

**ALPHEUS FLOW LIMITER
AUTOMATIC TYPE (AA)
Automatic de-blocking!!!
Product description**

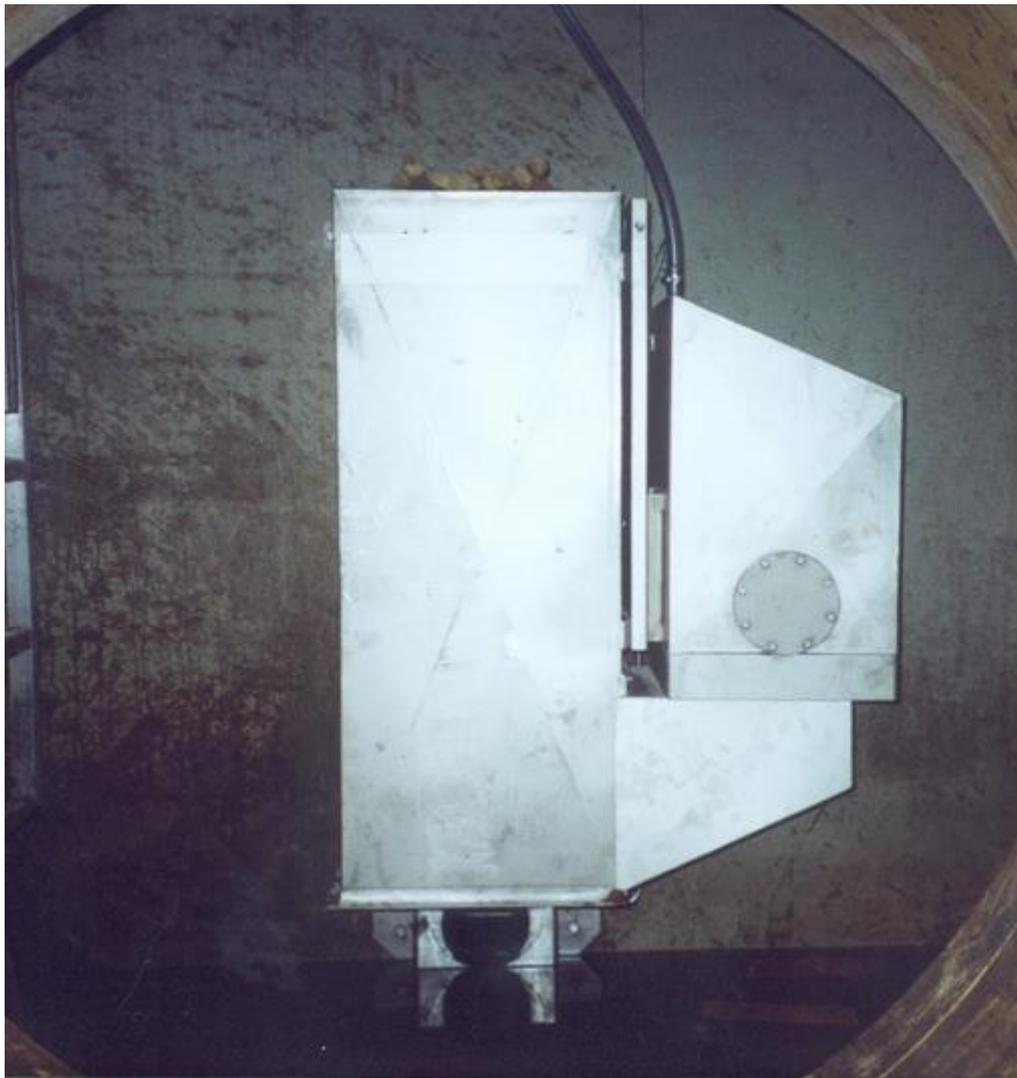


Table of contents:

The task of a flow limiter	3
Advantages over the ALPHEUS STANDARD Model	3
Operational description	3
Dry weather operation	4
Storm Flow operation	4
Operational description of the AUTOMATIC de-blocking device	5
Manual pull device for flushing the sewer	7
Design flow	8
Change in the flow design value	8
Different control concepts	9
An overview of dimensions and weights	10
Minimum manhole dimensions and installed dimensions	11
Emergency draining of the ALPHEUS Chamber	12
Discharge opening / wall opening / outgoing pipes	13
Profiling the inlet to the ALPHEUS	13
Installation in a rectangular chamber	14
Installation in a circular chamber	16
Optional components	18
DAPT TYPE adapter for circular chambers	18
TYPE SZ integrated bypass facility (spindle lifting system)	19
Adapter with integrated emergency bypass facility TYPE ADAPT – NE	20
Adapter with integrated emergency bypass facility and emergency overflowTYPE ADAPT – NE - NU	21
Integrated gate valve TYPE INT - FS	22
Additional equipment for remote monitoring	23
Recording the controller position	23
Electronic recording of the regulating position	23
Electronic recording of blockages	23
Incorporating the ALPHEUS FLOW LIMITER into the design	23
Advantages of the ALPHEUS FLOW LIMITER – AUTOMATIC TYPE	24

The task of a flow limiter

A combined storm/sewerage network provides common carriage for storm water and sewage. Depending on the catchment size this will consist of a number of collection systems all eventually discharging into the principle main sewer leading to a wastewater treatment facility. The design of the sewerage system is governed by the capacity of the receiving wastewater treatment facility. In order not to swamp the works a system of regulating or storing excess storm flows is required.

In the past flow control has been achieved through simple orifice plates or restricted pipe dimensions. However in order to make today's systems as effective as possible accurate flow regulation is required. Therefore high accuracy flow restricting devices are required to precisely restrict the discharge rate from a combined sewerage network – irrespective of the head of water – to allow a pre-designed flow of wastewater to be constantly discharged.

As many sewerage network storage systems do not have a power supply, **ESEP** has developed the ALPHEUS FLOW LIMITER, which runs without external power and with the same reliability as electrically actuated regulators.

Advantages over the ALPHEUS STANDARD Model

Due to the presence of sewage related debris it is possible for the standard version of the ALPHEUS FLOW LIMITER to suffer from blockages. These can be overcome by operating personnel using a manual pulling device. However, several hours or even days can pass between the blockage occurring and its detection/removal, as tank checks are mostly carried out at set intervals. For this reason, **ESEP** has developed the ALPHEUS AUTOMATIC. The flow regulation of the ALPHEUS AUTOMATIC TYPE is identical to that of the ALPHEUS STANDARD TYPE. However in addition to the manual pulling device, the AUTOMATIC TYPE has a system, which automatically detects and removes a blockage. This TYPE should be given preference, particularly in combined water systems and for low pass forward flow rates (<10 l/s).

Operational description

When no power supply is available, the ALPHEUS FLOW LIMITER is the correct regulator for the job. Installed in front of the discharge orifice of a sewerage system in a wet chamber installation, the designed discharge rate is accurately controlled – irrespective of the water level in the tank.

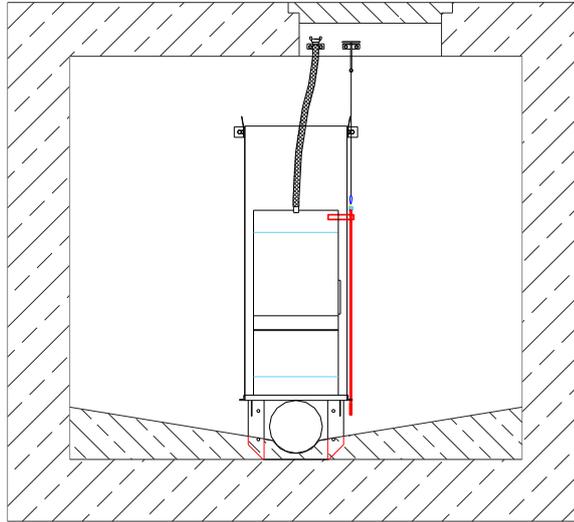
Accurate control, irrespective of head, is achieved with the help of a float, which is located inside the ALPHEUS' housing. The key design feature is that the housing is designed as a submersible bell: i.e. it is open at the bottom but is otherwise hermetically sealed. Consequently air is trapped within the housing and the water level inside the bell rises less than the level in the storm water tank because of the air pocket.

The benefit of the differential pressure is that the unit is smaller as we need less travel to achieve full regulation.

This reduced travel action enables a very compact unit design, which allows the ALPHEUS FLOW LIMITER to be installed even in very confined conditions. A further important advantage of the submersible bell housing over other designs is that the control mechanism lies inside the air zone, i.e. outside the wastewater and the risk of ragging is therefore prevented.

