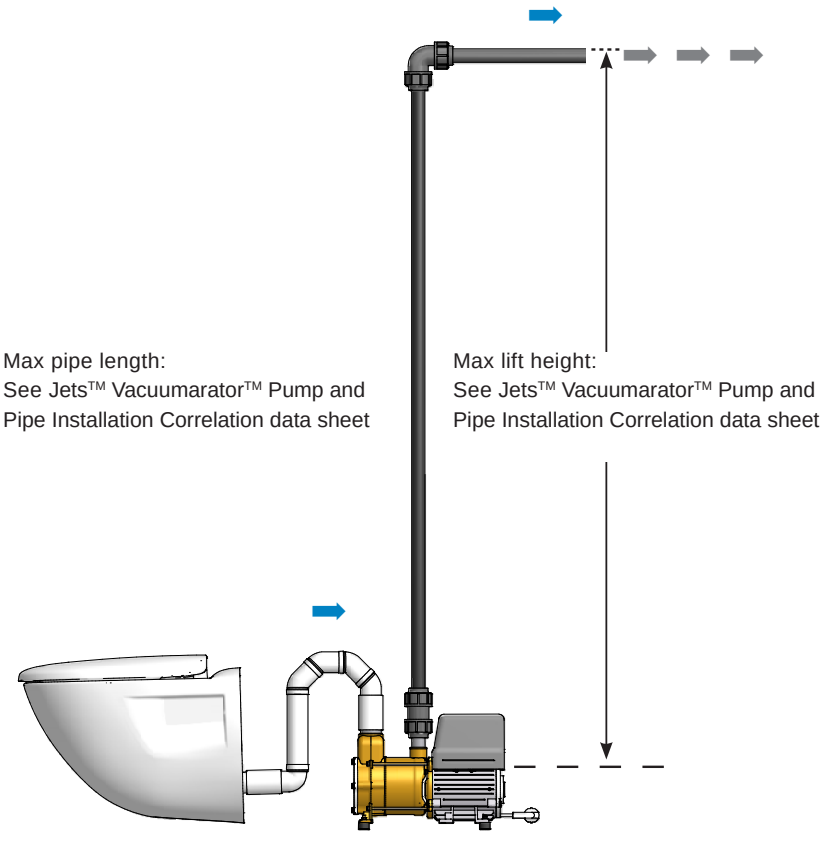
90 degree bends can be used (2 x 45 degree bends are recommended).

Lift Height

See Vacuumarator™ pump details regarding recommended minimum/maximum lift height.

Frost Protection

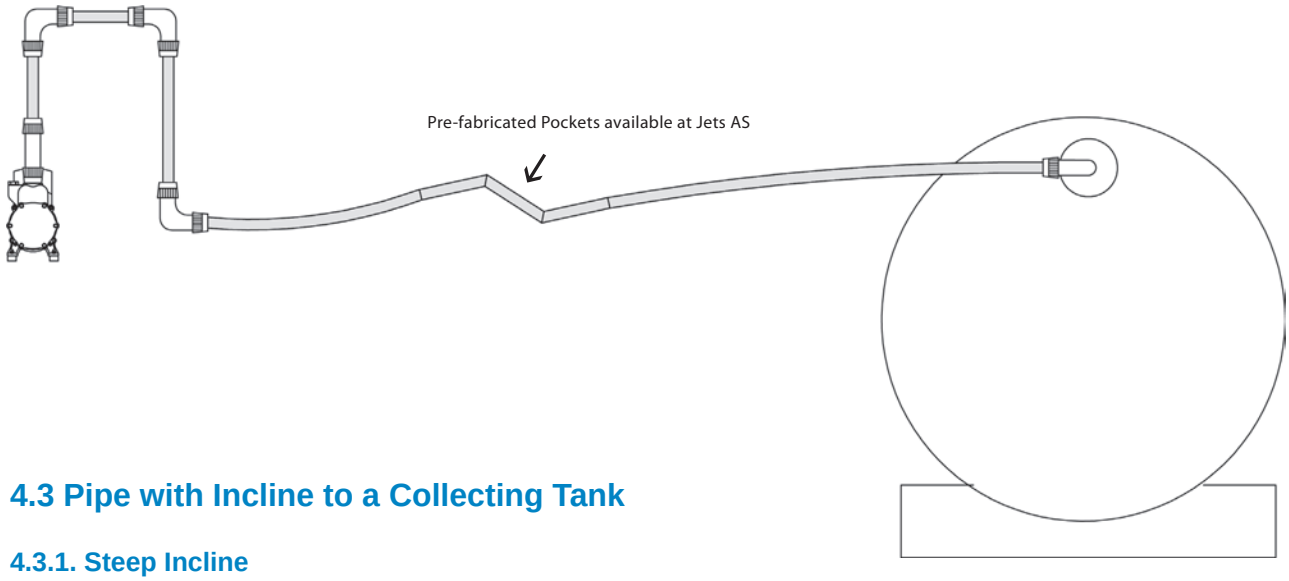
See Jets Information Data Sheet regarding frost protection for installations in areas where frost/ground freezing may occur.



