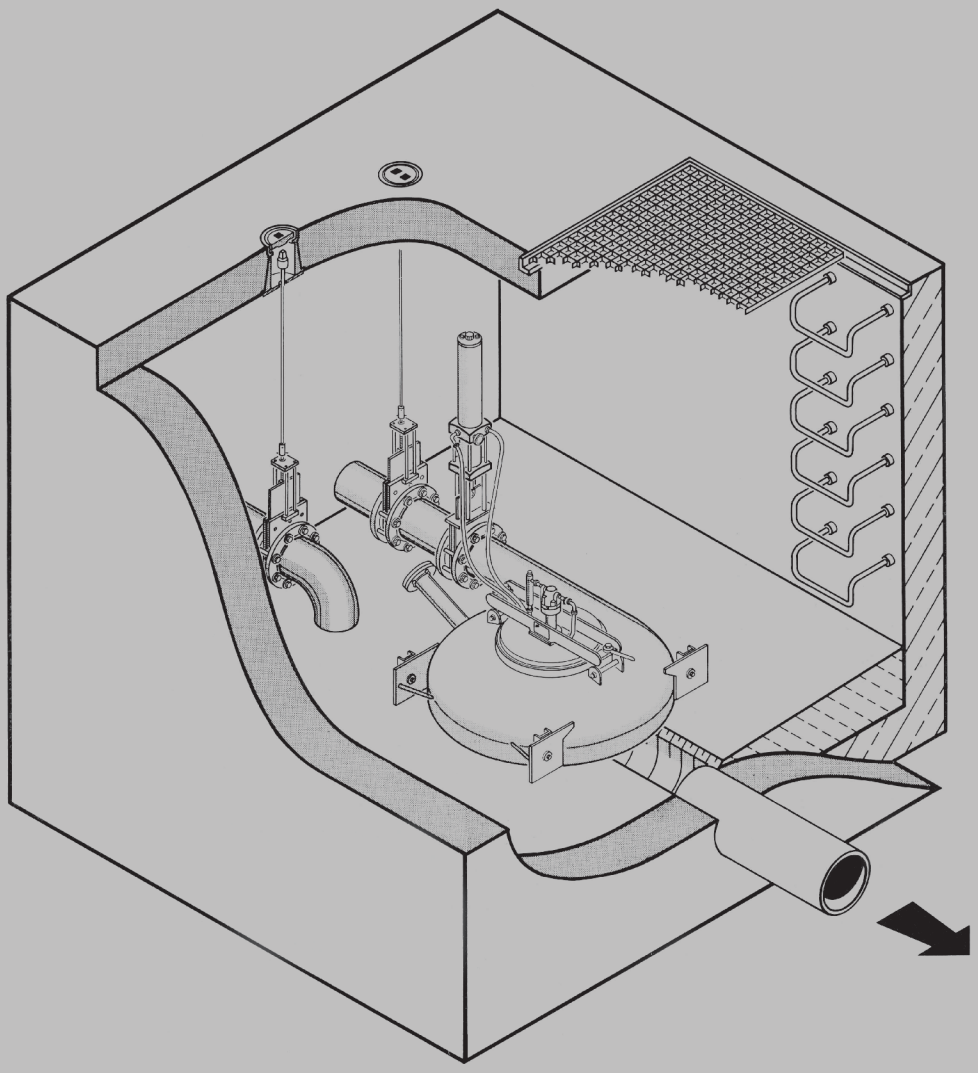

VEOLIA

HYDROVEX® TURBO FLOW REGULATOR

CSO, SSO, Stormwater Management

WATER TECHNOLOGIES

HYDROVEX® TURBO Flow Regulator

Application

The HYDROVEX® Turbo Flow Regulator is a turbine driven vortex flow regulator which provides a constant discharge regardless of the upstream water pressure. Based on the well-known and proven vortex flow regulator technology, the HYDROVEX® Turbo retains all the precision and reliability that made the vortex unit widely popular. Designed to operate in continuous sanitary or combined flow, this unit is particularly well suited for EQ and storm tank outlets with low to average output flow values. The regulator is installed in a dry chamber, downstream from the retention portion of the system.