Dry weather operation

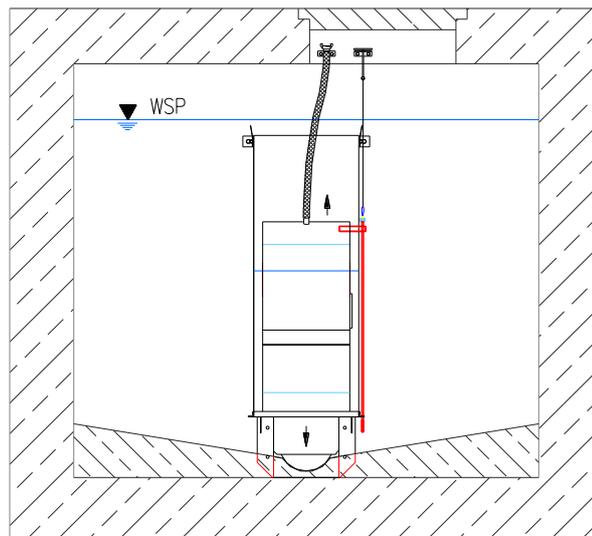
During dry weather flow the orifice plate of the ALPHEUS FLOW LIMITER is in its rest position and the orifice opening is completely free of obstruction. The float located underneath the ALPHEUS' hood is also in its rest position above the unrestricted orifice.



Storm Flow operation

When wastewater flows into the storage system under storm conditions flow passes through the Alpheus but due to the higher volume, the level in the chamber rises. As it does so the level will rise within the Alpheus unit itself, if the level reaches the float in the Alpheus housing the control mechanism commences.

As the float rises it causes the orifice plate to lower over the outlet thereby reducing the cross sectional area.



The mechanism that transfers the upward momentum of the float to a downward movement of the orifice plate is located above the water level and is therefore free from ragging up. As the movement of the orifice plate is not matched to the upward movement of the float, it is controlled via a radial cam.

The gate disk, which is permanently connected to the float, has a radial cam in which a cam follower is guided. The cam follower is attached to a slide rod that in turn is attached to the orifice plate. The upward movement of the float is therefore converted into a downward movement of the slide rod thereby restricting the orifice.

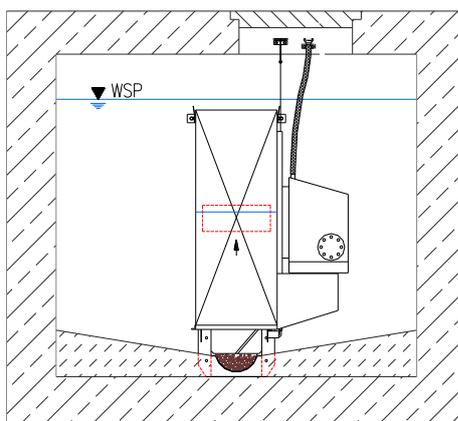
The float beneath the hood does not need to travel the same distance as the water level in the tank itself. This is because of the air trapped under the bell housing that provides downward pressure on the float. This enable the Alpheus unit to fit into a smaller chamber than would otherwise be required if the float level always had to be the same level as the water in the tank.

Operational description of the AUTOMATIC de-blocking device

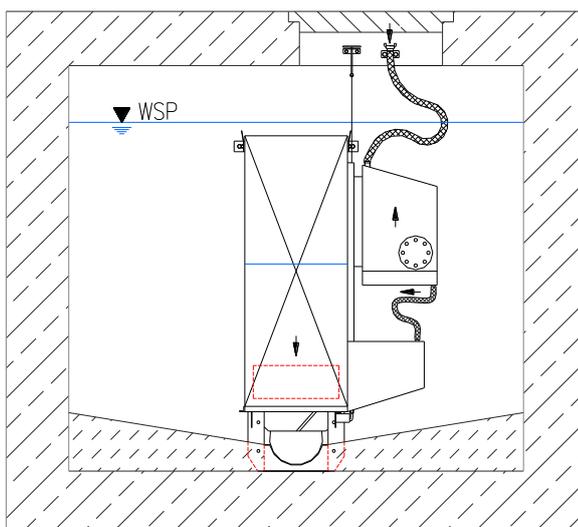
An additional AUTOMATIC device enables the ALPHEUS to automatically identify a blockage and to open the outlet orifice.

Provided that the components of the blockage are smaller than the outlet cross-section, they are flushed through the discharge outlet by the increased head of water.

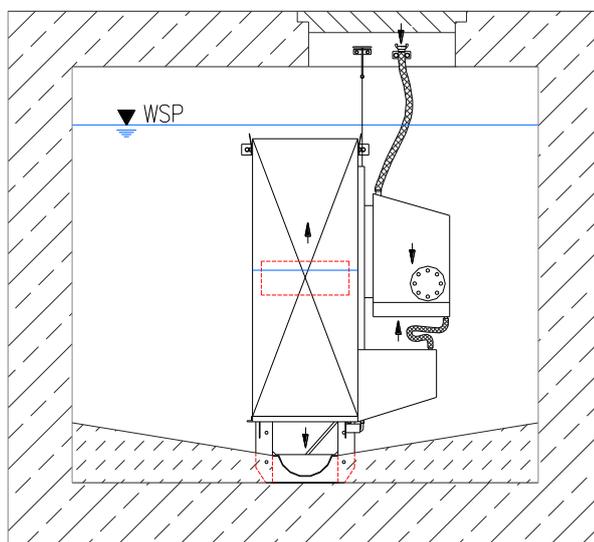
On the orifice plate there is a sensor, which is designed as an open pipe socket. During regulation the water flow passes the sensor with a high velocity and generates a partial vacuum. A valve in the trigger device is actuated by the partial vacuum. The tank water passes through the valve via the filler pipe into the auxiliary float. The air in the auxiliary float escapes via the ventilation pipe into the open air. The auxiliary float is weighted down by the inlet flow and remains in the lower end position.



If a blockage occurs in the discharge outlet during regulation, the partial vacuum disappears and the valve switches back into the home position. The water flows out of the auxiliary float through the valve and through the ALPHEUS housing into the sewer. Air passes through the ventilation pipe into the emptying auxiliary float. The auxiliary float becomes buoyant and pulls the control float located beneath the housing by means of a pulley system, against the buoyancy of the water. This opens the orifice plate to increase the outlet opening.



The water pressure flushes the blockage through the discharge outlet and the normal flow arte returns. With the reinstated partial vacuum the valve switches via the membrane and the auxiliary float fills with water and sinks back into the lower end position. The control float beneath the hood is released and moves the orifice plate back in front of the discharge outlet, so that the ALPHEUS can continue to regulate.



Manual pull device for flushing the sewer

In addition to the automatic de-blocking system, the ALPHEUS AUTOMATIC also has a manual trigger, which can be actuated during storm conditions to flush the sewer.

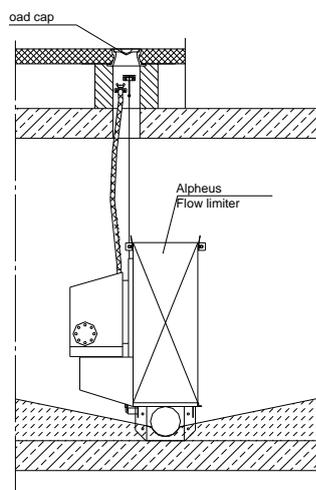
When the manual pulling device is actuated (stainless steel cable with operating handle and wall fixing) the effect of the float is cancelled and the discharge opening is almost fully opened.

This opening process takes place as long as the manual pull system is operated. The orifice plate then automatically returns to the regulating position – without any further action.

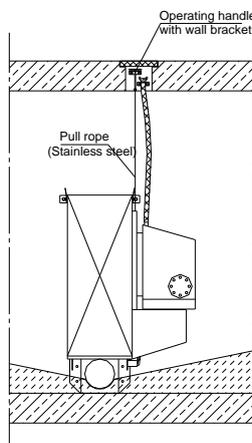
The operating handle of the manual pull system is located so that the personnel can easily access and use it. A road cap located above the controller is recommended for below ground units. In the case of tanks at ground level, the handle of the pulling rope can be located in an easily accessible position near to an access opening and above the maximum top water level. In both situations, it is important to ensure the cable is guided vertically as far as possible. If vertical guiding is not possible, **ESEP** can supply the necessary guide roller.

The manual pulling device does not replace the emergency draining (bypass) device required in accordance with ATV Standard A 166.

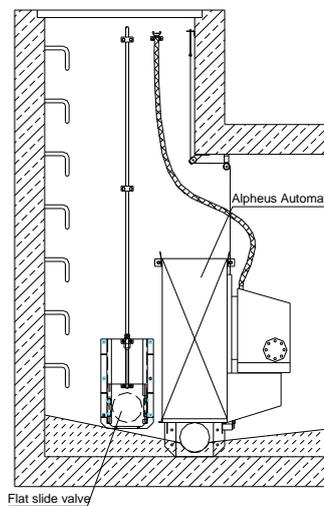
Situation 1:
Buried
retention tank



Situation 2 :
Ground level
retention tank



Situation 3:
Pull rope with idler pulley



Design flow

The nominal sizes of the FLOW LIMITER are selected according to the calculated design flow value detailed below. The guidelines of the ATV Standard A 111 / A 166 are to be followed for the design. A minimum size of DN 200 is required for foul and combined water.

Nominal size DN	Head of water (Standard) 1)	Flow capacity	Minimum impoundage for the automatic regeneration function	Areas of use
100	4 m	2 - 10 l/s	850 mm	Stormwater
150	4 m	7 - 26 l/s	950 mm	Stormwater
200	4 m	10 - 48 l/s	1050 mm	Storm/combined water
250	4 m	20 - 82 l/s	1150 mm	Storm/combined water
300	4 m	35 - 128 l/s	1250 mm	Storm/combined water
350	4 m	60 - 185 l/s	1350 mm	Storm/combined water

1) Please contact us for higher maximum heads.