4.2 Horizontal Pipe Length to a Collecting Tank

A transport pockets must be installed in each 15 meters of pipe between the VacuumaratorTM pump outlet and a collecting tank (i.e. 17m pipe: a transport pocket is required in the middle of the length).

Secure fittings must be used for all pipe connections (i.e. compression couplings).

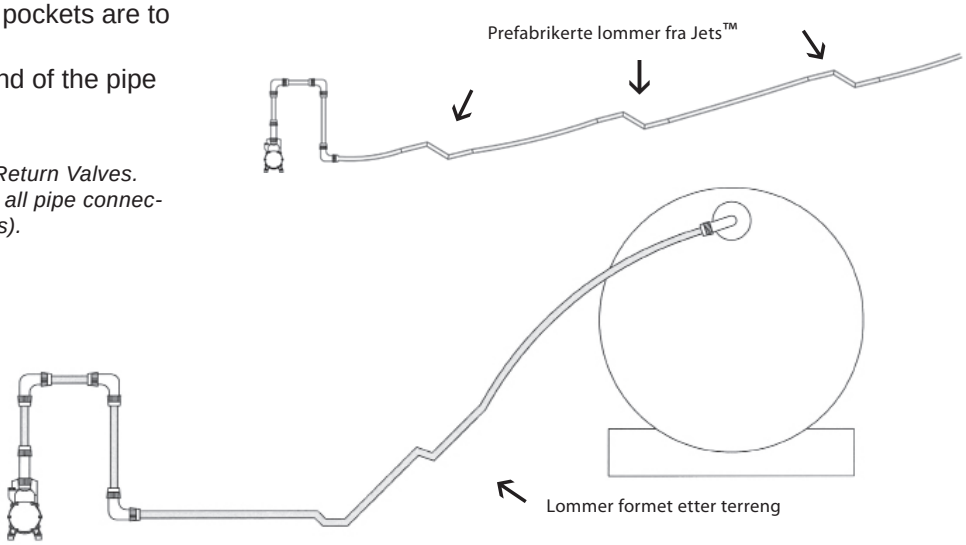


4.3 Pipe with Incline to a Collecting Tank

4.3.1. Steep Incline

- Transport pockets are to be installed at transition points from horizontal to raising pipes.
- Transport pockets are to be installed in ratio to the degree of lift in the pipe. The more lift required, the more transport pockets are to be installed.
- Vertical lift at the end of the pipe should be avoided.

For raising pipes: See also 6.0 Return Valves. Secure fittings must be used for all pipe connections (i.e. compression couplings).

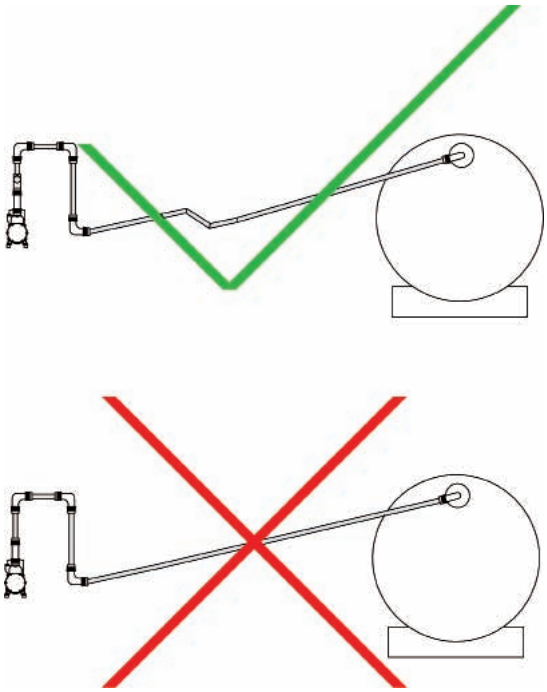


4.3 Pipe with Incline to a Collecting Tank

4.3.2. Straight Incline

- Transport pockets are required for pipes laid on a straight incline. Pockets are to be installed at a minimum distance of 3-7m, in ration with total lift height.
- See the Vacuumarator™ Pump and Pipe Installation Correlation data sheet for details.

For raising pipes: See also 6.0 Return Valves.
Secure fittings must be used for all pipe connections (i.e. compression couplings).



4.3 Pipe with Decline to a Collecting Tank

4.3.2. Pipes over the maximum length.

Pipes over the maximum length:

- See the Vacuumarator™ Pump and Pipe Installation Correlation data sheet for maximum pipe length appropriate to your pump.
- Standard pipe installations are based on Ø32mm pipe diameter.
- In locations with fall (decline) between the pump and the collecting tank, maximum recommended pipe lengths may be extended. Extended pipes from the recommended maximum installation (Ø32mm) are connected (extended pipe length should be adequately dimensioned at Ø50mm/ Ø63mm/Ø75mm pipe diameter) and installed to the collecting tank.

One-way Valve:

- In some cases where the maximum recommended pipe length is to be extended, it may be necessary to install a one-way valve at the point where the pipe dimension increases. This avoids issues with emptying of the effluent from the pump/toilet.
- For combination installations where horizontal pipe lengths or pipes with incline are connected further to a pipe length with decline, a one-way valve is to be installed at the highest point in the pipeline.