The HYDROVEX® Turbo Flow Regulator is a feedback flow control system and operates without the need for external energy or electrical power. The hydraulic circuit which controls the upstream knife gate valve is only activated once the flow inside the vortex portion reaches the design flow. Notable advantages of the HYDROVEX® Turbo Flow Regulator include:

- No external energy required to operate
- Superior reliability based on the proven design of the vortex flow regulator
- Able to control extremely small flows with a large open port area
- Built-in self unblocking mechanism
- Flow adjustment possible after installation
- Robust 304 stainless steel construction

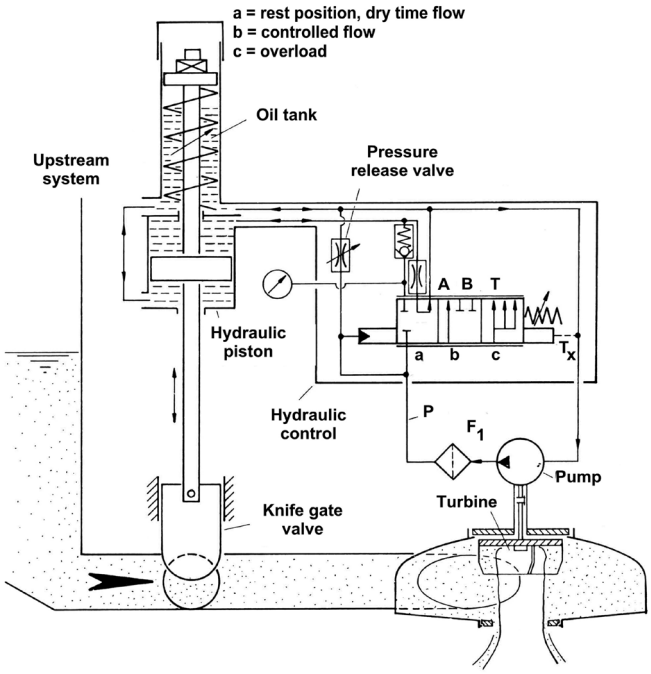

Figure 1: Hydraulic control circuit

Operation

A lightweight turbine is located in the upper portion of the vortex chamber. The turbine shaft, passing through the removable and watertight access cover, connects to a hydraulic pump. The pump uses biodegradable and non-polluting vegetable oil from a small reservoir, located on top of the regulating knife gate valve. A schematic representation of the hydraulic control circuit is shown in Figure 1.

Flow enters the body of the vortex regulator tangentially through the inlet pipe, and exits the unit through the outlet orifice. During dry weather flows, the vortex regulator fills up only partially and offers very little resistance to the flow. The turbine does not spin and the knife gate, located on the inlet pipe, remains completely retracted, leaving a full port opening for the flow and debris to go through. When high flow conditions occur, the turbine spins and activates the hydraulic circuit. The oil pressure activates the spring-loaded piston that drives the free moving knife gate. The gate will close until the turbine reaches a constant rotation speed. If the flow decreases, the turbine slows and the gate opens progressively.

If a radical change of conditions were to occur, for example passing from no flow to maximum flow instantly, the HYDROVEX® Turbo Flow Regulator can stabilize its flow condition in less than a minute. This great dynamic stability is based on the large energy transmission capacity of the hydraulic circuit in case of blockage.

The unit also incorporates important security features. In the event of a hydraulic system failure, the vortex portion of the HYDROVEX® Turbo Flow Regulator will act as an “emergency brake”. Furthermore, if a blockage were to occur during the closing process, a spring return mechanism on the piston will open the valve until the obstruction has passed.

Flow Characteristics

The HYDROVEX® Turbo Flow Regulator operates in dry time conditions without the help of the hydraulic system and knife gate, The flow curve shows a progression from 0 to design flow, then a slight “overshoot”, which is hard to notice in practice. The “S” shaped curve in the lower portion of the graph is caused by the hydraulic behaviour of the vortex regulator.

Once the hydraulic circuit is activated, the outflow becomes constant, irrelevant of the upstream head as the knife gate is throttling the flow. The passage from vortex to knife gate control is very fast.