Change in the flow design value

The flow design value set in the factory can be changed by approx. +/- 20% without replacing any parts simply by readjusting the slide rod.

If the design flow needs to be changed by a larger amount once the ALPHEUS has been installed, this can be accommodated without replacing the whole device. In this case only the gate disc responsible for the regulation requires replacement.

ESEP requires the following information in order to produce the new gate disc:

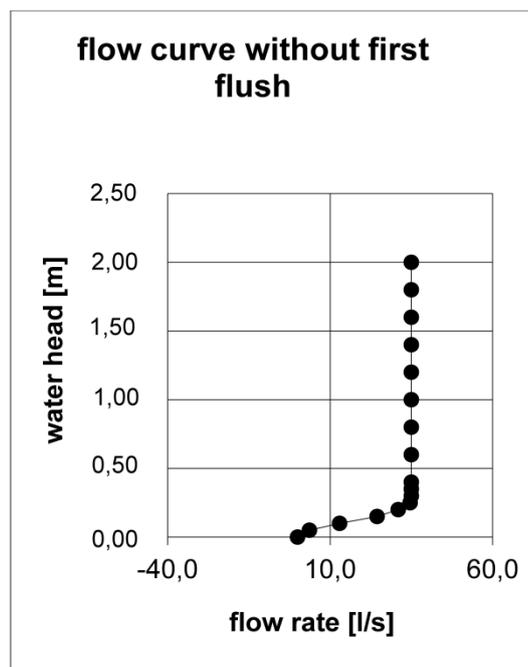
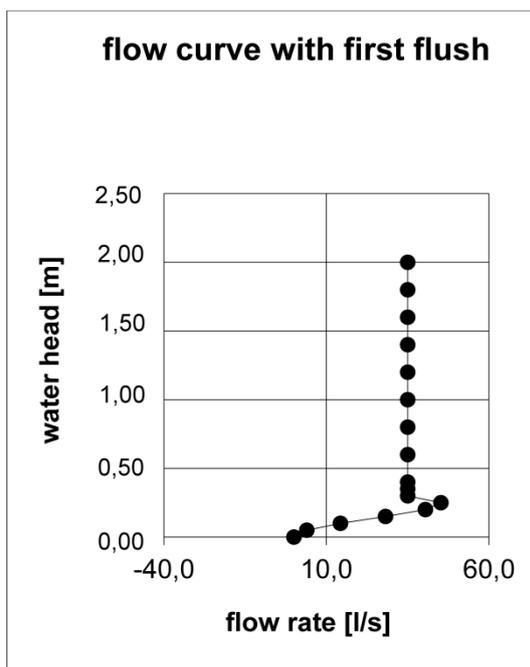
- a) Order or serial number
- b) New design flow
- c) Maximum head of water

Different control concepts

The ALPHEUS FLOW LIMITER is available with two different control concepts:

a) Unit design **with first flush**

b) Unit design **without first flush (with orifice restriction)**



The standard ALPHEUS FLOW LIMITER is supplied with the "First flush" option. In this version regulation does not begin until the head is approx. 5 cm above the crown of the orifice outlet.

Until this point has been reached the water flows uncontrolled through the ALPHEUS, this causes a surge flush (first flush). The duration of this flushing surge depends on the incoming flow rate.

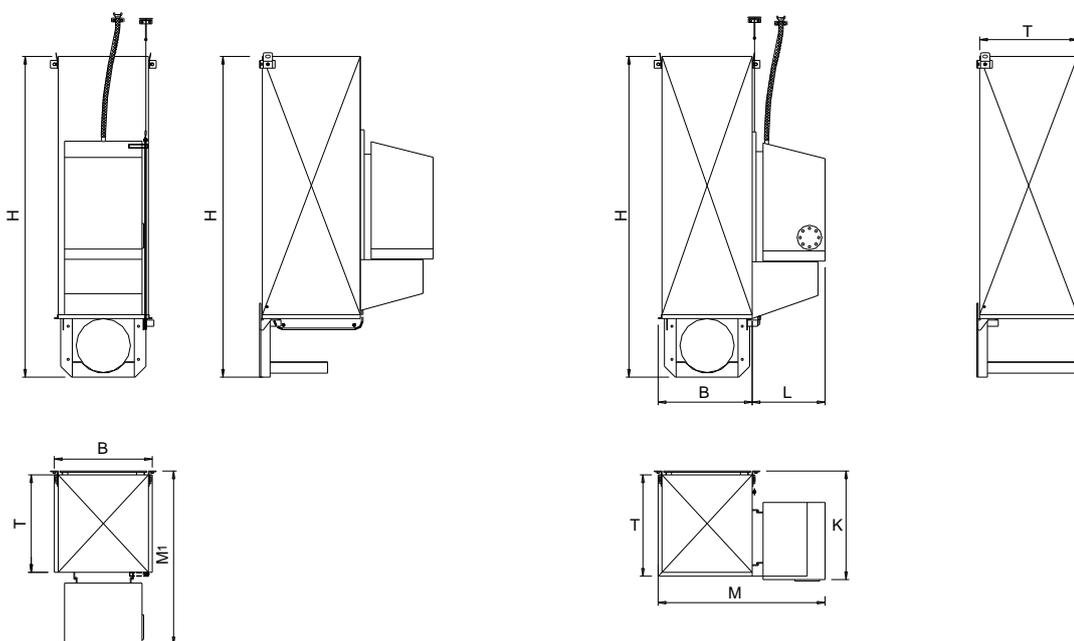
The advantage of the flushing surge is that the solids carried along with the initial storm event can flow through the full opening of the ALPHEUS and the risk of blockage is minimised.

The disadvantage of the flushing surge is, however, that the sewer systems and facilities downstream of the ALPHEUS are exposed to higher hydraulic loads than they are during the actual flow control.

If these downstream areas cannot withstand such hydraulic overloads even for a sort time (e.g. small wastewater treatment works or smaller inlet works), a *pre-restriction* must be made to the ALPHEUS. The **prerestriction** reduces the original outlet orifice cross-section. If a storm event now occurs, the Alpheus unit will regulate immediately.

The prerestriction however, has the disadvantage that the smaller cross-sectional area of outlet orifice flow is more susceptible to blockages.

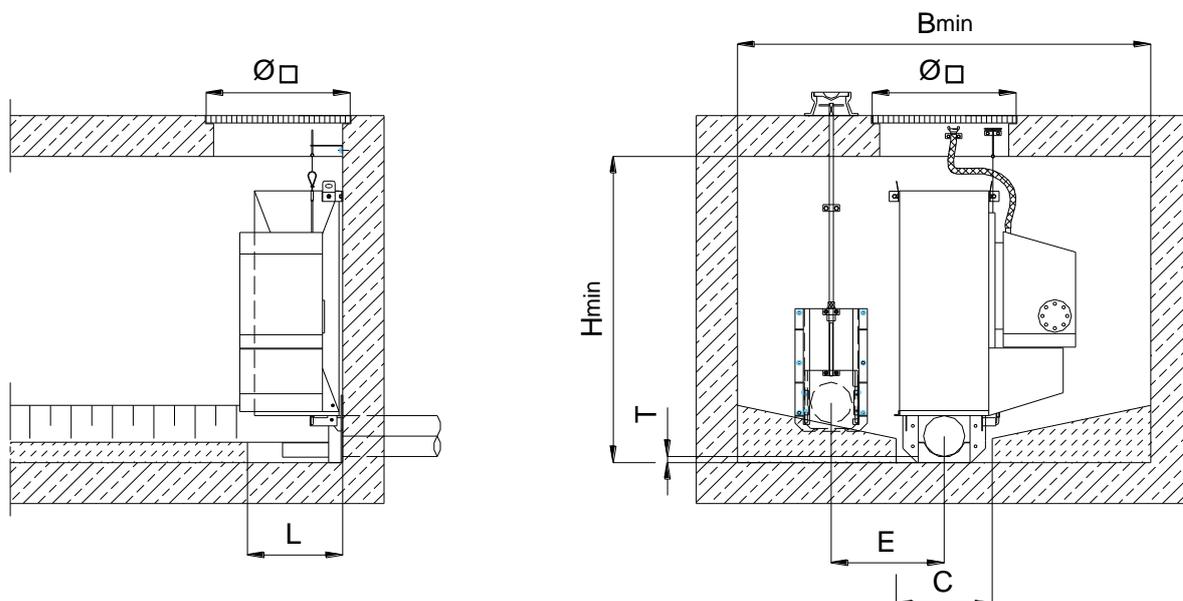
An overview of dimensions and weights



Nominal size DN	H Standard mm 1)	H min. mm	B mm 2)	T Mm	K mm	M mm	M1 mm	L mm	G (Kg)
100	1230	690	482	434	500	877	829	420	99
150	1280	840	482	434	500	877	829	420	99
200	1330	990	482	434	500	877	829	420	102
250	1580	1140	532	508	555	927	903	420	133
300	1830	1290	582	583	620	1027	1028	470	154
350	2080	1440	632	657	736	1077	1102	470	185

- 1) If the structure/chamber has a lower height dimension, it is possible to produce the ALPHEUS with a smaller unit height. The max. head of water should be no more than 2 x unit height.
- 2) Width of the unit is without hood fixing angle.