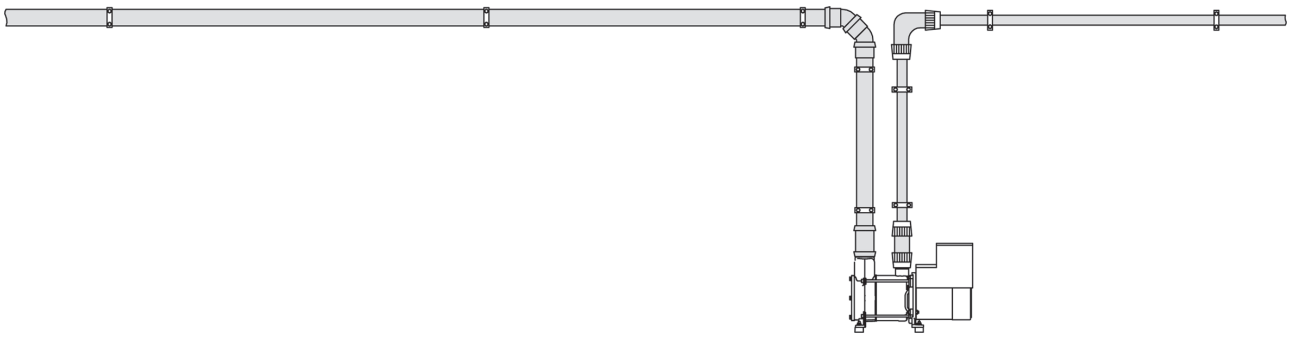
5.0 Pipe Clamps

On the vacuum side Ø50mm pipe is to have pipe clamps fitted at 1 meter intervals along the pipe length (as well as at pipe connections).

See the pipe manufacturer's recommendations for vacuum piping.

On the pressure side Ø32mm pipe is to have pipe clamps fitted at 1-2 meter intervals along the pipe length (covers indoor plumbing).

See the pipe manufacturer's recommendations for pressure classified piping.



6.0 Non-return Valves

To maintain capacity to the pump and prevent back flow and bubbling in the toilet, it may be necessary to install a non-return valve.

- For lift over 1m a non-return valve is required.
- For lift to the maximum recommended lift height for the pump a non-return valve is required.
- For pipe lengths over 15m a non-return valve is required.

501 CONTROL CHART - START-UP JETS VACUUM SANITARY SYSTEM

Information

ID/IMO No.:			
Constructor:		Constructor's representative:	
Construction No.:		Reference name:	
Jets unit No.:		Jets representative:	
Scheduled delivery:			

Equipment installed

	Type:	No. off:	Power supply (V)
Vacuum unit:			
Discharge pump:			
Toilet:			
Toilet:			
Grey water tanks:			
Urinals:			
Other:			
Other:			

Sewage Treatment Plant

STP type:		Serial No.	
Is STP delivered by Jets:	☐ Yes	☐ No	
Is STP commissioned by Jets:	☐ Yes	☐ No	

All functions specified in contract to be tested

No. of toilets tested: _____
Comments:

No. of grey water tanks tested: _____
Comments:

No. of urinals tested: _____
Comments:

Test of vacuum unit

No. ____ of ____

Snr. Vacuumarator™pump:	No.1		No.2		
	No.3		No.4		

Vacuum switch adjusted	Vacuumarator™ pump No.1.	Start	Bar	Stop	Bar
	Vacuumarator™ pump No.2.	Start	Bar	Stop	Bar
	Vacuumarator™ pump No.3.	Start	Bar	Stop	Bar
	Vacuumarator™ pump No.4.	Start	Bar	Stop	Bar

Current with 50% vacuum	Vacuumarator™ pump No.1.	Amp
	Vacuumarator™ pump No.2.	Amp
	Vacuumarator™ pump No.3.	Amp
	Vacuumarator™ pump No.4.	Amp
Current Discharge Pump	Pump 1.	Amp
	Pump 2.	Amp

Function in control cabinet				
	Pump Failure Alarm	☐ Installed	☐ Approved	
	Low Vacuum Alarm	☐ Installed	☐ Approved	Adjusted:
	High Level Alarm	☐ Installed	☐ Approved	Delayed:
	High High Level Alarm	☐ Installed	☐ Approved	Delayed:
	Low Level Indication	☐ Installed	☐ Approved	
	Running Time Alarm	☐ Installed	☐ Approved	Time adjusted to:
	Auto Discharge	☐ Installed	☐ Approved	Delayed:
	Intermittent Discharge	☐ Installed	☐ Approved	Time adjusted to:
	Running Signals	☐ Installed	☐ Approved	
Additional functions		☐ Installed	☐ Approved	
		☐ Installed	☐ Approved	
		☐ Installed	☐ Approved	

Comments:

Comments:

Signatures

For constructor:			
Date:		Sign.:	
Name in block letters:			
For Jets Vacuum AS:			
Dato:		Sign.:	
Name in block letters:			

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