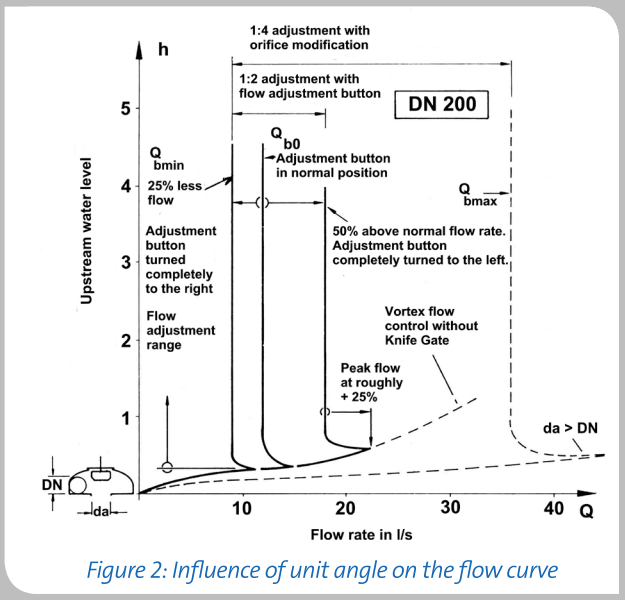

Figure 2: Influence of unit angle on the flow curve

Flow Adjustment

The HYDROVEX® Turbo Flow Regulator is delivered to site with the pre-set and factory calibrated design flow. Adjustment to the design flow can be easily made after installation.

The vortex flow regulator is supplied with a removal outlet orifice. The diameter of the outlet orifice sets the flow capacity of the unit. If the outlet orifice is removed or changed, the flow setting of the unit is automatically changed.

Additionally, the unit is supplied with a pressure release valve which is adjusted using the pressure control button (Figure 3). The more this valve is opened; the more velocity is required from the turbine to close the piston. The pressure release valve is gauged and pre-set prior to delivery, but it can be field adjusted if required.

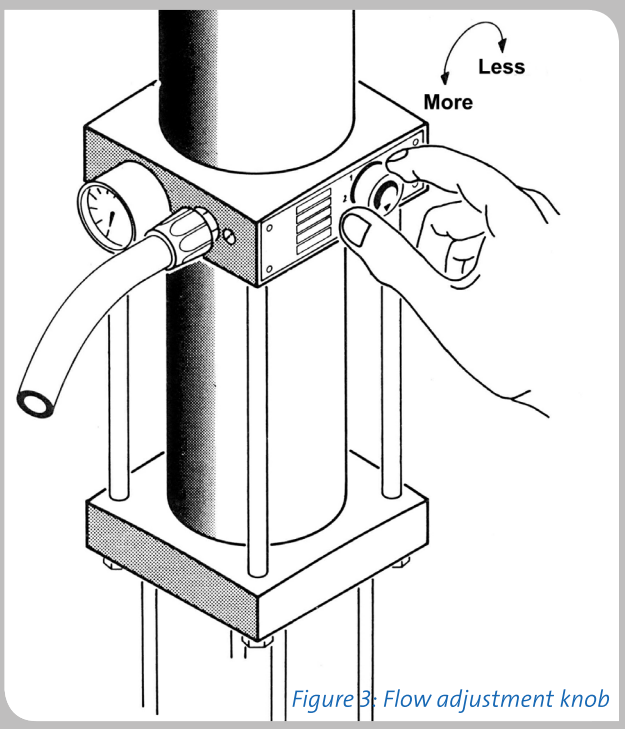

Figure 3: Flow adjustment knob

Selection

Three standard models of HYDROVEX® Turbo Flow Regulator are available and are represented in the table below. The range for each model is given by Qmin and Qmax, with Qo being the nominal discharge rate.

Model	Nominal Inlet Diameter (DN) mm [in]	Qmin L/s [gpm]	Qo L/s [gpm]	Qmax L/s [gpm]
150 TUR 5	150 [6]	4,5 [71]	6,0 [95]	18,0 [285]
200 TUR 5	200 [8]	9,0 [143]	12,0 [190]	36,0 [570]
250 TUR 4	250 [10]	18,0 [285]	24,0 [380]	72,0 [1141]

Table 1: Flow capacity of the HYDROVEX® Turbo Flow Regulator

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