Minimum manhole dimensions and installed dimensions



Nominal size	H _{min} Structure height	H _{min} Structure height	B _{min} Structure width	E _{min} Axis centre spacing	□ _{min} Installation opening	Ø _{min} Installation opening	C _{min} Opening width	L _{min} Opening length	T _{min} Opening depth below pipe invert
DN	1) mm	2) mm	mm	3) mm	4) mm	4) mm	5) mm	5) mm	mm
100	1450	1210	1500	500	500 x 450	610	500	500	30
150	1550	1290	1500	500	500 x 450	610	500	500	30
200	1700	1410	1500	500	500 x 450	610	500	500	30
250	1750	1490	1550	550	550 x 525	700	550	550	30
300	1850	1590	1700	550	600 x 600	800	600	600	30
350	2000	1690	1750	600	660 x 710	1000	650	650	30

1) The minimum structure height given only applies:

- if there is no manhole access directly above the unit.
- for FLOW LIMITERS with the standard unit height
- for FLOW LIMITERS with reduced unit height

Please contact us if you require any special dimensions.

If it is possible, an installation opening should be provided above the unit.

A special version with a hood that can be removed from the front can be selected if the clear structure height is inadequate, or if a sufficiently sized manhole opening is not available above the ALPHEUS.

2) The minimum structure height stated only applies to FLOW LIMITERS with a reduced unit height

- 3) The axis centre spacing applies in combination with an emergency draining slide valve DN 200
- 4) Installation opening without steps.
If the minimum installation openings are selected, the AUTOMATIC components must be removed before they are located in the structure and then refitted once inside the structure. In this case **ESEP** or its approved installer must carry out the installation.

In many cases, it helps to briefly lift the tapered section of the access manhole during the installation period, so that the full manhole cross-section is available during installation.
- 5) An opening in the profiling concrete only has to be provided if the profiling concrete is to be placed before the FLOW LIMITER is installed.

The dimensions given are only valid if the nominal size of the FLOW LIMITER corresponds to the nominal size of the discharge opening. Please contact us if the discharge openings are larger.

If the profiling concrete is to be placed higher than shown in the drawing examples, the opening on the side where the AUTOMATIC components are located must be wider.

Emergency draining of the Alpheus chamber

In accordance with ATV Standard A 166, a higher emergency bypass pipe with a minimum diameter of DN 200 is to be provided parallel to each Alpheus device, through which the wastewater can be drained by gravity in the event of a blockage.

Although the ALPHEUS Standard TYPE has a manual pull device and the ALPHEUS AUTOMATIC TYPE has an automatic de-blocking system, in extreme cases a large blockage of the regulator can occur, which cannot be resolved by either of the de-blocking systems. In cases such as these, the upstream sewer network including the storage chambers may have to be pumped out, unless a bypass arrangement is installed. For this reason, we always recommend the installation of an emergency draining facility.

ESEP supplies several emergency drainage options for use with our regulating devices:

- a) For the simplest arrangement, we recommend the **ESEP** gate valve, which can be bolted by the side of the ALPHEUS to provide an emergency bypass. Depending on the manhole arrangement, the emergency bypass may require additional pipework downstream to return the flow into the existing sewer.
- b) If it is not possible to use a gate valve for space reasons, e.g. structure too narrow or a bypass pipe cannot be laid (e.g. in case of retrofitting), it is possible to use an integrated emergency draining facility, TYPE SZ or the adapter with an integrated emergency draining facility, TYPE ADAPT-NE. Further details of these two options are detailed in the following chapter, optional components.

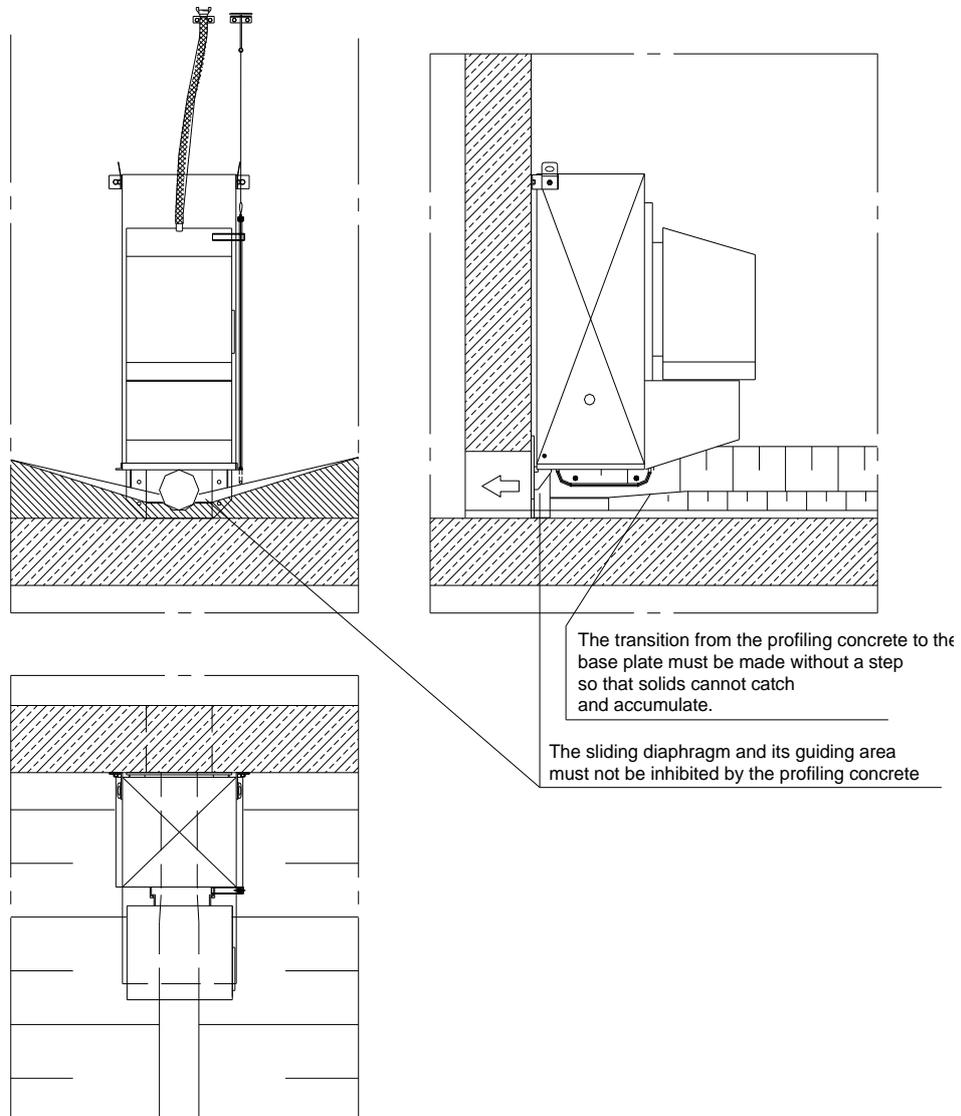
NOTE: The slide valves of flow restrictor devices and bypass pipes in “wet” and “semi-dry” structures are to be equipped with slide rods or spindle extensions in accordance with ATV Standard A 166 for safety reasons, so that they can be operated without entering the structures or tanks.

Discharge opening / wall opening / outgoing pipes

The diameter of the discharge opening must be at least the same size as the diameter of the ALPHEUS FLOW LIMITER. Larger discharge openings are of course possible, but the base plate design of the FLOW LIMITER will need to be made larger to accommodate such an arrangement.

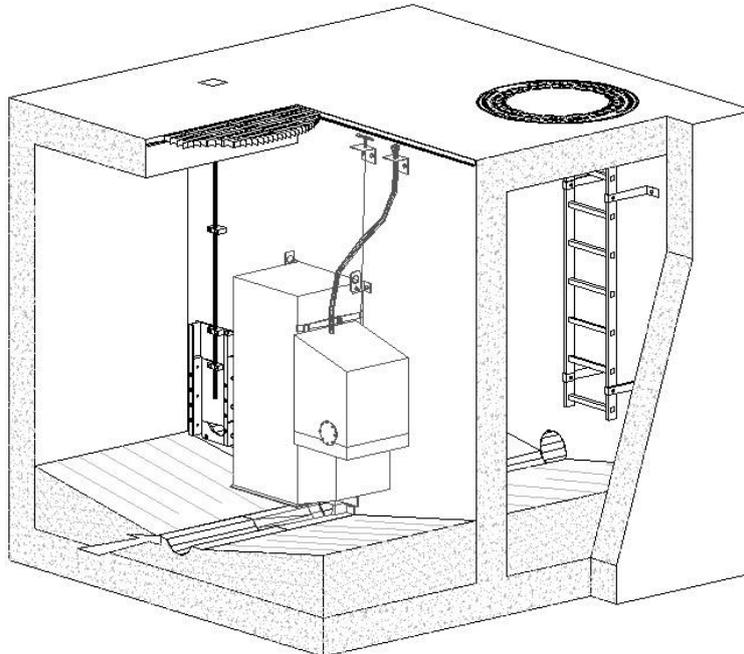
Profiling the inlet to the ALPHEUS

The dry weather channel must be constructed with a half-pipe or one-third pipe, so that a smooth dry weather flume is achieved. The flow velocity across the chamber should be high enough to prevent settlement. Care needs to be taken with the invert levels to ensure that there are no steps. The Alpheus unit has a pre-fabricated base plate and when installed this should exactly match the level of the DWF flume to prevent deposition of solids.

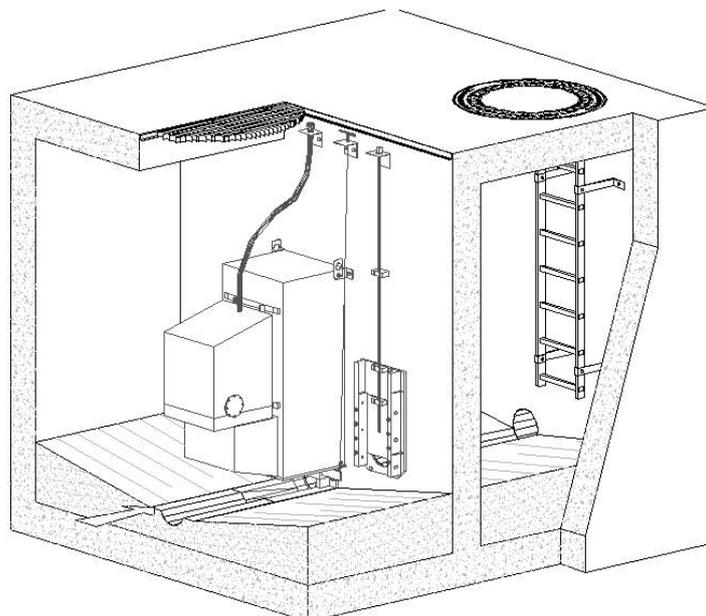


Installation in a rectangular chamber

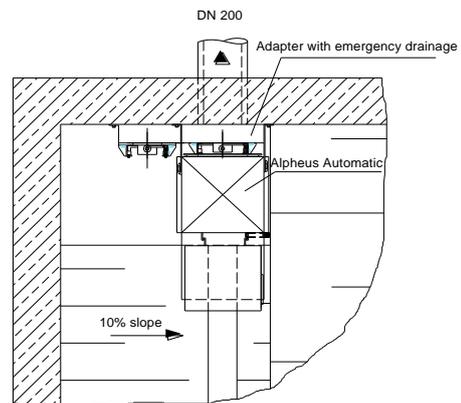
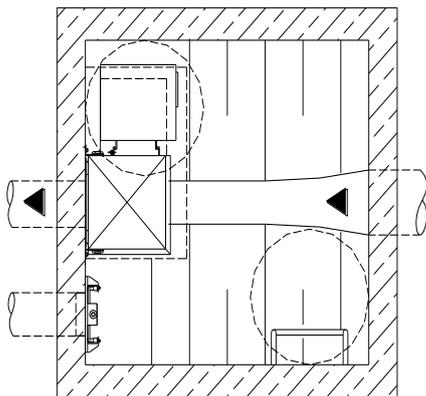
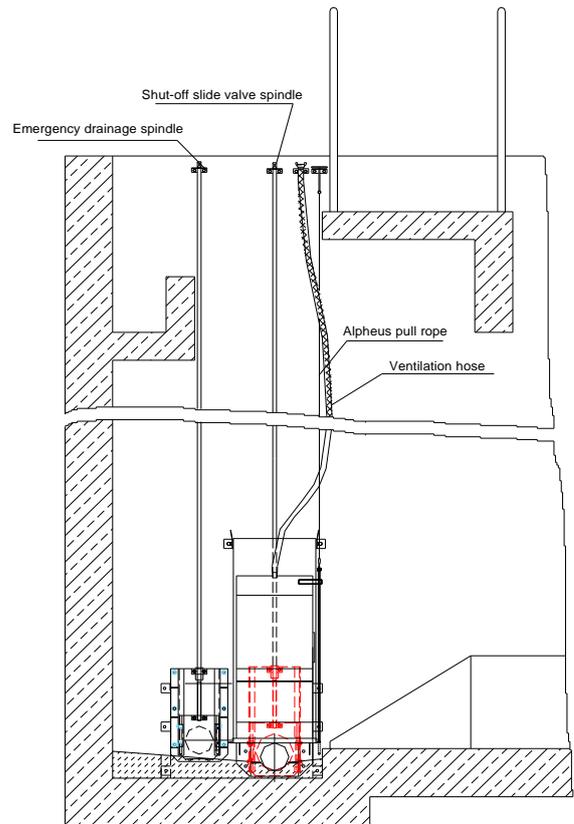
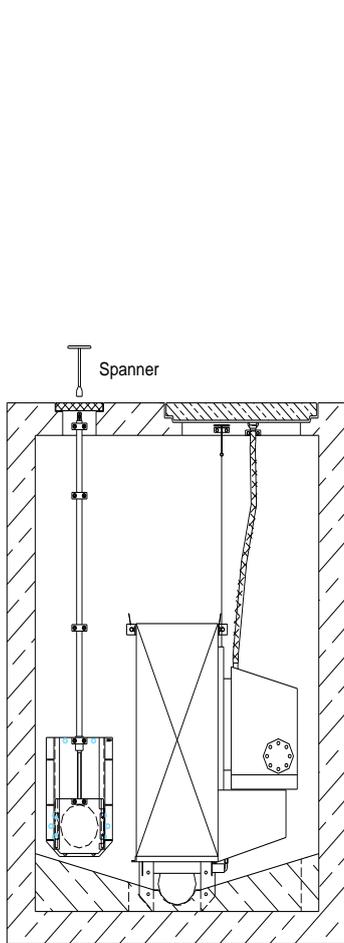
A vertical installation surface is required for installation of the ALPHEUS FLOW LIMITER. The bottom of the unit is fixed to the wall via the base plate with four wall plugs and bolts in front of the outlet orifice and to the wall using the two fixing angle brackets mounted on the housing.



ALPHEUS AUTOMATIC with “right-hand” auxiliary float and separate emergency bypass using a slide valve.



ALPHEUS AUTOMATIC with “front mounted” auxiliary float and separate emergency bypass slide valve.



ALPHEUS AUTOMATIC with separate emergency bypass slide valve.

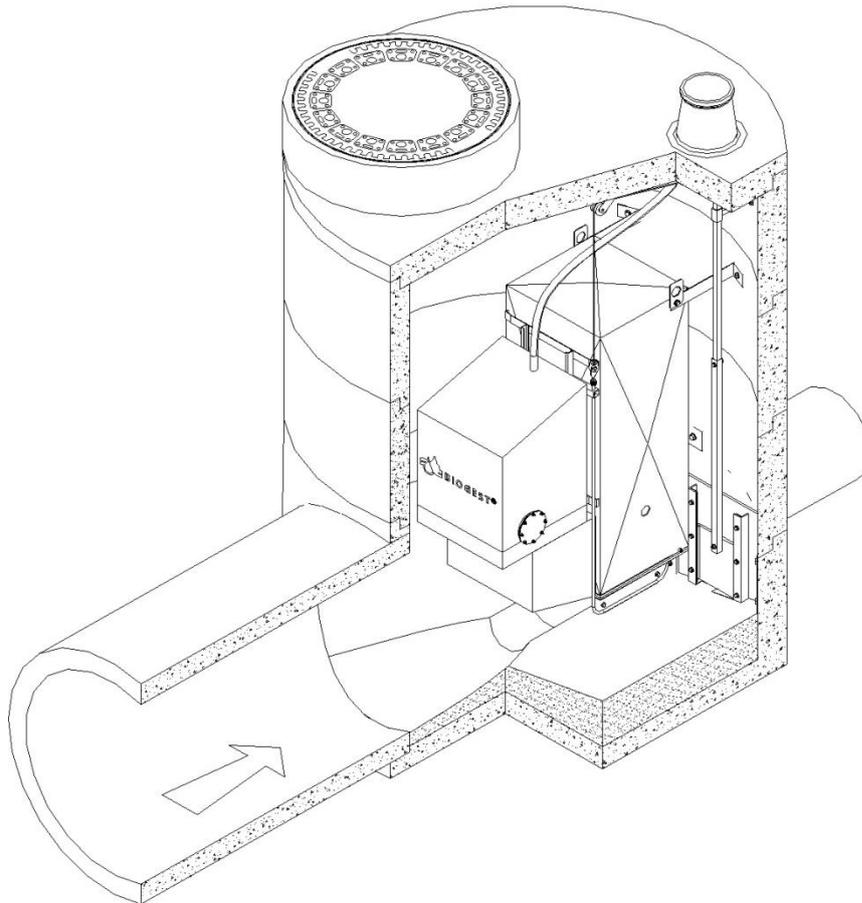
ALPHEUS AUTOMATIC with an integral Adapter incorporating an emergency bypass facility and gate valve.

Installation in circular chambers

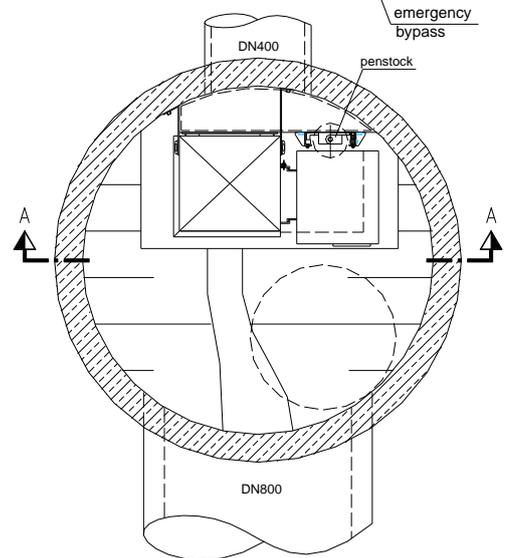
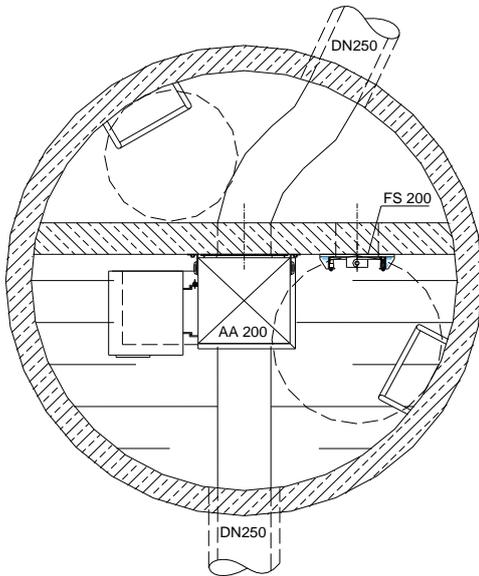
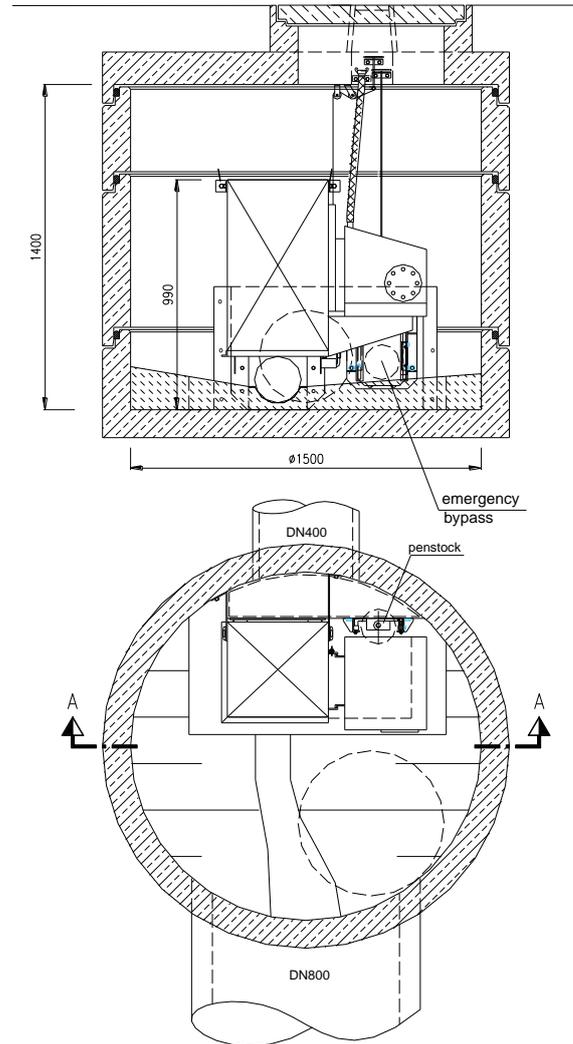
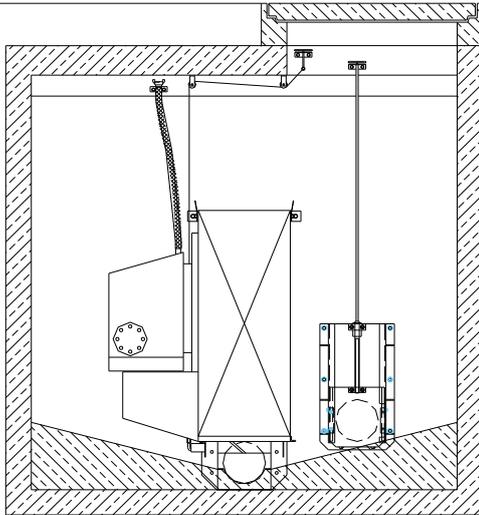
ALPHEUS FLOW LIMITERS can be installed in suitably dimensioned circular chambers. A flat and vertical installation surface (concrete surface) is required for the ALPHEUS unit to be fixed correctly.

If a flat and vertical installation surface is not available, **ESEP** can supply an adapter, which balances out the radius of the shaft (see the following optional components).

The following diagram shows the installation of an ALPHEUS AUTOMATIC DN 200 together with an adapter with integrated emergency bypass facility in a DN 1500 chamber.



ALPHEUS AUTOMATIC DN 200 with front end mounted auxiliary float and adapter with integrated emergency draining facility in a circular DN 1500 chamber.



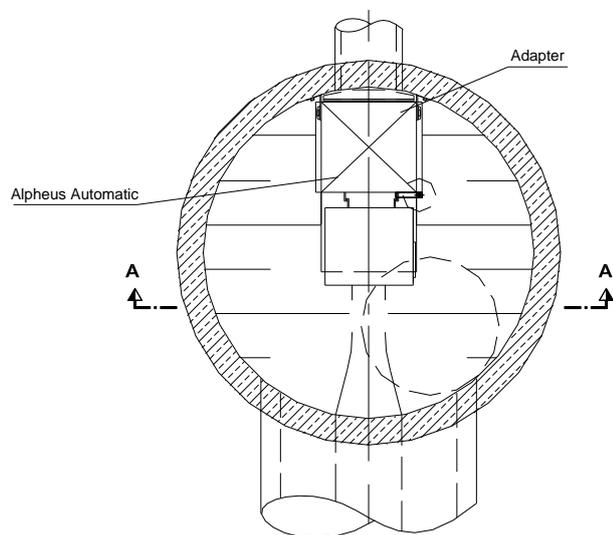
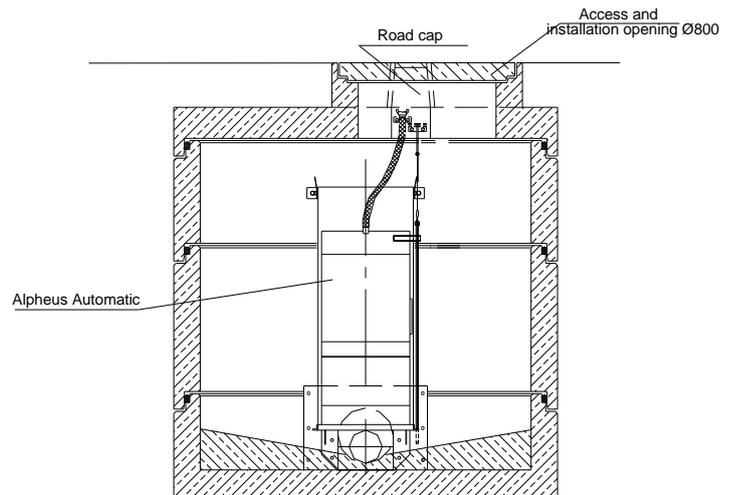
ALPHEUS AUTOMATIC with separate emergency bypass slide valve in a circular chamber split by a weir.

ALPHEUS AUTOMATIC with reduced overall height and with an adapter with integrated bypass facility in a circular chamber.

Optional components

ADAPT TYPE adapter for circular chambers

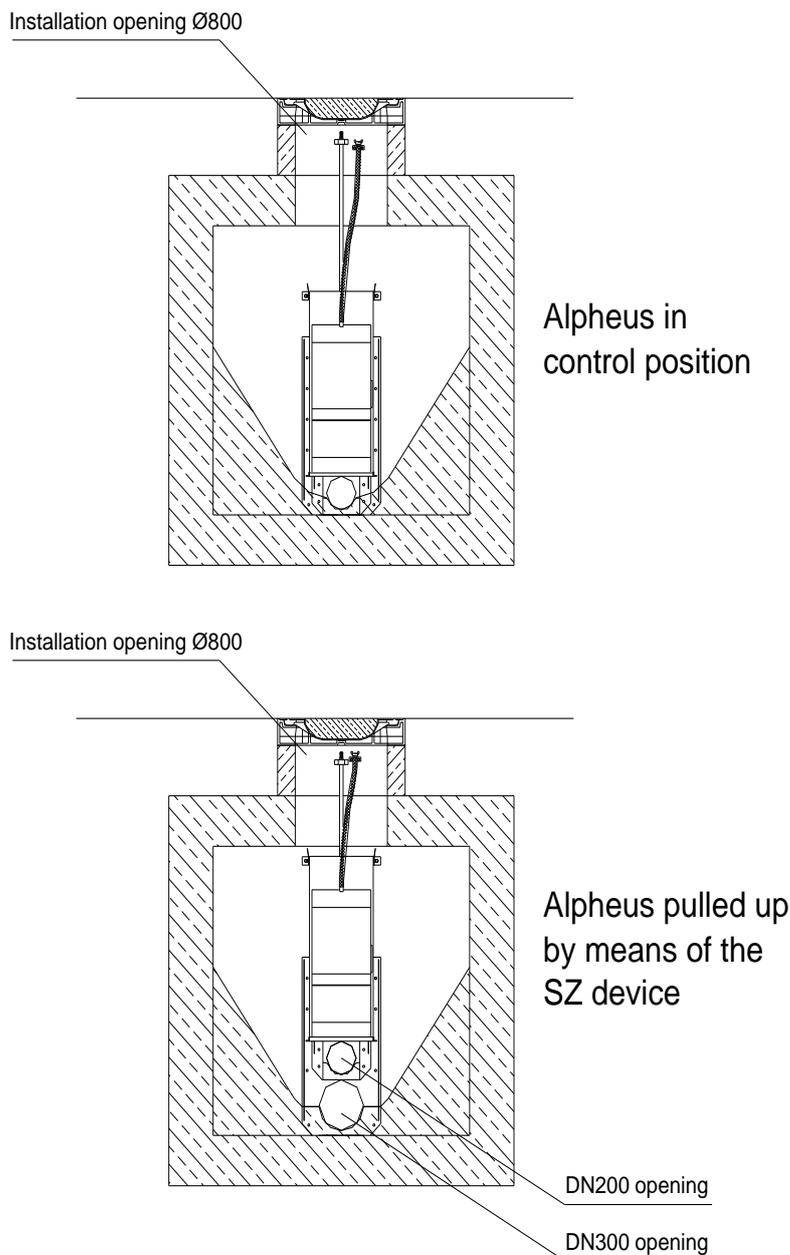
An adapter manufactured from stainless steel enables the ALPHEUS FLOW LIMITER to be directly fixed to a circular chamber saving time-consuming and expensive site work to create a flat and vertical installation surface in front of the outlet.



ALPHEUS AUTOMATIC with adapter

TYPE SZ integrated bypass facility (spindle lifting system)

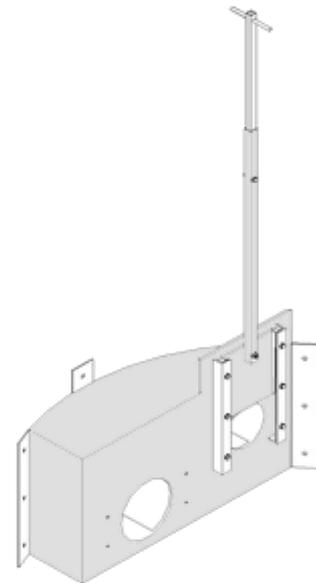
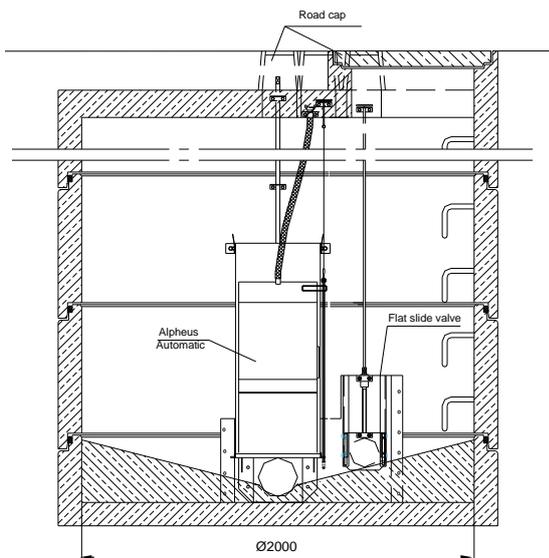
With the "SZ" device, the complete ALPHEUS FLOW LIMITER can be lifted up with the help of the spindle. Any coarse materials causing a blockage in front of the discharge opening are then punched through the larger cross-sectional area of the outlet, so that the chamber can be drained. Any remaining coarse material can then be removed from the tank so that the ALPHEUS FLOW LIMITER can be replaced in its working position. Use of the ALPHEUS TYPE "SZ" is dependent on the geometry of the stormwater tank. Where new storage systems are to be built, the facility can be easily accommodated within the design and realised at a low cost and minimal effort. Where a retro fit is required due consideration must be given to the ease and practicality of installing the lifting device.



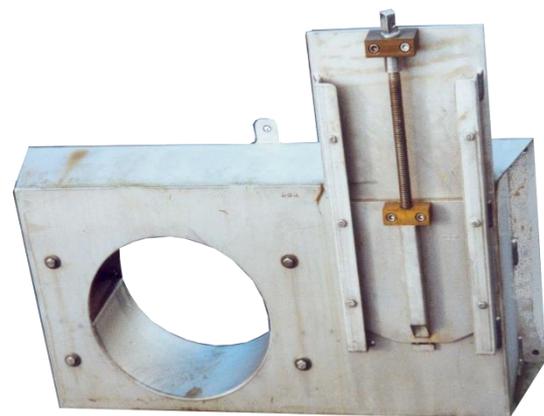
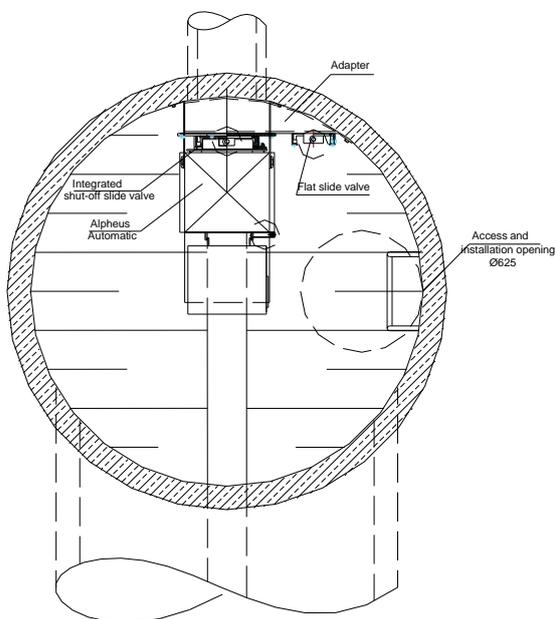
ALPHEUS AUTOMATIC DN 200 with SZ device

Adapter with integrated emergency bypass facility TYPE ADAPT-NE

Many chambers often only have one discharge outlet. To realize the emergency bypass facility required to meet standards such as ATV Standard A166 a separate bypass system must be installed at great expense due to the additional pipework required to return the flow from the bypass back into the continuation flow. The Alpheus integrated adapter provides an emergency bypass facility in an easier and more cost effective method.



Adapter with emergency bypass facility for a circular chamber

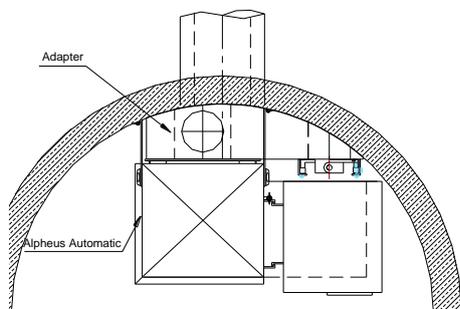
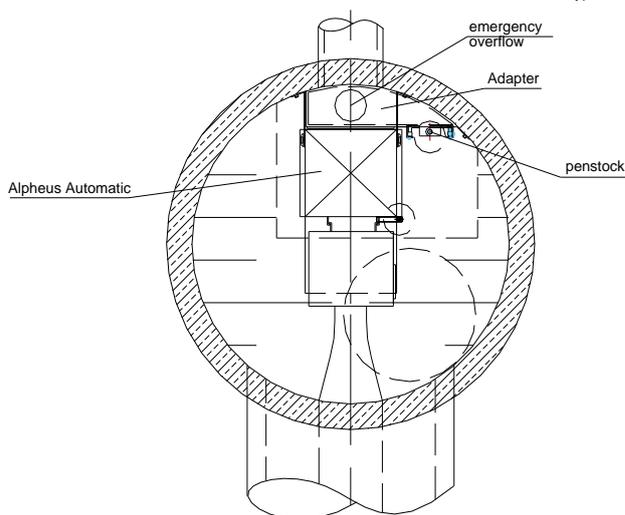
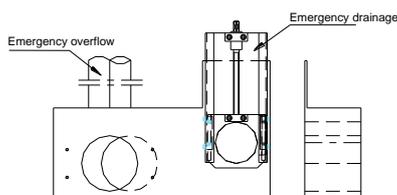
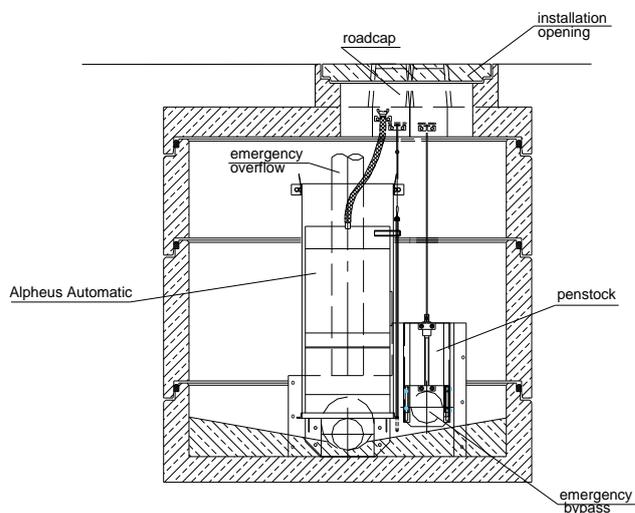
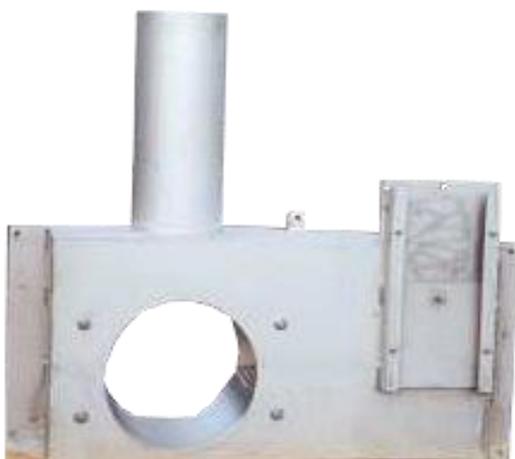


Adapter with emergency bypass facility for a rectangular chamber

Adapter with integrated bypass facility and emergency overflow TYPE ADAPT-NE-NÜ

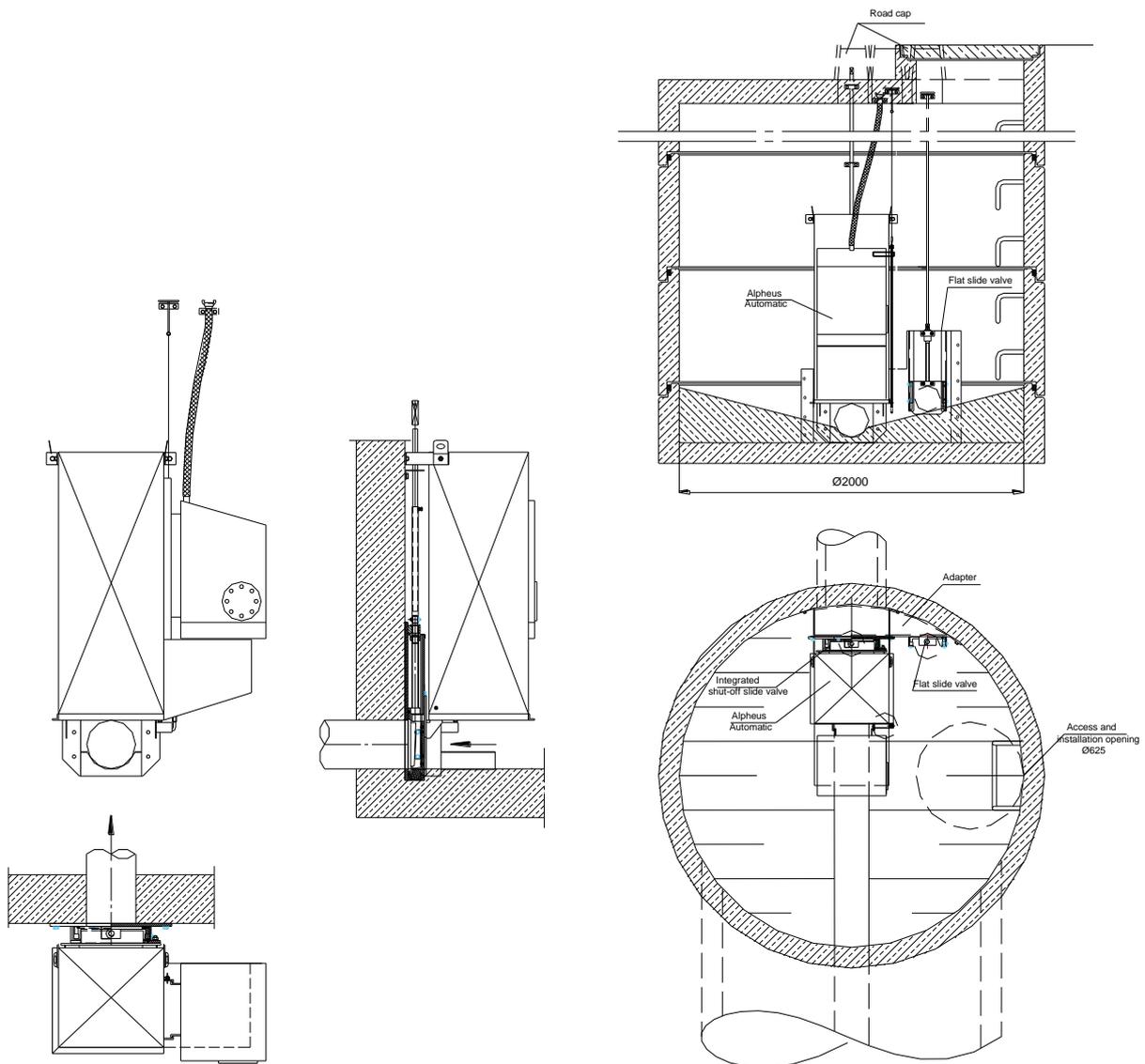
This adapter provides three additional functions, it is a very compact system, and is available for installation in a rectangular or circular chambers.

- Function 1: Squares the radius
Time-consuming construction of a concrete installation surface is eliminated.
- Function 2: Emergency bypass facility
This allows an emergency bypass facility that does not require any additional holes to be cut into the chamber.
- Function 3: Emergency overflow
Removes the need to construct an overflow form the bypass back to the continuation flow sewer.



Integrated gate valve TYPE INT-FS

According to the ATV Standard A 166, all stormwater tanks should have a flow restricting gate valve regardless of the type of flow restrictor used. The gate valve is required for the trial run, for tests according to the EKVO, for maintenance and repair work to the sewer network and for using the retention tank as an emergency storage tank.



ALPHEUS AUTOMATIC with integrated gate valve

ALPHEUS AUTOMATIC in combination with an adapter with integrated emergency bypass facility and an integral gate valve.

Additional equipment for remote monitoring.

ALPHEUS FLOW LIMITERS can be equipped with sensors and measuring devices, which enable the operating status and faults to be recorded and forwarded to a central control system.

Recording the controller position

Limit switch for registering the regulation position for display and registration of the neutral position / regulating position in a control cabinet / data recording system.

Electronic recording of the regulating position

Ultrasonic measuring system with signal output 4-20 mA for connection to a data recording system for display and registration of the float position and the slide valve position incl. supply of the data for preparation of a characteristic flow curve. Designed as a compact ultrasonic measuring device (Ex protected), installed in an additional stainless steel housing beneath the hood of the ALPHEUS FLOW LIMITER.

Electronic recording of blockages

Sensor for detection of a flow restrictor blockage for remote connection to a control system / data recording system. Vacuum switch for use in potentially explosive (Ex) areas. The vacuum switch is installed in an additional stainless steel housing beneath the hood of the ALPHEUS FLOW LIMITER. In addition, the regulator position must also be recorded for evaluation.

Incorporating the ALPHEUS FLOW LIMITER into the design

The surest method to avoid misunderstandings when incorporating the ALPHEUS FLOW LIMITER into your design is to contact **ESEP** directly - we are always pleased to help!

Send us a drawing of your chamber and a few brief explanations of your design requirements – we will then check the installation and comment on the most practical design.

Advantages of the ALPHEUS FLOW LIMITER - AUTOMATIC TYPE

- Automatic de-blocking
- An additional structure is not required for the installation of the ALPHEUS. The compact housing can be located in a small space, without any special design requirements for the chambers discharge arrangements. No step is required in the chamber base.
- Active surface water controlled restricting device in accordance with ATV Standard A111 / A 166
- The ALPHEUS is renowned for its precise regulation capabilities. The TÜV (German Technical Inspectorate) Rheinland determined a practically vertical Q/H line (test certificate dated 22.01.90).
- The control mechanism does not come into direct contact with the wastewater and is therefore protected against ragging and jamming.
- The additional manual pull device enables the downstream sewer to be flushed during a storm event.
- The ALPHEUS operates without any external power. Electrical connection, compressed air, etc. are not required.
- The ALPHEUS, including all fixing materials, are manufactured in stainless steel. The risk of corrosion, generally associated with wastewater, is therefore minimised.
- The costs of the ALPHEUS FLOW LIMITER are particularly favourable compared to its benefits. Despite the high quality, the unit prices are favourable. In addition, the costs for installation are also low.

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